



PANORAMA

SOLUTIONS FOR A HEALTHY PLANET

SOLUTIONS IN FOCUS

Key Themes for Ecosystem-based Adaptation

On behalf of:



Federal Ministry
for the Environment, Nature Conservation
and Nuclear Safety

of the Federal Republic of Germany



INTERNATIONAL
CLIMATE
INITIATIVE

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Zusammenarbeit (GIZ) GmbH

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Acknowledgements

This publication provides a selection of applied EbA measures (solutions) with a focus on key topics relevant for the successful and sustainable implementation of EbA that can be found online at the PANORAMA Solutions Platform. We would like to sincerely thank all 19 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), UNDP (United Nations Development Programme), the World Bank, GRID-Arendal, Rare, ICCROM (International Centre for the Study of the Preservation and Restoration of Cultural Property), ICOMOS (International Council on Monuments and Sites) and IFOAM Organics International, and funded by the International Climate Initiative (IKI) and by the Global Environment Facility (GEF).

This document was produced under the leadership and oversight of Luise-Katharina Richter from the Global Project “Mainstreaming EbA – strengthening Ecosystem-based Adaptation in planning and decision-making processes”, funded by IKI and implemented by GIZ, with support from Juanita Schmidhammer (GIZ Global Project Mainstreaming EbA).

Introduction

Inspired by Nature: Ecosystem-Based Adaptation

Healthy ecosystems are essential for human well-being and development. People worldwide depend on their services, 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 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 protection of peatlands as natural water storages for buffering increasing amounts of sudden rainfall or the restoration 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.

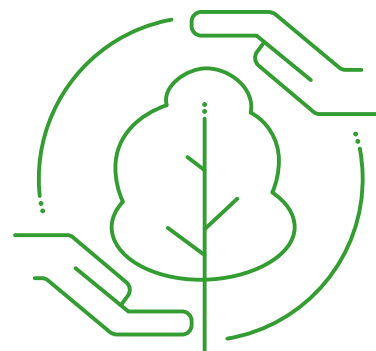
The “Mainstreaming EbA” Project

The Global Project “Mainstreaming EbA” has been established to strengthen the ability of decision-makers at international, national and local levels to mainstream Ecosystem-based Adaptation into policy and planning processes.

The project offers 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, it supports the compilation of EbA good practices by following the ‘solutioning’ approach.

The project is funded by the Division International Climate Initiative (IKI) and is being implemented by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH.



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.

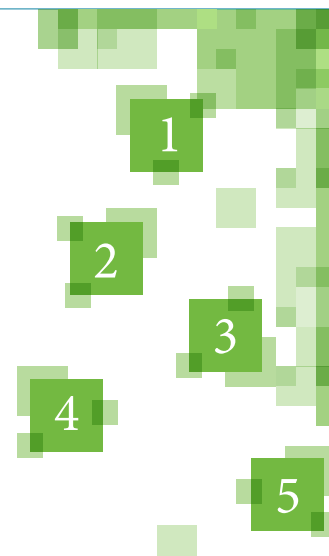
Different communities contribute to **PANORAMA**. On the web platform, these communities are currently represented through Conservation Areas, Blue (Marine and Coastal), Agriculture and Biodiversity, Species Conservation, One Health, Business Engagement, Restoration, Cities, Nature-Culture and Ecosystem-based Adaptation solutions.

Inspiring Others: The 'Solutioning' Approach

This publication intends to inspire policy- and decision-makers as well as practitioners by showcasing a selection of solutions that have been applied in very different settings and focusing on key aspects and themes that are important for the longevity of EbA. It shows that EbA has 'many faces': it is being implemented successfully in a broad range of countries and ecosystems and it is driven forward by all kinds of people and organisations. At the same time, the publication makes clear that in order for EbA to be sustainable, projects need to consider cross-cutting topics such as governance and gender; they need to ensure and come up with long-term financing mechanisms and need to aim for the mainstreaming of EbA into other fields such as agriculture and urban contexts.

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 the 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 (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 other building blocks to address specific challenges in different socio-cultural, ecological, political or economic contexts, sectors, or geographies.



Criteria

EbA measures qualify as PANORAMA 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 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.

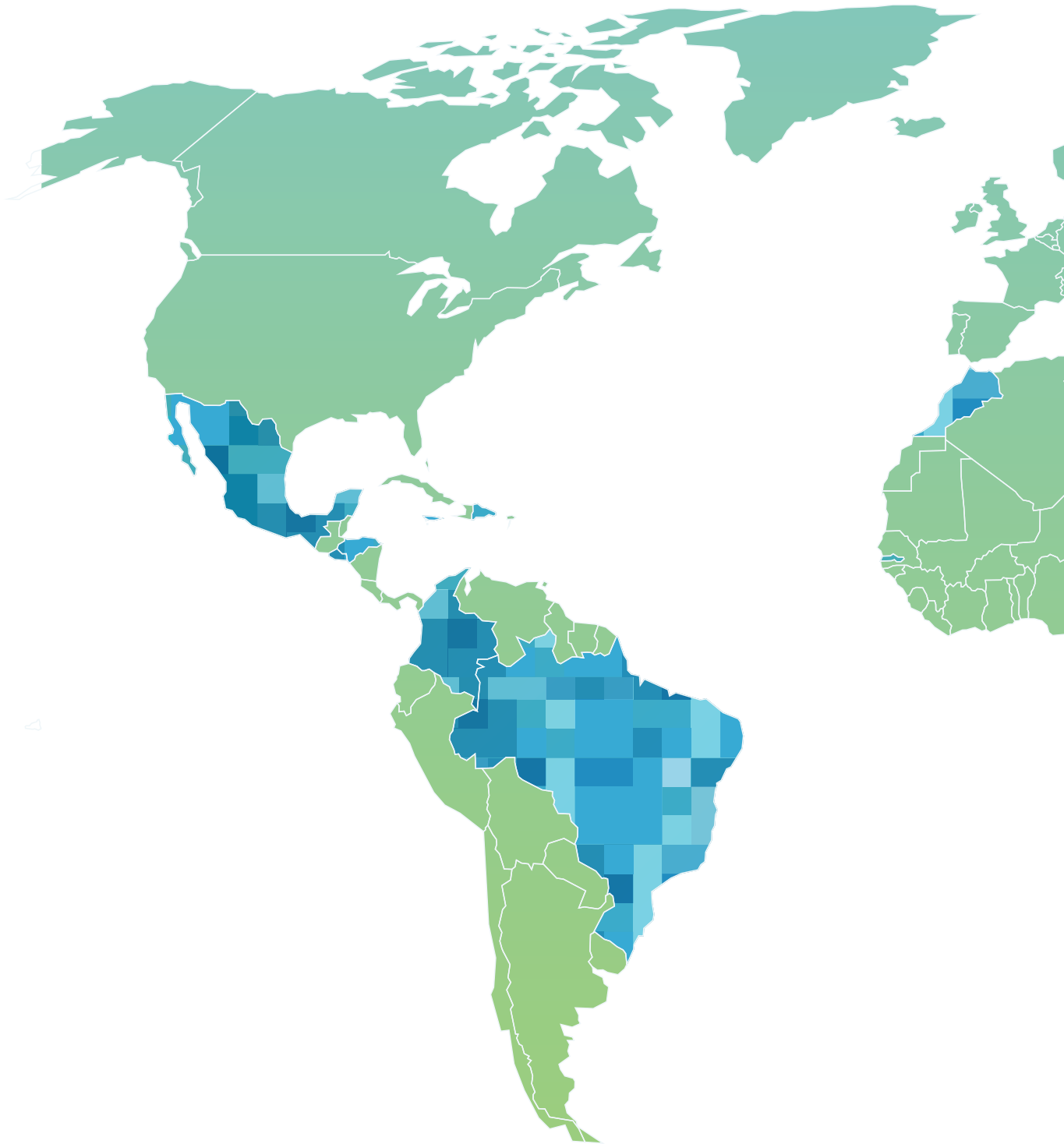
3. Replicable and/or scalable

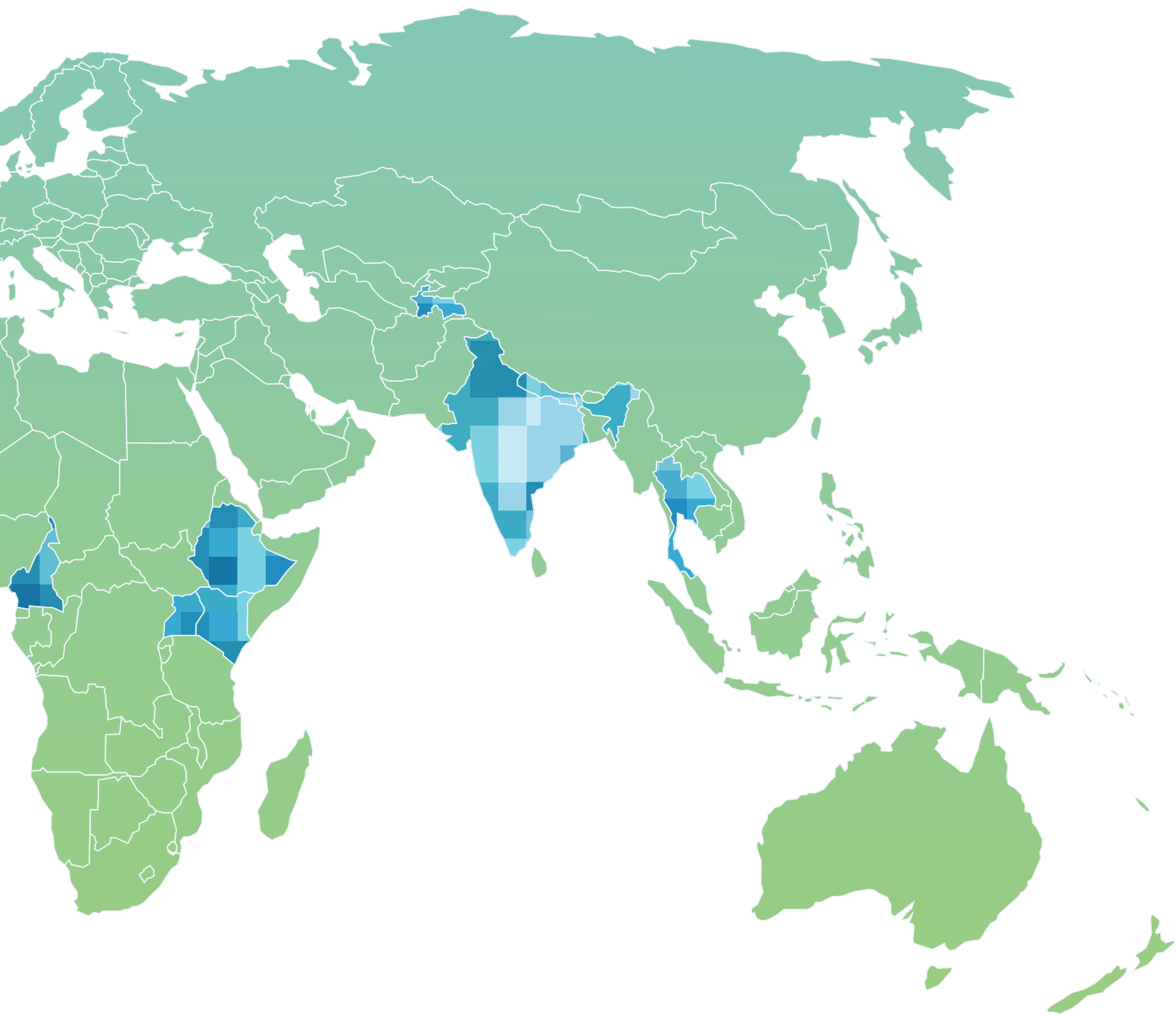
Elements (building blocks) of the solution have the potential for adaptation, replication or upscaling in other geographic, social or sectoral contexts.

All solutions featured in this booklet, and many others, are available on the PANORAMA web platform. We invite everyone to visit and explore the platform, and share their own solutions!



EbA Solutions from Around the World





Glossary of Themes per Solution

Many solutions are relevant to multiple topics.
Some other solutions relevant to the main themes are:

Governance and Policy	
Nepal	26
El Salvador, Jamaica and Mexico	28
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Agroecology and Sustainable Agriculture	
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Solutions also address topics beyond the main themes.
You can find them here:

Capacity building	
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Communication	
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Covid 19

Brazil	16
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Infrastructure

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Mexico: ADAPTUR	36
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Local and indigenous communities

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NDC/NAP

Mexico: ADAPTUR	36
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Water

Thailand	12
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Mexico: Strengthening capacities	32
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5 Grandes Bosques de Mesoamérica

iniciativa regional para
el clima, la biodiversidad, y la gestión



SOLUTIONS



Governance
and Policy

Fostering Ecosystem-based Adaptation in River basin planning for Yom and Sakaekrang river basins in Thailand

Solution published in	English
Solution Provider	Lisa Hunsinger, GIZ
Location	Yom River Basin, Sakae Krang River Basin, Thailand
Challenges addressed	Drought, Erratic rainfall, Floods, Ecosystem loss, Lack of technical capacity, Lack of public and decision maker's awareness
SDGs addressed	   
Other topics addressed	Governance and Policy , Gender, Economy and Finance, Agroecology and Sustainable Agriculture, infrastructure, water , mitigation, local and indigenous communities, NDC/NAP, M&E, planning , capacity building , tools/instruments , research/science , communication, Covid 19
Summary	Thailand's Yom and Sakae Krang River Basin are highly vulnerable to the impacts of climate change. Their water flows strongly vary between floods in the rainy and drought in the dry season with adverse effects to local livelihoods. To enhance water security and address climate risks, the Thai water sector has undertaken a set of activities including the systematic integration of Ecosystem-based Adaptation (EbA) into river basin planning processes, capacity building, multi-stakeholder collaboration, and the development of technical guidance documents for planning and implementing EbA measures.

Impacts

- Awareness raising, capacity building and integration of EbA in planning processes contribute to climate resilience entailing positive economic and social effects for communities and foster awareness for the benefits of sustainable ecosystem management.
- River Basin Committees are equipped with technical know-how to develop climate-sensitive river basin master plans that include EbA as a key adaptation strategy to reduce flood and drought risks.
- Multistakeholder cooperation based on local knowledge and balance of interests in the river planning process is strengthened.
- Trainings and participatory approaches in carrying out climate risk assessments and subsequent identification and prioritisation of suitable EbA measures, contributed to a fostered sense of ownership of local stakeholders for climate-sensitive river basin planning.
- The policy-science interface connecting research, knowledge and practical implementation of EbA in the water sector in Thailand has been enhanced.

Organisations involved This solution is being implemented by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH.

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Zusammenarbeit (GIZ) GmbH



River Basin Committees (RBC) of
Yom and Sakaekrang river basins



READ FULL SOLUTION



Inter-Agency Policy Dialogue „Integrating Climate Change Adaptation (CCA) and Ecosystem-based Adaptation (EbA) into the Thai Water Sector“ on 2 December 2019



Communities along the Sakaekrang River whose livelihoods have been impacted by intensified drought in the dry season and flooding in the rainy season

Building Blocks:

Solution elements for replication

1 Integration of climate change adaptation and EbA into the water policy framework

The key to mainstreaming climate change adaptation (CCA) and EbA into water policies and plans for climate resilience in the Thai water sector was the strengthening of inter-agency cooperation between the lead agencies on water and on climate change by

- policy dialogues and a policy brief series on EbA as an essential pillar for sustainable and climate-sensitive water management.
- Developing a rapid self-assessment tool ('5 Dimension Framework') for water policy makers.
- Developing a national guideline for the development of climate-sensitive River Basin Master Plans (RBMPs) integrating EbA and climate finance options

2 Capacity Development Programme (CDP) on cooperation management for climate-sensitive Integrated Water Resource Management (IWRM) and EbA

A comprehensive Capacity Development Programme (CDP) aiming to strengthen the technical and institutional capacity of the River Basin Committees (RBCs) to develop "climate-sensitive River Basin Master Plans" focuses on capacity building on

- Climate Risk and Vulnerability Assessments and integrating the EbA planning cycle in the RBMP development and
- "Management and Planning Process Facilitation" to strengthen the management and communication skills of key stakeholders

It also supports the development of a trainer / facilitator pool and Training-of-Trainer activities.

3 Engaging stakeholders for enhancing collaboration and creating ownership

To foster multi-level and cross-sectoral collaborations and create ownership in river basin management, an inclusive and multi-stakeholder approach was fostered to effectively address water-related climate risks on the ground. This includes working closely with public agencies across sectors at both national and sub-national levels, experts, and local water users.

In addition, there is ongoing cooperation with universities and international experts that feeds up-to-date research and international best practices into the work on EbA in Thailand.

4 Developing guidance products for policymakers and practitioners

To support policymakers and practitioners in integrating CCA and EbA into planning and implementation processes, the project is developing a series of guidance products which includes:

- a 'River Basin Master Plan Process Toolbox' which is a compilation of relevant concepts and tools to help run and facilitate effective and participatory processes,
- an 'EbA Guidebook' for training Thai professionals in the water and other related sectors on Ecosystem-based Adaptation,
- an 'EbA Code of Practice' (EbA CoP) to support the implementation of EbA solutions on the ground by offering blueprints of different EbA options and providing technical guidance on aspects such as design principles and cost-benefit analyses to practitioners and engineers.

Water Stewardship Initiative (WSI) in semi arid regions of rural agrarian Maharashtra, India

Solution published in	English
Solution Provider	Ankita Yadav, WOTR
Location	Ahmednagar, Dhule and Jalna, Maharashtra, India
Challenges addressed	Drought, Erratic rainfall, Increasing temperatures, Land and forest degradation, Loss of biodiversity, Erosion, Ecosystem loss, Lack of technical capacity, Lack of public and decision maker's awareness
SDGs addressed	     
Other topics addressed	Governance and Policy , Gender, Economy and Finance, Agroecology and sustainable agriculture, infrastructure, water , mitigation, local and indigenous communities , NDC/NAP, M&E, planning, capacity building, tools/instruments, research/science , communication, Covid 19
Summary	Watershed Organisation Trust (WOTR) realised that climate change's threats to water management and agriculture production were not addressed sufficiently by increased groundwater levels as only few people could construct wells to benefit. This led WOTR to initiate the 'Water Stewardship Initiative' (WSI) in 100 rain-fed villages of Maharashtra to sensitise communities about the causes of their fragile 'water health' status, develop pedagogy to nudge them towards more efficient harvesting and use of water, and evolve a set of norms and regulations to manage water sustainably.

Impacts

- Village water health charts, a summary of water availability, its quality, types of uses and resource management set up, etc., played an important role in mobilising and motivating the community to design and implement interventions like water budgeting and water efficiency measures.
- A total of 78 project villages set rules for water use and crop management and had these rules ratified in their records of the local general body.
- This helped to meet the irrigation water demands using efficient micro-irrigation techniques and resulted in saving 3.24 billion litres of water by 2000 farmers between October 2015 and March 2018.
- It also saved 78 out of 100 project villages from suffering from water scarcity in the drought year 2018. Those villages had water available for domestic use due to planning and management of their water budget.

Organisations involved This solution is being implemented by the Watershed Organisation Trust - Centre for Resilience Studies (WOTR).



READ FULL SOLUTION



Shramadan (Volunteer Work) by villagers of Dehed, Bhokardan



Members of Village Water Management Team preparing Village Water Health Chart in Hivre Korda village, Ahmednagar District, Maharashtra

Building Blocks:

Solution elements for replication

1 Village Water Health Chart

Gathering required information is key for understanding the local situation of quality and quantity of water resources, climate aspects and water needs and subsequently planning judicious and sustainable use of water. Therefore, the Water Health Chart was prepared participatorily to analyse local patterns of water resource management including social aspects.

The Water Health Chart makes a village community aware of the real situation of their water resources and water availability for their living and livelihoods and triggers a 'call to action' to achieve prudent water management. The process also focuses on the behavioural change of users towards the adoption of appropriate water use practices.

2 The Village Water Budget (WB)

The two-step water budget focuses on central issues of environmentally sustainable and efficient management of available water.

The WB prepared in March / April calculates the water requirement for the whole year. This exercise presents the water deficit which encourages the village to undertake repairs and maintenance of the water harvesting (WSD) structures earlier constructed, to meet the demand estimated in the water budget.

The WB prepared in October (post monsoons) helps in planning and to decide whether cultivating summer crops would be viable and the area for their cultivation.

3 Water Harvesting

Harvesting water through Watershed Development (WSD) is an important and widely accepted technique to increase the supply and make a village water secure. WSD is based on the principle of catching rainwater on the ground surface; by constructing locally appropriate area treatments (Close Contour Trenches, Farm bunding, Tree plantation, Terracing, etc.) and drainage line structures (Gully plugs, Loose boulder structures, check dams, etc.), thus increasing the water stock on the surface and in aquifers.

However, repairs and maintenance are important to continue receiving the benefits. Thus, once the water budget of the village is calculated, the repair and maintenance requirement of water harvesting structures are documented. If a village has a water deficit, repairs and maintenance works are taken for structures to function to their full potential or new soil and water conservation structures are erected. All these works are done through Shramdaan (local contribution generally in kind) and convergence with the government and other donor projects if available.

4 Stakeholder Engagement (ShE) Workshops

Management of surface and groundwater resources equitably and sustainably requires joint action. Two types of ShE events used are:

1. Engaging the primary and secondary stakeholders at cluster level, direct water users and the neighbouring (upstream and downstream) communities to understand the scientific knowledge and actively engage them in exercises.
2. Engaging representatives of the primary, secondary and tertiary stakeholders at block or district levels, mainly the government officials, experts in water, agriculture and allied sectors, practitioners, academics and research institutes to discuss the larger perspectives of policy, advocacy and legal dynamics of water resources.

Community and gender-oriented Ecosystem-based Adaptation: The Monte Serrat case, Brazil

Solution published in	English
Solution Provider	Paula Moreira, GIZ
Location	Monte Serrat, Santos, São Paulo, Brazil
Challenges addressed	Avalanche/landslide, Floods, Land and forest degradation, Erosion, Ecosystem loss, Infrastructure development, Lack of alternative income opportunities, Lack of infrastructure, Poor governance and participation, Unemployment / poverty
SDGs addressed	    
Other topics addressed	Governance and Policy, Gender, Economy and Finance, Agroecology and sustainable agriculture, infrastructure, water, mitigation, local and indigenous communities, NDC/NAP, M&E, planning, capacity building, tools/instruments, communication, Covid 19
Summary	Formerly occupied hill areas classified as high risk due to frequent landslides required a new use to avoid renewed illegal occupation. A participatory process discussed the design of Ecosystem-based Adaptation (EbA) measures for the site, using restoration of native forests with a focus on climate change adaptation and, at the same time, the well-being and resilience of local communities. The use of inclusive and non-sexist language and group dynamics raised awareness about gender equity and recognition of privileges and differences in the perception of climate risk between men and women.

Impacts

- The solution enabled joint work between various sectors of the city hall as well as civil society institutions, promoting dialogue for a common good and building trust between City Hall secretariats, departments and civil society.
- Training for technicians and the community on the EbA methodology integrate the relationship between human, ecosystem services and climate resilience.
- Reflection on gender equity and the unequal impacts of climate change as well as on the importance of biodiversity and ecosystem services took place.
- The workshops, developed with the support and labour of women from Monte Serrat, provided income for the community.
- There was new meaning given to the natural environment as a possible source of income and food security, opening possibilities and opportunities for the community.

Organisations involved This solution is being implemented by Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH.



Secretaria de Meio Ambiente
de Santos (SEMAM)



READ FULL SOLUTION



Presentation on EbA concept by ProAdapta consultant



Dynamics of opening a workshop on EbA methodology with technicians of the Municipality of Santos, SP, Brazil

Building Blocks:

Solution elements for replication

1 Participatory approach – community-based solutions

The relocated families were invited to participate in the workshops to value their history and the ties built in the region and to take advantage of the benefits of the EbA measure.

The strategy of the participatory approach, joint between public authorities, civil society and the assistance of ProAdapta, (i) built community knowledge about climate change and its link to local climate vulnerability and (ii) strengthened relationships of trust among the diversity of stakeholders involved. The high-risk areas that had been vacated needed to be urgently and consensually designated before any attempt at reoccupation, therefore the urgency of the EbA workshops.

2 Gendered community-based EbA solutions

The gender approach of Monte Serrat recognises women as victims but also part of the solution. Climate change affects groups that are socially, environmentally, and economically vulnerable differently, be it women, indigenous peoples or communities. Thus, it is essential to think of solutions that respect the right to non-discrimination of these groups. Guided by international recommendations, gender mainstreaming favours the participation and equitable engagement of all people living in Monte Serrat. In addition, the idea was to promote representativeness in the technical staff responsible for implementing the EbA measures.

Gender equity was reinforced in all stages and resulted in greater participation of women, including pregnant, nursing women and women with babies, without the embarrassment of bringing children to the workshop space. They were welcomed and given special attention through the support of the municipality's Secretariat of Social Assistance.

This made it possible for women to feel comfortable to contribute to the construction of EbA solutions that benefit them directly, by giving suggestions for a recreation area for their children with fruit trees that could be used in cooking.

3 Implementation approach: virtual actions after planning and engagement – due to Covid

In the period at the end of 2019 and beginning of 2020, together with the Community Association, dialogues began to plan the implementation of the EbA proposal. However, in February and March 2020 there were torrential rains (extreme events) that caused landslides on Monte Serrat, causing death in some of them and destruction of homes, making it impossible to continue the work.

In the brief period between the end of the rains and the beginning of the pandemic, the city's technicians started to recover the slopes of some hills by planting native species according to the EbA methodology learned.

After adapting to the new pandemic scenario, during 2020 and 2021 virtual meetings were held in order to monitor the situation of the community, to resume activities and plan the Communication project

4 Connection with public policies: Santos Climate Action Plan (PACS), Conservation and Restore of Atlantic Forest Plan (PMMA) and Sao Paulo State Climate Action and Race to Resilience

The EbA measure was discussed and included as a practical implementation measure during the development of the following public policies in the region: (a) PACS - Santos Climate Action Plan (b) Municipal Plan for Recovery and Conservation of the Atlantic Forest (PMMA) (c) Subnational adaptation governance study and (d) São Paulo State Adaptation Plan under the Race to Resilience.

Since the beginning, the PMMA applied the EbA cycle and gender equity and climate change lens. The EbA methodology was characterised as a common goal of the multiple sectors that encouraged diverse political will and allowed the integration in environmental, urban and risk reduction policies in the municipality of Santos. Institutionalisation of public policies enables EbA enhancement, replication and involvement of the private sector.

Governance for adaptation in the shared basin of the Goascorán River

Solution published in	English and Spanish
Solution Provider	Marta Pérez de Madrid, IUCN
Location	Goascorán, Valle, Honduras La Unión Department, El Salvador
Challenges addressed	Habitat fragmentation and degradation, Drought, Erratic rainfall, Increasing temperatures, Land and forest degradation, Erosion, Pollution (incl. eutrophication and litter), Lack of technical capacity, Lack of public and decision maker's awareness, Poor governance and participation
SDGs addressed	   
Other topics addressed	Governance and Policy , Gender, Economy and Finance, Agroecology and sustainable agriculture , infrastructure, water , mitigation, local and indigenous communities , NDC/NAP, M&E, planning , capacity building , tools/instruments , research/science , communication, Covid 19

Summary

A lack of a border development agreement and great diversity of actors are part of the governance challenges of the Goascorán River basin, shared between Honduras and El Salvador. To adapt to climate change, a multidimensional, participatory, flexible and ecosystemic governance model is needed. Transboundary coordination was facilitated by establishing Environmental Technical Tables and promoting rapprochement to the Goascorán River Basin Council. At the local level, Lituy River and Honduritas River Micro-basin Councils were formed, creating capacities through a “learning by doing” approach.

Impacts

- The Lituy River and Honduritas River Micro-basin Committees were created and strengthened.
- The Action Plan of the Lituy River Micro-basin Committee was adopted.
- Ecosystem-based Adaptation measures (EbA) including restoration of water sources, soil conservation, and agroforestry systems were implemented.
- Greater advocacy and management capacities of municipalities, as well as knowledge concerning the advantages of EbA exist.
- Agreements between municipality commonwealths on both sides of the border target improved ecosystem management.
- Greater water security for >5,000 families through the restoration of water springs.
- Incorporation of the EbA approach into 7 Municipal Development Plans and the management capacities of 6 Municipal Environmental Units; the National Adaptation Plan of Honduras; and in agreements between municipality commonwealths.

Organisations involved

This solution is being implemented by the International Union for Conservation of Nature (IUCN).



Comité de
Microcuenca
del Río Lituy

Comité de
Microcuenca del
Río Honduritas

Municipalidad
de Aguanque-
terique



Mesa Técnica
Ambiental del
Norte de La Unión

Mesa Técnica
Ambiental del
Sur de La Unión



On behalf of:
Federal Ministry
for the Environment, Nature Conservation
and Nuclear Safety

of the Federal Republic of Germany



READ FULL SOLUTION



Pine plantations in water recharge areas



Board of Directors – Rio Honduritas Microbasin Committee (El Salvador)

Building Blocks:

Solution elements for replication

1 Achieving multidimensional governance for adaptation

The work in Goascorán targeted several levels of decision-making to reinforce the basin's governance through the vertical and horizontal articulation of socio-political platforms. This included, at the community level, EbA measures implemented to improve food and water security. With municipalities, adaptation to climate change was incorporated into Environmental and Municipal Development Plans. At the micro-basin level, two Micro-basin Committees (one on each side of the border) were created as multi-stakeholder governance platforms, receiving training, preparing internal regulations and plans, and enabling wide-ranging advocacy with linkages and integration of EbA into management on various levels.

2 Achieving participatory governance for adaptation

The participation of all basin stakeholders has been at the core of the conformation and training of new governance structures. The integration of grassroots organisations, Community Development Associations and educational centers has been important. Locally, the leadership shown by teachers, women and community authorities contributed significantly to social mobilisation and the adoption and scaling-up of EbA measures, making these actors an essential part of the "learning by doing" processes of communities. The result is self-motivated communities that participate and take on responsibilities.

3 Achieving flexible governance for adaptation

In Goascorán, the lack of regulatory and policy frameworks for the management of shared basins limits the capacity to jointly respond to climate change. This limitation was remedied by integrating adaptation into various management instruments at the micro-watershed, municipal and national levels, and in transboundary agendas between local actors. The effectiveness of frameworks should be evaluated in interim periods, to allow for revisions and adjustments as knowledge about climate change increases; the same is true for EbA measures. The information that underpins these iterative processes must integrate Western science with local knowledge. In this way, it is possible to be flexible and identify new adaptation options and criteria for its evaluation.

4 Achieving ecosystemic governance for adaptation

Governance for adaptation requires an ecosystemic vision, whereby actions implemented in the field for building up the resilience of natural resources focus more on protecting watershed ecosystem services (forest-water-soil) and less on responding only to problems found at the level of individual farms. For this reason, the prioritisation of restoration areas is key. The three types of EbA measures implemented in the Goascorán River basin were: 1) restoration of water sources, 2) soil conservation, and 3) agroforestry systems. This combination recognises the interdependence of the forest-water-soil components and allows communities to witness positive changes over intermediate periods, which in turn increases their confidence in the "natural solutions" being introduced for water and food security. Territorial management with a basin or micro-basin vision also contributes to the ecosystem approach that is required for sustainable development, that is, one that is adaptive to climate change.

A dynamic tool for integrated land use and water management

Solution published in	English
Solution Provider	CONANP Mexico
Location	River Basin in the Gulf of Mexico; Gulf of California, Mexico
Challenges addressed	Drought, Earthquake, Erratic rainfall, Floods, Land and forest degradation, Shift of seasons, Tsunami/tidal wave, Conflicting uses / cumulative impacts, Ecosystem loss, Infrastructure development, Lack of alternative income opportunities, Changes in socio-cultural context, Lack of public and decision maker's awareness, Poor monitoring and enforcement, Poor governance and participation
SDGs addressed	   
Other topics addressed	Governance and Policy , Gender, Economy and Finance , Agroecology and sustainable agriculture , infrastructure, water , mitigation, local and indigenous communities , NDC / NAP, M&E, planning , capacity building , tools/instruments , communication, Covid 19
Summary	An integrated, dynamic and operative land use and water management planning tool has been created through an inter-institutional alliance for the design, development and implementation of "Integrated River Basin Management Action Plans" (PAMIC, using the Spanish acronym). Its vision is innovative, using water as a conductive element energising the different management units in the basin. The modelling of hydrological services permits the identification of demand and supply zones, connecting them through the collaboration of the river basin stakeholders. In addition, a permanent funding scheme has been created and implemented.

Impacts

- The inter-institutional coordination between the key environment sector government entities and national and international NGOs, as well as community groups, has strengthened the pathways of inter-institutional cooperation. It has created an important precedent for the sustainable management of resources.
- With PAMIC, the river-basin scale land use and water management planning benefits from a vision of the connectivity between key zones of water supply and sediment retention, and key zones of demand for these services.
- The conservation of ecosystems alongside the promotion of sustainable production has been key to sustainable community adaptation within the river basin.
- Permanent funding has been assured for a large number of Protected Natural Areas (ANP, using the Spanish acronym).
- A coalition of local NGOs has been achieved, creating synergies which have led to resource savings.

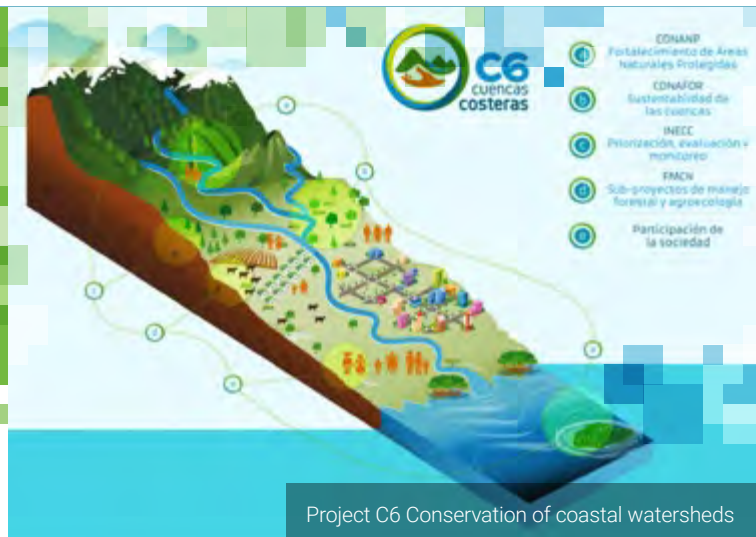
Organisations involved This solution is being implemented by National Commission of Natural Protected Areas (CONANP).



READ FULL SOLUTION



Natural floodplain of the Atchafalaya River



Project C6 Conservation of coastal watersheds

Building Blocks:

Solution elements for replication

1 Inter-institutional governance at different levels

To create and develop PAMIC, diverse government entities belonging to the environment sector joined forces to design a cutting edge and innovative project: the National Institute of Ecology and Climate Change (INECC) coordinated the construction of the PAMIC plans; the National Commission of Natural Protected Areas (CONANP) consolidated the management and operation of the project within the Protected Natural Areas (ANP); and the National Forestry Commission (CONAFOR) implemented Payments for Environmental Services schemes from the biodiversity fund. The Mexican Nature Conservation Fund (FMSN) contributed its experience in the management of financing schemes. All in all, this created two further funds to stimulate activities and impacts. Moreover, the inter-institutional coordination included i) a Technical Project Committee that supervised and directed the operation; ii) a Unit Project Coordinator and iii) two Regional Project Units, which were responsible for the daily coordination of technical and logistical issues. Such a design has been an essential aspect that generated major advances in land use planning for collective benefits.

2 Creating a shared vision of land management through water

In order to promote an operational connectivity between the diverse upriver and downriver sub-basins (zones) of a river basin, including both ecosystems and productive activities, water was chosen as the conductive element; the element to bring the zones and stakeholders together. Modelling of the surface water supply and sediment retention in different zones permitted the identification of provider-recipient-accumulation relationships. Through this, the dynamics between demand for hydrological services and those that produce them (mountainous zones with forest cover) could be identified and connected. Based hereon, the different stakeholders were brought together to learn about and exchange on key information on zonal levels of production and services available. This in turn led to the identification of what should be done where and by whom.

3 Key elements for ecosystem conservation are also anthropic

As part of PAMIC, great consideration on the dynamics of landscape transformation is being made. There is an attempt to identify and conserve those elements that are key for ecosystem conservation, whether they are of natural or anthropic origin. In PAMIC's philosophy, conservation does not mean maintaining pristine ecosystems. On the contrary, conservation includes restoring managed landscapes and using sustainable practices. This allows the maintenance of the whole socio-ecological system through a sustainable use of the land, as demonstrated by shade-grown coffee production, agro-silvo-pastoral and community forest management projects, which support both livelihoods and ecosystems.

4 Support from local institutions and grassroots organisations

The Project Unit Coordinator has been forming an alliance with local governments, research centres and grassroots organisations with specific presence in each of the project basins. In this way, effective communication with producers and other actors in the territory could be ensured. Thanks to the network of local NGOs, information and results workshops had high levels of impact and thereby allowed for a more efficient translation of stakeholder insights into practicable solutions in the field. Examples of this support on the ground include: i) the management of different interests and potential conflicts between actors in the Cofre de Perote NPP; ii) the connection of governmental social assistance programs, subsidies, etc., to river basin zones that coincide with the project, which in turn created useful synergies; iii) the establishment of coordinated lines of work from the government level to protected natural areas (ANP) and to CSOs.

Food and water security of communities in the shared Sumpul River sub-basin

Solution published in	English and Spanish
Solution Provider	Marta Pérez de Madrid, IUCN
Location	San Ignacio, Chalatenango, El Salvador
Challenges addressed	Habitat fragmentation and degradation Avalanche/landslide, Drought, Erratic rainfall, Floods, Land and forest degradation, Conflicting uses/cumulative impacts, Pollution (incl. eutrophication and litter), Lack of technical capacity, Lack of public and decision maker's awareness, Poor governance and participation, Lack of food security, Unemployment/poverty
SDGs addressed	   
Other topics addressed	Governance and Policy , Gender, Economy and Finance, Agroecology and sustainable agriculture , infrastructure, #water , mitigation, local and indigenous communities, NDC/NAP, M&E, planning, capacity building, tools/instruments , communication, Covid 19
Summary	Water scarcity and extreme weather events are already a reality in the sub-basin of the Sumpul River, shared by Honduras and El Salvador, and will likely worsen as the impacts of climate change intensify. This requires adaptation responses on 3 axes of work: strengthening capacities and knowledge through an "action learning" approach; increasing the resilience of ecosystems and livelihoods by implementing Ecosystem-based Adaptation measures (EbA); and revitalising the governance of the sub-basin.

Impacts

- Implementation of EbA measures in agroforestry systems (crop diversification, soil conservation practices, protection of water sources) benefiting >100 producers in the sub-basin.
- Greater articulation between key actors of the sub-basin linked to the integrated management of water resources.
- Strengthening of four Water Committees in the upper part of the sub-basin and internal regulations for the water supply systems for human consumption.
- Participatory formulation and adoption of new planning and management instruments for existing governance platforms (Binational Community Committee of the Sumpul River Sub-basin and four Water Committees, which are locally known as "Water Boards" and are a core part of the Community Development Associations, ADESCOs).
- Technical accompaniment by the Municipalities of La Palma and San Ignacio.
- Greater communication and advocacy capacities after training 38 community leaders in negotiation, policy influencing and communication.

Organisations involved

This solution is being implemented by the International Union for Conservation of Nature (IUCN).



Comité Comunitario
Binacional de
la Subcuenca
del Río Sumpul



Comunidades de los cantones:
Los Alvarado, Las Pilas y Río
Chiquito (Muni. San Ignacio) y
La Granadilla (Muni. La Palma)

On behalf of:



of the Federal Republic of Germany



READ FULL SOLUTION



A water spring protected by reforestation actions



Action learning: The benefits of terraced avocado production

Building Blocks:

Solution elements for replication

1 "Action learning" and monitoring to increase capacities and knowledge

Supporting producers to implement EbA measures that improve their productive practices and increase the resilience of agro-ecosystems, generates an "action learning" process that allows other actors to witness the benefits of these measures and creates conditions for their sustainability and upscaling.

The socio-environmental vulnerability of communities and their livelihoods is examined, in a participatory way, in order to then prioritise EbA measures and their location.

Technical support is provided to producers, complemented with their traditional knowledge, to plan and implement the EbA measures (improvements to agroforestry systems).

Training and exchanges of experience are carried out on transboundary cooperation are carried out; integrated management of water resources; policy frameworks and legislation on water and climate change; and policy influencing and communication.

Monitoring of food and water security is carried out with 14 families.

The governance and management capacities of community and municipal entities linked to water resource management is strengthened.

The increase in skills and knowledge strengthens social capital and contributes to community empowerment and to valuing ecosystem services and their management for the benefit of all.

2 Community implementation of adaptation measures in forests and agroforestry systems

The EbA measures implemented in the sub-basin focused on water and soil ecosystem services, on productive diversification and on mitigating the impacts of climate change on crops and community assets. Together with >100 producers from the upper part of the sub-basin, fruit and timber trees were introduced into agroforestry systems bordering 7 water sources, and organic agriculture was encouraged, allowing families to diversify their income and reduce the vulnerability of their crops, productive infrastructure and housing, which are affected by strong winds. This, in combination with soil and water conservation practices (hillside irrigation ditches, non-burning and crop residue incorporation), has helped to reduce soil erosion caused by extreme rainfall, as well as improved moisture retention in crops, soil fertility, and water infiltration and capture in the area. The EbA measures not only generate more resilient agro-ecosystems, but also increase the availability of water, which benefits >400 families in the sub-basin. These actions have raised awareness of the need for ecosystem and adaptive approaches to territorial management in the face of climate change.

3 Revitalising governance for adaptation

To be effective, governance for adaptation must be multidimensional and participatory, which entails involving farmers, municipalities, ministries and other public institutions in the area, community leaders, public health units and educators, in water management and adaptation processes. In the Sumpul River, this was achieved particularly through "action learning" processes and the revitalisation of the Binational Community Committee of the Sub-basin. The work and local legitimacy of the Binational Committee was enriched by the inclusion of community bodies that for years were disjointed and lacked participation, such as the Water Committees, which are important entities in each community. New management instruments were also generated, leadership and the active participation of youth and women was promoted within the Binational Committee, and training and exchange of experiences were carried out for collective learning. Other contributions to governance came from producers who implemented EbA measures on their farms (and are now spokespersons for the benefits derived from such measures) and from municipalities (La Palma and San Ignacio) that integrated the EbA approach into their policies through the formulation of Local Adaptation Plans.



SOLUTIONS



 Gender



Improving livelihoods, addressing gender inequality and adapting to climate change in a women-led community forest in Bishnupur, Nepal

Solution published in	English
Solution Provider	RECOFTC
Location	Sarlahi District, Janakpur, Nepal
Challenges addressed	Erratic rainfall, Floods, Increasing temperatures, Land and forest degradation, Shift of seasons, Wildfires, Conflicting uses / cumulative impacts, Erosion, Ecosystem loss, Invasive species, Lack of alternative income opportunities, Lack of technical capacity, Unemployment / poverty
SDGs addressed	   
Other topics addressed	Governance and Policy, Gender , Economy and Finance, Agroecology and sustainable agriculture, infrastructure, water, mitigation, local and indigenous communities , NDC/NAP, M&E, planning, capacity building, tools/instruments, science/research , communication, Covid 19
Summary	A community forestry project to empower local people, especially women, to manage, protect and benefit from forests and adapt to climate change was developed with Bishnupur's women-led community forest user group. RECOFTC, local government and sectoral agencies supported the group to apply participatory approach in assessing climate vulnerability, identifying and implementing priority actions including the protection of farmland from floods by planting trees and the introduction of agroforestry and beekeeping to diversify livelihoods. Women led, decided and benefitted financially.

Impacts

- The project increased tree cover and diversified incomes by providing 1800 trees.
- Annual incomes rose by an average of US\$450 (about 18%) for six families that received beehives and technical support to produce honey.
- Boring a deep well improved access to water for 64 households for domestic and agricultural use on 30 hectares, reducing vulnerability to variable rainfall.
- Since 2015, there has been no riverbank erosion despite annual flash floods and less silt and debris deposited across the village's 45 hectares of forest, farm and settlement thanks to the stabilised one-km-long stretch of riverbank, using sandbags and stone reinforced by bamboo plantation.
- The project enhanced community cohesion, mitigating social tension over water access, reduced gender inequality and empowered women as climate adaptation leaders.
- A climate change response component in the community forest management plan helped mainstream adaptation and ensure the forest stores an estimated 888 tons of carbon.

Organisations involved

This solution is being implemented by Regional Community Forestry Training Centre for Asia and the Pacific (RECOFTC).



READ FULL SOLUTION



A woman showcasing her beehives. She has now established herself as a small-scale beekeeper in her locality



A field worker from HIMAWANTI, holding a pen, facilitates talk with women in Bishnupur during the climate vulnerability assessment

Building Blocks:

Solution elements for replication

1 Participatory assessment of climate vulnerability

Following a free, prior and informed consent process with stakeholders, the community level vulnerability assessment generally identifies climate threats and impacts, assesses threats and impacts to community livelihood assets and identifies vulnerabilities and vulnerability response topics. A female field worker from the Himalayan Grassroots Women's Natural Resource Management Association consulted women stakeholders. It was perceived as inappropriate for male workers to engage with women.

A series of matrices allow for clear collection, organisation and evaluation of climate change and socioeconomic information to assess vulnerabilities. The matrices are completed using primary data from participatory rural appraisal and participatory action research and secondary data from community forest user groups' guidelines and operational plans, district-level government offices, and forest and land use research institutes.

2 Co-production of adaptation intervention feasibility assessment

A feasibility assessment uses input from community forest user group members and other stakeholders to identify adaptation interventions. First, community forest user group members and facilitators review the climate vulnerability assessment and the identified intervention topics. The assessment identifies at least three topics based on detected climate threats, vulnerabilities and adaptive capacities. Each topic is a broad adaptation strategy with actions.

Then, facilitators use a template for evaluating topics to assist community forest user group members in seeking technical expertise, and then collate information into a single 'snapshot' document to enable selection of a more detailed action.

As a final step, facilitators work with community forest user group members to list expertise and experts for the intervention topics. Facilitators update the list, as needed, considering a broad range of stakeholders and service providers. Final matrices list response options under each topic and are completed based on information that the target participants provide. This section may require gathering information from technical consultants and/or service providers.

3 Implementation of Ecosystem-based Adaptation interventions

The aim is to use nature-based interventions identified by the feasibility assessment to address sources of climate vulnerabilities. To do this, the community forest user group leadership mobilises resources and people, and works with partner organisations identified in the feasibility assessment to access resources and technology.

In Bishnupur, the women leaders of the community forest user group worked with RECOFTC to buy around 300 mango and lychee tree seedlings at subsidised rates from the regional horticulture development centre. RECOFTC provided beehives and training on beekeeping.

To stabilise the riverbank, the user group members built a retaining wall of stones and sandbags topped with live bamboo and other plants along a kilometre-long stretch of the river. They planted 200 bamboo rhizomes and 4,000 fodder-crop seedlings from the District Forest Office and the District Soil Conservation Office, together with locally available fast-growing and multipurpose grass.

Building climate resilience of urban systems through Ecosystem-based Adaptation (EbA) in Latin America and the Caribbean

Solution published in	English
Solution Provider	Bryce Bray, UNEP
Location	San Salvador, San Salvador, El Salvador Kingston, Saint Andrew, Jamaica Xalapa, Veracruz, Mexico
Challenges addressed	Avalanche / landslide, Drought, Erratic rainfall, Extreme heat, Floods, Increasing temperatures, Land and forest degradation, Storm surges, Erosion, Ecosystem loss, Infrastructure development, Lack of technical capacity, Lack of public and decision maker's awareness
SDGs addressed	        
Other topics addressed	Governance and Policy, Gender , Agroecology and sustainable agriculture, infrastructure , water , mitigation, local and indigenous communities , NDC / NAP, M&E, planning , capacity building , tools / instruments , communication, Covid 19
Summary	CityAdapt's goal is to reduce the vulnerability of urban communities to current and future effects of climate change by mainstreaming urban Ecosystem-based Adaptation (EbA) in city planning. It carries out EbA activities in urban areas and surrounding watersheds in Mexico, Jamaica and El Salvador. These activities include the restoration of mangroves, forests and riparian areas, implementation of climate-smart agriculture, construction of water retention structures, establishment of community gardens, and installation of roof rainwater catchment systems.

Impacts

- Environmental: CityAdapt has restored 20 kilometres of riparian areas and more than 300 hectares of forest and coffee plantations (agroforestry), to absorb water and reduce risk of floods and landslides while ensuring reliable supplies throughout the year.
- Social: Women are included fully in the project, including alternative livelihood projects such as beekeeping and mushroom cultivation.
- The vulnerability assessments use a gender-differentiated approach to capture how climate change affects men and women differently, ensuring the activities target more marginalised parts of society with greater need, which often tends to be women heads of households.
- All this has created a space for discussion on gender issues and a greater sense of self-advocacy.
- Economic: Community rainwater harvesting systems have helped build social cohesion for managing water and saves time and money.
- Alternative livelihoods are generating additional sources of income, including an extra \$152 USD per month for households.

Organisations involved This solution is being implemented by the United Nations Environment Programme (UNEP).



READ FULL SOLUTION



A farmer showing damage from landslides



Construction of terraces, infiltration ditches, and living fences or barriers along contours (El Salvador)

Building Blocks:

Solution elements for replication

1 Gender-differentiated vulnerability assessment

This vulnerability assessment methodology allows for the accurate targeting of Nature-based Solutions to critical areas of need in cities and sectors of the population. It specifically includes a gender focus to ensure that adaptation efforts take into account how climate change affects women differently than men, given their varying roles in society. The vulnerability studies allow identification of the areas of greatest danger from weather-related events (such as landslides, floods, etc.) based on the exposure, sensitivity and adaptive capacity of the analysed territory. They are carried out through participatory processes with communities and key stakeholders and climatic scenarios that integrate climatic, environmental and socioeconomic variables at the same time. The analysis also allows estimating the risk of loss of ecosystem services and therefore the potential needs for adaptation to climate change. This exercise is the basis for designing and implementing Nature-based Solutions to strengthen the resilience of communities in urban and peri-urban systems. Finally, this process builds a sense of co-ownership and relationships for partnerships to carry out the project.

2 Nature-based Solutions for Adaptation via sustainable livelihoods and green infrastructure

The Nature-based Solutions themselves are a core building block of the project. These solutions include reforestation, riparian restoration and infiltration trenches, the establishment of lineal, permeable trails for improved watershed functioning to reduce the risk of flooding and landslides during heavy rains, and water scarcity during dry periods. The tangible co-benefit of these measures is the reduction of disaster risk and easier access to water supplies, to name just two.

An integral part of these Nature-based Solutions is the creation of sustainable livelihoods that take pressure off ecosystems, including edible mushroom cultivation, beekeeping, urban agroforestry and gardening. The presence of these activities not only helps with decreasing pressure on ecosystems but also creating buy-in on the part of communities; they see a tangible economic benefit from the project and thus have a vested interest in its success. For example, mushroom cultivation has led to an additional source of income of \$152 USD per month per plot for Xalapa households.

3 Project learning activities

CityAdapt's various implementation activities are carried out with demonstration sites to showcase benefits to surrounding populations and inspire replication. This includes demonstration sites for edible mushroom cultivation, urban gardens, roof rainwater harvesting systems, beekeeping, water infiltration systems, agroforestry, and other activities.

CityAdapt also emphasises learning from project activities, especially for planning officials and communities to take ownership and help them continue after project end. It has therefore produced or is producing an array of knowledge products, including manuals, policy briefs, case studies, technical guidelines, and education material for children. A key aspect of this work has been highlighting NbS' cost-effectiveness in comparison to conventional solutions.

One key is a virtual class with 45 students that work on adaptation-related issues in their respective 17 countries. All the students reported an across-the-board improvement in their knowledge of NbS for urban adaptation. This class model will now be expanded to other regions. These learning components help to build the case for further NbS integration in urban planning and policy while spreading CityAdapt's lessons to other actors interested in using NbS for their respective cities.

Restoring Morocco's biodiversity through agroforestry

Solution published in	English
Solution Provider	Yossef Ben-Meir and Sofia Ashooh, High Atlas Foundation
Location	Meknes and Ifrane, Fès-Meknès; Ouaouizert, Béni Mellal-Khénifra; Tameslouht, Oukaimeden, Ouirgane and Imgdal, Marrakesh-Safi; Taroudant, Souss-Massa; Agoudim, Drâa-Tafilalet; Guercif, Oriental, Morocco
Challenges addressed	Desertification, Erratic rainfall, Loss of biodiversity, Erosion, Ecosystem loss, Pollution (incl. eutrophication and litter), Lack of access to long-term funding, Lack of alternative income opportunities, Lack of technical capacity, Unemployment / poverty
SDGs addressed	  
Other topics addressed	Governance and Policy, Gender, Economy and Finance, Agroecology and sustainable agriculture , infrastructure, water, mitigation, local and indigenous communities , NDC/NAP, M&E, planning, capacity building, digital tools/instruments , communication, Covid 19
Summary	Through agroforestry methods with native plants, High Atlas Foundation (HAF) aims to rehabilitate Moroccan biodiversity and adapt to climate change. Trees grown in HAF's nurseries are provided to farming families and education centres as sole beneficiaries of the yields. The nursery projects are managed by the people who plant, maintain and harvest to integrate communities in land rehabilitation and promote sustainable livelihoods. HAF builds capacities of agricultural cooperatives and rural people in food safety, financial management, marketing, and development of agricultural business plans.

Impacts

- HAF works to promote more sustainable agricultural practices to help people adapt to climate change and improve their livelihoods. Since 2003, HAF planted approximately 4 million fruit trees in 39 provinces of Morocco, impacting 15,000 farming families through sustainable income generation and enhancing more than 650 schools.
- HAF's rights-based empowerment workshops, the precursor to many of its projects, have supported over 900 women and girls in 11 regions across Morocco. These workshops have helped women realise their potential and create plans to reach their goals.
- As a result of these and other capacity building activities, HAF created 16 and strengthened more than 100 cooperatives and associations, particularly with women and youth (reaching two-thirds participation).

Organisations involved This solution is being implemented by the High Atlas Foundation.



READ FULL SOLUTION



Participatory workshop with a women's cooperative in Essaouira, Morocco



Children in Moroccan primary school during an environmental workshop

Building Blocks:

Solution elements for replication

1 Participatory project approach

In implementing community development projects, it is vital that local communities are involved as they understand their environment best. The participatory approach encourages close collaboration with civil groups. Heavily focusing on its members' capacities to be effective managers of change, a more functional and successful solution can be adapted. Through participatory dialogues, technical trainings, and the fostering of partnerships among NGOs, business, and governments, solutions are generated that cannot be achieved by any of these entities on their own. These dialogues allow for the opportunity to collectively assess needs, and identify, design, and implement initiatives.

2 Women's empowerment for economic, social and environmental development

Empowerment outcomes with women's groups in different regions of Morocco have been enabled by the Imagine workshop, which takes place over 4 days and 32 hours. These workshops help build the personalised vision of the women participants, provide the setting and coaching to analyse social relationships, including familial relationships that may promote and/or need strengthening to gain the support needed to achieve greater levels of self-determination and economic benefits. Imagine workshops, however, are not solely for women - men have and will continue to be encouraged to participate in empowerment workshops such as Imagine to support a holistic community empowerment process. As a result of these workshops, beneficiaries often join to create cooperatives and self-employment initiatives. For example, 178 women now earn income from 13 new cooperatives which operate activities such as fruit tree and medicinal plant nurseries, food processing, and beekeeping.

3 GIS-Based monitoring

The systematic monitoring, called AKVO, was developed by Ecosia, a German organisation which plants trees using revenue generated from their search engine. Trained in the use of this application, the monitoring team disperses throughout the regions, visiting the farmers and monitoring the trees that were planted during the previous planting season. Stored in a shared database, the information collected by the team in collaboration with local nursery caretakers will enhance informed decision-making at all levels of governance and across sectors by filling gaps in knowledge and precedence regarding practical application of resource management.

4 Financing tree nurseries

The trees that HAF and community partners grow from seeds in nurseries in Morocco are generators of direct revenue from the a) sale of the trees at a subsidised rate to farmers, cooperatives, associations, and education centres, and b) voluntary and credited carbon offsets that are secured with HAF's monitoring system of the trees that are transplanted from the nurseries, integrating and maximising the benefits from remote sensing and ground-truthing with community engagement. The sale of carbon credits, in particular, ensures maximum impact - revenue generated by the trees planted is reinvested directly into the communities that grow the trees.

5 Capacity building for value adding

HAF is dedicated to the capacity building of community and cooperative members, especially in natural resource management and participatory decision-making among people who understand their local environment best. HAF provides consultancy and capacity-building workshops to achieve value added processing and marketing of agricultural products by the growing communities and their cooperatives. HAF does not control or own the raw or processed products, the farmers do, but this activity is an indirect and significant local income benefit that yields high quality and quantity product standard. Examples include supporting a cooperative in blanching almonds produced by their trees, developing a business plan for value-added walnut processing, and organic certification.

Strengthening capacities and reducing risks to stimulate a process of long term adaptation

Solution published in	English
Solution Provider	Aram Rodriguez de los Santos, INECC
Location	Tabasco, Gulf of Mexico, Mexico
Challenges addressed	Erratic rainfall, Extreme heat, Floods, Land and forest degradation, Salinisation, Sea level rise, Storm surges, Ecosystem loss, Pollution (incl. eutrophication and litter), Unsustainable harvesting incl. Overfishing, Lack of access to long-term funding, Lack of alternative income opportunities, Changes in socio-cultural context, Lack of technical capacity, Poor governance and participation, Social conflict and civil unrest, Unemployment / poverty
SDGs addressed	    
Other topics addressed	Governance and Policy, Gender , Economy and Finance , Agroecology and sustainable agriculture, infrastructure , water , mitigation, local and indigenous communities , NDC / NAP, M&E, planning , capacity building , tools/instruments , communication, Covid 19
Summary	The National Institute of Ecology and Climate Change (INECC, using the Spanish acronym) has put in place a participatory, inclusive process of creating awareness about socio-environmental problems as well as strengthening capacities and reducing vulnerabilities in 3 communities of the Carmen-Pajonal- Machona Lagoon System. This process includes the development of a social enterprise offering rainwater capture and water purification; community-led reforestation activities; and the construction of houses on stilts designed to reduce risks to property in time of flooding.

Impacts

- Local communities have benefited from mentoring for almost 3 years, provided by NGOs and the local government under the auspices of INECC. This has developed capacities in the following areas: i) improved abilities to identify threats, and their origins and solutions; ii) organisational capacity to support the reduction of risks, such as from diseases related to the consumption of contaminated water, as well as from flooding; iii) technical capacities related to the establishment of various eco-technologies such as rainwater capture systems; plant nurseries; and mangrove reforestation.
- Women's groups have benefited particularly from having increased their self-confidence which has allowed them to create governance systems that have strengthened social cohesion in the area.
- The groups have also initiated changes that require a high level of organisation such as the opening of new pathways for the commercialisation of ecosystem services for social benefit.

Organisations involved This solution is being implemented by National Institute of Ecology and Climate Change (INECC).



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READ FULL SOLUTION



Women preparing the land for building stilt houses



Reforestation led by the community

Building Blocks:

Solution elements for replication

1 Incentivising community participation as a motor of transformation

It has been vital to incentivise community participation within the zone to achieve action aimed at restoring, managing and conserving local mangroves. Spaces for social learning, interaction and communication have facilitated the dissemination of information about the important role of ecosystems in local livelihoods; awareness raising about threats to the socio-ecological systems; and capacity development on how to manage resources sustainably as well as how to commercialise ecosystem services. The constant and consistent work has created a sense of belonging in communities towards their ecosystem and a responsibility for its care.

2 Mangrove reforestation financed by the project, supported by the community

The strategy for the reforestation and maintenance of mangroves involved working with communities to further develop awareness on the significance of a healthy mangrove for their livelihoods. Workshops with children, women and men were organised to provide them with a voice in decision making regarding the mangrove activities. In this way, community members took on ownership of the activities, seeing them as a benefit for their productive activities and for the general wellbeing of their families. They decided where to reforest and with what local species. Despite the reforestation not succeeding due to technical, seasonal and administrative issues, the community activity was key in generating confidence. This stimulated the social capital to support other social processes intended in the wider project.

3 Positioning women's groups as agents of change

The adoption of a gender equality focus provided an opportunity to consider the perceptions and concerns of women. In women-only workshops, their social vulnerability in the form of family violence, crime and drug addiction, was recognised. The workshops made evident their desire to participate in project activities that would improve the quality of life for their families. Their resulting participation was manifold. A women's group built capacity in the technology needed for the operation of rainwater capture systems as well as water purification equipment. Additionally, the women created the social enterprise "Drops of Love" by which they could provide potable water to the primary school and nursery, whilst selling the remaining water to families in the community.

Other women learned about construction and eco-tech and formed the group "The Breeze of El Mingo" to take part in the construction of palafitos (houses on stilts) to protect goods and property of the 80 families from disasters.

4 Collective initiatives for disaster risk reduction

Activities also involved strengthening the communities' collective management and disaster risk reduction. Faced with faltering access to potable water, community investments in infrastructure and health were made including the installation of rainwater capture systems as well as water purification and bottling equipment; the creation of a community enterprise through which potable water is produced and provided to the primary school and nursery and sold on to increase potable water supply to families. In addition, flood risks to property and belongings were managed and reduced through a collective initiative that included not only the construction of roofed palafitos but also the creation of emergency plans and their promotion through the establishment of a civil protection committee.

5 Constructing strategic multi-level and multi-actor alliances

INECC established a multi-actor alliance with public as well as private institutions at different governance levels that could facilitate institutional support for capacity development including:

- literacy support for the communities
- donation of cement and bottles
- construction of raised kitchen gardens for schools and palafitos
- preparation of didactic materials
- design of risk maps and zonal plans focused on climate change



SOLUTIONS



ADAPTUR: Mainstreaming Ecosystem-based Adaptation (EbA) in the tourism sector as a strategy for NDC implementation in Mexico

Solution published in	English and Spanish
Solution Provider	Daniela Valera, GIZ
Location	Entire Mexico, with emphasis in three tourist destinations: San Miguel de Allende, Guanajuato State; Puerto Vallarta and Riviera Nayarit, Pacific Ocean; Riviera Maya, Mexican Caribbean, Mexico
Challenges addressed	Drought, Floods, Increasing temperatures, Land and forest degradation, Ocean warming and acidification, Sea level rise, Tropical cyclones / typhoons, Conflicting uses / cumulative impacts, Ecosystem loss, Infrastructure development, Lack of public and decision maker's awareness
SDGs addressed	   
Other topics addressed	Governance and Policy , Gender, Economy and Finance , Agroecology and sustainable agriculture, infrastructure , water, mitigation, local and indigenous communities, NDC/NAP , M&E, planning , capacity building , tools/instruments , communication , Covid 19
Summary	The main components of the project Ecosystem-based Adaption to climate change in the tourism sector (ADAPTUR) are: economic risk analysis, communication strategy, strengthening public and private sector cooperation, capacity building, planning and implementation of EbA solutions with the participation of all relevant stakeholders (handmade dams and forest restoration to reduce vulnerability to droughts), mobilising finance from public and private sectors, as well as policy development on the national and regional levels.

Impacts

- Awareness raising among industry leaders and decision makers in the tourism sector through a target group-specific information and communication campaign.
- Development plans, policies and regulations at national and local levels include EbA and climate change approaches and are related to NDC implementation in Mexico (e.g. the Climate Plan of Puerto Vallarta incorporates EbA solutions like forest restoration to reduce vulnerability to flooding and landslides).
- Leading Mexican investors have integrated climate risks and ecosystem-based solutions into the planning process of their current tourism projects with the objective to make their investments more "climate-proof".
- Implementation of several EbA solutions with contributions from the public and private sectors, implemented by NGOs and in cooperation with local communities providing benefits, like improved water supply, restoration of habitat for wildlife, and temporary jobs for communities during the economic crisis of Covid-19.

Organisations involved This solution is being implemented by Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH.



READ FULL SOLUTION



Restoration of semi-desert ecosystems by women in the municipality of San Miguel de Allende



Company leaders and civil society organizations exploring sites for the implementation of EbA solutions

Building Blocks:

Solution elements for replication

1 Setting a price tag on climate change for the involvement of private sector in Ecosystem-based Adaptation

Translating environmental and climate change-related risks into business risks helps to draw the private sector's attention. Therefore, ADAPTUR performed an economic risk assessment in 3 destinations to calculate the future costs of climate change for the tourism industry and published a handbook on climate-proof investment. It became clear that adaptation is a good investment because by making businesses more resilient to climate change, it is possible to reduce their future costs.

2 Communication and capacity building strategy for climate action

The first step towards the development of a target group-specific communication and capacity building strategy was a KAP analysis (knowledge, attitude, practices) as a baseline. The analysis also included a capacity needs assessment, which served as input for ADAPTUR's capacity building and training program now comprising several topics about climate change vulnerability, climate-proof investment, cost-benefit analysis, national/ subnational policies related to climate change, EbA solutions, public-private cooperation, financial mechanisms, etc.

At the same time, a press campaign was launched in cooperation with local media and journalists. The ADAPTUR website was introduced with regular newsletters, best-practices, case studies and messages from industry leaders.

3 Strengthen cooperation structures between public and private sector

To overcome obstacles and to build a strong cooperation structure between its counterparts, ADAPTUR followed the Collective Leadership Model from the Collective Leadership Institute in Potsdam, Germany.

The model understands change as a longer process with several phases and includes key elements from creating a shared vision, building cooperation structures, consolidating agreements, and implementing learning mechanisms. The result was integration of smaller groups of well-selected change agents of private, public and social sectors who show strong support for the envisioned change, to act as first movers and at a later point in time motivate other actors in the sector to join the initiative or movement.

4 Mainstreaming of Ecosystem-based Adaptation in tourism policies

Despite their importance, ecosystems and their services are often not considered sufficiently in the development of tourism plans and policies. Therefore, ADAPTUR assigned Technical Advisers to the Ministry of Tourism and the Ministry of Environment to work closely together and establish cooperation structures which allowed to integrate aspects of biodiversity and climate change into national legislation.

One important result was the new Tourism Programme 2020-2024 PROSECTUR, which represents a major milestone in Mexico's ambitions to fulfil its Nationally Determined Contributions (NDC) and to integrate Ecosystem-based Adaptation (EbA) into its sector plans.

5 Implementation of EbA solutions with private sector financing

The project applied over 30 cost-benefit analyses and had workshops to evaluate and prioritise adaptation options.

As a result, in San Miguel de Allende, a new Green Fund was established by the Ministry of Environment that channelled private sector fees and contributions towards EbA measures. In addition, the money mobilised through the Green Fund was matched with money from an existing Program for Payments of Ecosystem Services (PES) run by the National Forestry Commission. Through this co-financing scheme, the city was able to implement five EbA solutions which include handmade dams and forest restoration in accordance with level curves to ensure sufficient drinking water in the future. All solutions were implemented with the cooperation of local NGOs and communities.

Because of the pandemic, the other proposed EbA solutions in the other sites were not implemented.

Sustainable wood energy management in Cameroon: Regional strategies as tools to limit the effects of climate change and support economic development

Solution published in	French
Solution Provider	Felix Kouedji, ECO Consult
Location	East, North and Far North Regions, Cameroon
Challenges addressed	Land and forest degradation, Erosion, Ecosystem loss, Lack of alternative income opportunities, Lack of technical capacity, Unemployment / poverty
SDGs addressed	   
Other topics addressed	Governance and Policy, Gender, Economy and Finance, Agroecology and sustainable agriculture, infrastructure, water, mitigation, local and indigenous communities, NDC/NAP, M&E, capacity building, tools/instruments, communication, Covid 19

Summary Cameroon's demand for wood energy is very high. This pressure on the nation's forest cover weakens forest ecosystems and their availability to protect Cameroonians from the negative impacts of climate change. Therefore, a holistic approach focuses simultaneously on several levers along the wood energy value chain: it reduces the demand through the introduction of improved cooking stoves, produces more sustainably by turning sawmill wastes into charcoal, afforests using partly Ecosystem-based Adaptation and includes all this in a broader strategy on sustainable wood energy management.

Impacts

- Positive impacts, both socio-economic as well as environmental are visible as consequences of the actions along the value chains.
- About 400 jobs by the sawmill waste carbonisation activities were created producing 15,000 tons of charcoal from sawmill waste, thereby generating 1,183,766 Euro between 2018 to 2020 alone.
- 3,153,585 Euros are saved on the purchase of wood thanks to the improved three-stone fireplaces (FA3P).
- On the environmental level 228,765.4 Tons of CO₂ equivalent (Teq) were avoided, or 901 ha of natural forest were preserved by the carbonisation of sawmill waste over the three years. The diffusion of the improved stoves avoided emissions of 50,474.2 Teq CO₂ or 4,805.1 ha of dry forest preserved.
- From 2016 to 2020, 50.97 ha of private reforestation carried out by the population to restore and / or improve the ecosystem functions of degraded areas and 10,741.67 ha of forest reserves transferred to the Communes of the Far North.

Organisations involved This solution is being implemented by ECO Consult.



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Sawmill wood scrap



Private reforestation

Building Blocks:

Solution elements for replication

1 Carbonisation of sawmill waste in the Eastern Region

The activity of carbonisation of sawmill waste has gradually been set up by working on the organisation and structuring of producer groups. Once these producer groups were legally recognised, an effort was made to sign agreements on sawmill waste with the holders of the raw material in order to secure the supply of charcoal makers with wood waste.

The professionalisation of charcoal makers at the production level has focused on the development and implementation of environmental impact notices for charcoal making activities and training in improved charcoal making techniques. Also, it consisted of facilitating the acquisition of secure transport documents necessary for the transport of coal to markets.

2 Dissemination of improved cookstoves in the Far North Region

The promotion and use of improved cookstoves is one of the mitigation strategies used by GIZ/ECO Consult to reduce the pressure on the timber resource in the Far North, as their use reduces household wood consumption and related expenses. The dissemination and use of the improved three-stone stove (FA3P) and the improved bil-bil stove in the Far North region since 2015 has made it possible to significantly and rapidly reduce wood energy consumption.

3 Individual reforestation as an Ecosystem-based Adaptation strategy

The deficit observed between the supply and demand of wood energy in the northern regions is at the origin of an ever-increasing degradation of natural resources, and a reduction of the vegetation cover, coupled with a decrease in agricultural productivity.

Individual reforestation is carried out on a small scale on areas ranging from 0.25 to 5 ha. Two main types of reforestation have been implemented: i) agroforestry reforestation which is practiced on cultivated land with the aim of improving the productivity of agricultural land despite climate change; ii) forest reforestation which is practiced on degraded land unsuitable for agriculture with the aim of restoring the degraded forest cover and improving the provision of ecosystem goods and services.

Support was provided to beneficiaries through training and the provision of technical sheets for the establishment and monitoring of individual reforestation plots.

4 Regional wood energy strategies and Nationally Determined Contributions (NDC)

Cameroon's NDC calls for reducing unsustainable fuelwood consumption through, for example, sustainable wood energy management and improved stoves, and the reforestation actions of this solution are in line with NDC Adaptation Program No. 19 related to the forestry sector.

The use of improved stoves by households thanks to wood savings and the carbonisation of sawmill waste constitute concrete greenhouse gas (GHG) emission mitigation activities. Similarly, the restoration of ecosystem functions in degraded areas through individual reforestation is an added value for adaptation. However, a mechanism for accounting for its contributions at the national level is not yet operational.

The regional wood energy strategies developed are in themselves locally appropriate mitigation measures for wood-energy value chains.

5 Improvement of the framework conditions for the development of value chains

Multi-stakeholder consultation frameworks have been set up to ensure the orientation and monitoring of the development of wood-energy value chains in the target regions.

Consultation frameworks are held every six months and serve as a forum to review the progress of the value chains concerned and to formulate guidelines for their proper functioning.

The resolutions resulting from these meetings made it possible to obtain certain advances, namely: i) the definition of a regulatory framework relating to the production and circulation of wood energy; ii) the development and validation of guideline standards for the management of dry-land forests.

Restoring life underwater: A multi-stakeholder partnership to save coral reefs in the Dominican Republic

Solution published in	English
Solution Provider	Mauricio Solano, GIZ
Location	Dominican Republic
Challenges addressed	Ecosystem loss, Lack of access to long-term funding, Poor governance and participation
SDGs addressed	 
Other topics addressed	Governance and Policy, Gender, Economy and Finance , Agroecology and sustainable agriculture, infrastructure, water , mitigation, local and indigenous communities, NDC / NAP, M&E , capacity building , tools/instruments , communication, Covid 19

Summary

The Dominican Republic, known for its tourism, relies on the ecosystem services provided by coral reefs. However, climate change and coastal developments endanger these reefs. Restoration became a popular alternative to safeguard these ecosystems and started to grow rapidly, but lacked control and caused many nurseries to become abandoned. This triggered the creation of the Dominican Coastal Restoration Consortium, a Multi-Stakeholder Partnership that works with the Ministry of Environment, monitoring coral nurseries and leading the evaluations, as well as steering restoration initiatives.

Impacts

- The Dominican Coastal Restoration Consortium (CDRC) conserves and restores coral reef ecosystems to enhance environmental and social resilience against the impacts of climate change and other degrading factors through the application of practical approaches in which communities can actively participate.
- The CDRC's solidly advancing assessment aims at consolidating standardised procedures for nursery configuration, maintenance, data collection, information exchange, and general performance.
- Nowadays, CDRC is the leading institution in coral restoration efforts in the DR and is also a regional model, sharing their skills and knowledge with other countries like Costa Rica and Honduras.
- In DR, a total of 17 coral nurseries are managed by CDRC members and monitored and evaluated by the CDRC staff.

Organisations involved This solution is being implemented by Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH.



READ FULL SOLUTION



Coral reef nursery in Dominican Republic



Monitoring coral reef nurseries in Dominican Republic

Building Blocks:

Solution elements for replication

1 Creation of the multi-stakeholder partnership

In the Dominican Republic, coral reef restoration became a popular alternative to try to safeguard these ecosystems. At the beginning, the approach started to grow rapidly lacking control and causing many nurseries to become abandoned. This concern triggered the creation of the Dominican Coastal Restoration Consortium (CDRC), a multi-stakeholder partnership that works along with the Ministry of Environment monitoring coral nurseries all over the country and leading the nursery evaluations, as well as steering the restoration initiatives in the DR.

2 Construction of a private-public agreement and a tool for the evaluation of coral reef nurseries

There was a need to collaborate between stakeholders and secure the resources to carry out specific field activities like the monitoring and evaluation of coral reef nurseries, which cannot be carried out solely by the public or the private sector independently. In the DR, an agreement between the CDRC and the Ministry of Environment was signed so that the CDRC could lead the monitoring and evaluation of every coral nursery in the country, with the technical support of the Ministry. To carry out the monitoring and evaluation of coral nurseries, the CDRC created a specific manual.

3 Constitution of a financial mechanism for the private sector investment in coral reef conservation and restoration

Along with the stakeholders involved in the partnership, a well-structured financial mechanism was established. In order to achieve this, a legal analysis was performed, looking into existing payment for ecosystem services schemes in the DR and in other countries (eg. Costa Rica). After that, an initial structure for the mechanism was proposed and discussed in several workshops with the partnership members and representatives of other relevant institutions. Finally, a concerted version of the structure for the mechanism was implemented.

Locally-based mapping and management of resources in Kenya's northern drylands

Solution published in	English
Solution Provider	Xiaoting Hou Jones, IIED
Location	Isiolo, Eastern Province, Kenya
Challenges addressed	Drought, Land and forest degradation, Conflicting uses / cumulative impacts, Lack of access to long-term funding
SDGs addressed	  
Other topics addressed	Governance and Policy , Gender, Economy and Finance , Agroecology and sustainable agriculture , infrastructure , water , mitigation , local and indigenous communities , NDC / NAP, M&E, planning , capacity building , digital tools/instruments , communication, Covid 19

Summary Pastoralist communities tailor their production strategies to harness the benefits that variability in rainfall and plant nutrients can offer, to maximise livestock productivity over other livelihoods. Two tools of the solution facilitate bottom-up climate change resource management, in which decision-making and planning is placed in the hands of pastoralists at the ward level. This increases capacity of communities to respond rapidly and flexibly in highly variable and sometimes unpredictable climatic conditions, something which is difficult to achieve when power is centralised and top-down.

Impacts

- Locally based climate change planning allowed context-specific adaptation activities to be planned, funded and implemented. This includes e.g. conservation of key water sources to prevent overgrazing, funding of local-led sustainable water resource governance, operations and formal recognition of customary range-management institutions, and development of a County Climate Information Services Plan for dissemination of climate-related information.
- Tangible benefits were experienced by an estimated 18,825 people from 2010-14. In 2014, Isiolo County managed to avoid reaching the 'alarm' level of drought and its accompanying socioeconomic decline despite rainfall patterns that would usually be correlated; this was attributed to good natural resource management.
- Overall, it was felt that land deterioration was slowed as a result of the devolved climate-change planning activities, and that resilience was improved as a result.

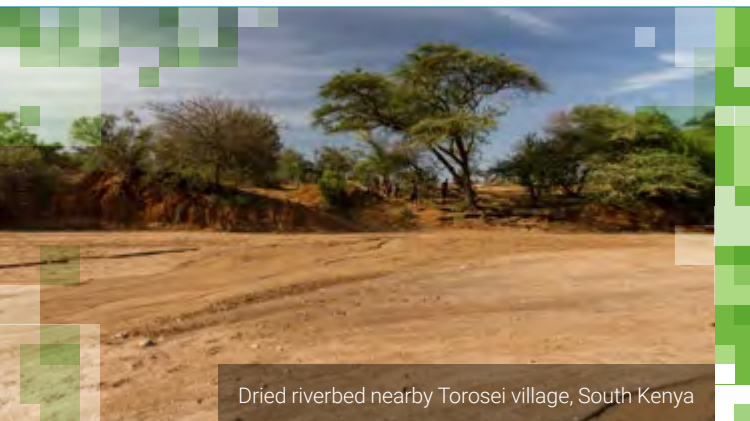
Organisations involved This solution is being implemented by The Adaptation (Ada) Consortium.



On behalf of:
 Federal Ministry for the Environment, Nature Conservation and Nuclear Safety
 of the Federal Republic of Germany



READ FULL SOLUTION



Dried riverbed nearby Torosei village, South Kenya



A herder with his livestock in Isiolo County, Kenya

Building Blocks:

Solution elements for replication

1 Isiolo County Climate Change Fund

Isiolo County Climate Change Fund (ICCCF) is a locally managed (devolved) financial mechanism, allowing county and ward-level decision-making on investments for addressing climate change challenges. Piloted in Isiolo (2011-12) under the then Ministry of State for Development of Northern Kenya and Other Arid Lands, the mechanism was extended from 2013 to Garissa, Kitui, Makueni and Wajir counties and from 2018 is being scaled up nationwide by the National Drought Management Authority within the Ministry of Devolution and ASALs. Ward-level investments in Isiolo supported by the ICCCF include rehabilitation, fencing, sand dams, workshops, funding community radio and more.

Investment decision-making is participatory:

- Ward Adaptation Planning Committees (WAPCs) are formed through a public vetting process and consensus; male and female members are selected based on integrity, dedication, knowledge of the area and commitment to report back to the community.
- WAPCs identify priority investments which are submitted to the Isiolo County Planning Committee (CAPC) for review (the CAPC cannot veto proposals that meet jointly agreed investment criteria).
- Once approved, investments are opened to competitive tenders. The successful provider receives payments in phases, based on certified completion of the previous phase.

2 Participatory digital resource mapping

This building block builds on perception mapping, combining it with digital data and spatial tech to produce detailed and useful county and ward resource maps, documenting community knowledge of resources and attributes. The participatory mapping process allows traditional knowledge to enhance digital national-level data and vice versa.

Workshops introduced the project; OpenStreetMaps satellite imagery was projected onto a wall alongside paper perception maps, and participants worked to transfer points of interest from the paper maps into GIS using coordinates to pinpoint locations in a way that could be verified and shared. Qualitative data on key resource points was then embedded into the spatial data. The maps were shared with participants and other stakeholders for feedback, before the process was repeated to refine.

Locally grounded, scientifically sound maps are useful in dryland contexts, where pastoralists must be able to utilise different resources at different times of year. Such maps also demonstrate— in a format understood by planners and others —where key resources are located, and how poorly planned / non-participatory development projects may restrict pastoralists' access to resources.



SOLUTIONS



Agroecology
and sustainable
agriculture

Scaling up climate resilient water management practices for vulnerable communities in La Mojana, Colombia

Solution published in	English
Solution Provider	Montserrat Xilotl, UNDP
Location	Municipalities of Ayapel, San Marcos, Caimito, Sen Benito Abad, Majagual, Guaranda, San Jacinto del Cauca, Nechi, Aichi, Magangue, Colombia
Challenges addressed	Drought, Floods, Increasing temperatures, Conflicting uses / cumulative impacts, Ecosystem loss, Lack of technical capacity, Lack of public and decision maker's awareness, Lack of food security
SDGs addressed	   
Other topics addressed	Governance and Policy, Gender, Economy and Finance, Agroecology and sustainable agriculture, infrastructure, water, mitigation, local and indigenous communities, NDC / NAP, M&E, planning, capacity building, tools/instruments, science/research , communication, Covid 19
Summary	Intense flooding and prolonged dry seasons affect the population in La Mojana region through impacts including loss of crops, changes to ecosystems and their capacity to provide water management services. These impacts intensified by climate change provide additional pressures to overstressed water sources, affecting both supply and quality. This solution adopts a long-term climate change risk informed disaster risk reduction strategy for drought and flooding. It is based on water supply infrastructure, restoring ecosystem services for adapted regional water management and enhancing the capacity for climate resilient and ecosystem compatible rural livelihoods with an impact on household food and water security.

Impacts

- To date the project has enhanced the capacities for local forecasting while providing climate information through agro alerts and bulletins.
- Project investments have provided gardening kits and capacity training to establish agrodiverse home gardens and rainwater harvesting systems while enhancing the water management capacity and institutional strengthening of local water boards. This allowed communities to better manage the COVID pandemic and recent flooding events.
- Ultimately 40,000 ha of wetlands will be restored through the productive landscape approach while 203,918 people will benefit directly through increased water supply access, food security and enhanced livelihoods.
- 201,707 people will be indirectly benefitting through early warning alerts.
- Impacts will include economic opportunities for people residing in the restoration areas through adapted livelihoods options and practices.

Organisations involved This solution is being implemented by the United Nations Development Programme (UNDP).



Fondo Adaptación

Ministerio de Ambiente y Desarrollo Sostenible de Colombia (MADS)



Ministerio de Agricultura

Departamento Nacional de Planeación



GOBIERNO DE CORDOBA



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Establishing agrobiodiverse home gardens



Family with agrobiodiverse home garden

Building Blocks:

Solution elements for replication

1 Strengthened understanding & systematisation of knowledge on the impacts of climate change (CC) to water management in the region

Stakeholders had little practical awareness on CC impacts, and information was not always available to all nor packaged to translate learning into action. Therefore, the project invested in the development of knowledge products for water management such as a groundwater flow and quality model supported by a decision maker's guide to ensure local capacity for its use in planning. The project also invested in a socialisation strategy to allow communities to receive targeted information and training for a greater understanding, comprising an indigenous strategy that includes traditional information and methods on water management presented through indigenous universities.

2 Enhancing water system infrastructure for improved drinking water supply in rural communities in the case of drought and flooding

As access to reliable sources of safe drinking water is one of the most critical issues in La Mojana and will be exacerbated by climate change, the project has invested in a diverse set of water solutions based on a local vulnerability analysis. The solutions include household and community rainwater harvesting systems to capture water during rainy seasons and the enhancement of existing water infrastructure. This was done by repairing local micro-aqueducts and ensuring that these have the capacity to withstand use during summer months and are able to protect water sources from contamination during floods.

Solutions are accompanied by training on how to operate and maintain these systems and water quality monitoring. Training is also provided to local water boards to enhance community capacity for water management.

3 Restored wetland ecosystem services for water management

The area is located on a wetland system that provides services in natural flood protection, purification and water supply as well as their economic value in community livelihoods.

Restoration work is guided by hydrological flow modelling and organised by community restoration plans and environmental monitoring carried out by local communities, particularly women. Restoration actions include a productive landscape approach that prizes ecosystem compatibility of productive activities inclusive to women and indigenous peoples in the region, including agroforestry and silvopastoral activities.

4 Improved early warning systems

While some local early warning capacities existed, weather station coverage and data management capacity were insufficient for localised weather alerts. The project addressed the need for early warning systems by enhancing the development of a regional forecasting centre with the capacity for hydrological modelling as well as in the development of early warning information products. This has resulted in the development of timely agro bulletins and alerts that have enhanced communities' access to climate information. The project has also provided information on how to manage early alerts, looking to integrate local capacity.

5 Climate resilient agro ecosystems and extension support

Agriculture extension services support effective water management and climate-smart agriculture research and capacity development at the community level. They promote agro-diverse and traditional local climate resilient crops and the implementation of climate adapted productive practices compatible with the wetland systems.

Households are provided with home gardening and water management kits including seeds (provided through women managed local seed banks), mulch, and other inputs. Training on how to establish these systems including using low-cost irrigation technologies and elevating crop beds is given. Rural extension support allows households to learn by doing through experimentation with a farmer field school approach. These home gardens have enhanced food security in the face of COVID and recent flooding.

Large-scale Ecosystem-based Adaptation in the Gambia river basin: Developing a climate-resilient, natural resource-based economy

Solution published in	English
Solution Provider	Oscar Ivanova, UNEP
Location	Lower River Region; Upper River Region, Central River Region North; Central River Region South, The Gambia
Challenges addressed	Drought, Erratic rainfall, Extreme heat, Land and forest degradation, Loss of biodiversity, Ecosystem loss, Unsustainable harvesting incl. Overfishing, Lack of access to long-term funding, Lack of alternative income opportunities, Lack of public and decision maker's awareness, Lack of food security, Unemployment / poverty
SDGs addressed	      
Other topics addressed	Governance and Policy, Gender, Economy and Finance, Agroecology and sustainable agriculture, infrastructure, water, mitigation, local and indigenous communities, NDC / NAP, M&E, planning, capacity building, tools/instruments, science / research, communication, Covid 19
Summary	The consequences of climate change in the Gambia are stark and Gambians extremely vulnerable. UNEP is supporting The Gambia's government with its large-scale Ecosystem-based Adaptation (EbA) intervention to build climate resilience over large areas and promote climate-resilient sustainable development. This is achieved by restoring degraded ecosystems and agricultural landscapes with climate-resilient plants that provide goods for consumption or sale; and by facilitating the establishment of natural resource-based businesses and management committees to manage natural resources sustainably.

Impacts

- So far, EbA activities cover 7,770 ha. This includes 4,403.5 ha of degraded lands rehabilitated (including 250 ha of mangroves, which act as buffer zones from storm surges and floods, and 456.7 ha of agricultural lands across 251 farm holdings), and 125.6 kms of fire belts to protect the restored areas. No incidences of fires were subsequently reported.
- 30 beekeeping businesses equipped with 300 beehives created 398 jobs, 121 of these filled by women.
- The project also carried out significant business plan development and is commencing implementation of other natural resource-based enterprises focused on eco-tourism, andropogon harvesting, and wildlife farming.
- Ecosystem-based concepts have been integrated into two national-level policies: i.e., the agricultural five-year extension policy, and the Rural Development Policy. A total of \$11.3 m will be raised over 20 years for the National Forest Fund from taxes and licensing fees.

Organisations involved

This solution is being implemented by The Gambian Ministry of Environment Climate Change and Natural Resources (MECCNAR).



READ FULL SOLUTION



Staff from the Ministry of Environment assess the progress of a new building being supported by UN Environment as part of a climate change adaptation project



Farms hold a variety of rain-fed crops that have become increasingly difficult to grow due to climate change in Dingiri, The Gambia

Building Blocks:

Solution elements for replication

1 Constructing new plant nurseries and gene banks

One of the main challenges was the low availability of adequate and viable seedlings. To overcome this challenge, the project began constructing new tree nurseries. Instead of one nursery per region, as it was initially planned, the project was recommended to construct nine nurseries altogether as part of the strategy to meet the 10,000 hectares restoration target or slightly more. To sustain these nurseries, the project recruited 18 nursery attendants (two per nursery).

The nurseries aim to increase available planting materials to supply the EbA interventions and for use by communities outside the scope of the project. The project also developed long-term business plans and revenue models to support sustained operations of expanded / created nursery facilities.

In addition, six forest stations were refurbished as part of the nursery infrastructure.

UNEP is also working with the Department of Forestry to explore low-cost options to establish small gene banks for use by the project and beyond the lifetime of the project. With the construction of these nurseries, adequate seedlings are and will be available throughout the year.

2 Adopting mitigation measures to reduce the impact of climate risks

Based on the results of baseline studies that determined climatic risks, different Ecosystem-based Adaptation and mitigation measures were identified. Individual farmers and community-based organisations were incentivised to lead the various activities through diverse training (led by World Agroforestry (ICRAF)), including:

- The establishment of a two-meter-wide fire belt around all preferred mother trees, large trees within a forest that act as centralised hubs, supporting communication and nutrient exchange amongst trees.
- Farmer-managed tree growing approach, named Zai Pits, half-moon planting pits, which farmers create in the hardpan soil using hand tools or plows and animals. These act as micro-water catchments, holding about four times the amount of water that normally runs off the land but also compost, thereby increasing production.
- Adding water-buffering vegetation around the runoff water collection reservoir to reduce wind flow over the reservoir and thus reduce evaporation from the system. The system also facilitates reduction in runoff and enhances groundwater recharge through infiltration.
- Rainwater harvesting, storage, and distribution techniques were implemented to support the restoration efforts and overcome the shortage in water resources due to extreme weather conditions and low rainfall.

3 Promoting climate-resilient natural resource-based economy and businesses

The project increases the generation of ecosystem goods and services and promotes the establishment of commercially viable natural resource-based businesses managed by local communities. To establish such businesses, the project conducted a baseline study including an assignment on the Economics and Market Analysis for establishing financially viable natural resource-based businesses in the Gambia. The report proposed 7 potential business portfolios and defined the financial implications of these natural resource-based businesses for the contributions to the National Forest Fund (NFF) through a detailed discounted cash flow analysis. One such activity to facilitate the establishment of these businesses was the introduction of bee-fodder tree species to support bee farming in the community-owned forests and community-protected areas (CPAs).

The project also facilitated the integration of the EbA approach and natural resource-based businesses into existing government plans and activities and demonstrated and quantified their commercial viability to promote further investment by the government and the private sector beyond the project implementation period.

Smallholder farmers taking the lead: Farmer Field Schools in Tajikistan

Solution published in	English
Solution Provider	Thure de Frenne, GIZ
Location	Tajikistan
Challenges addressed	Erratic rainfall, Floods, Land and forest degradation, Loss of biodiversity, Erosion, Ecosystem loss, Lack of technical capacity, Lack of food security
SDGs addressed	    
Other topics addressed	Governance and Policy, Gender, Economy and Finance, Agroecology and sustainable agriculture , infrastructure, water, mitigation, local and indigenous communities , NDC/NAP, M&E, capacity building, tools/instruments , science/research, communication, Covid 19

Summary Assisting farmers to implement land conserving approaches and to foster biodiversity through Farmer Field Schools (FFS) is an initial and important step to tackle challenges in Tajikistan's agriculture. The focus of FFS was on diversification of crops and cultivation methods. The technical approaches came from an assessment that was done prior to the FFS and including the participating farmers themselves. The emphasis was on local needs and included good practices in pasture management, orchard management and diversified irrigation methods. In addition, approaches to reduce soil erosion were implemented.

Impacts

- During the 37 FFS more than 700 farmers (57% female) were reached leading to diversified household diets and increased food security as well as increased capacity (e.g. preparatory techniques), problem solving skills and self-reliance as main impacts on farmers' living
- Main impacts on biodiversity, made possible by behavioural change of farmers towards natural resources, included newly created habitats (living fences, planting trees as shelterbelts), increased crop variety and reintroduction of traditional, local crops, the production and application of organic fertiliser and the usage of intercropping.
- Climate change resilience was increased by designing contour lines properly and contour ploughing, no/low tillage techniques, water management (improved furrow irrigation and water harvesting) and reseeded of rain-fed pastureland.
- Social impacts include strengthened local collaboration and community building, strengthened local knowledge and an increased exchange of information between farmers living in different regions. Also, farmers now conserve and share local seeds in seedbanks.

Organisations involved This solution is being implemented by Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH.





Training on pasture reseeding with participating farmers



Exchange visit of farmers from Ayni District to Rasht District, Tajikistan

Building Blocks:

Solution elements for replication

1 Implementers as facilitators

In a high-quality learning process farmers need to solve and answer challenges and questions among themselves during the FFS. This leads to farmers building trust, widening their agro-ecosystem knowledge and learning from each other at a personal level.

Following Jürgen Habermas' theory, adults mainly learn for three reasons: work, social interaction and power. To keep this in balance and initiate a group process where learners find an intrinsic motivation, the workshops need to be facilitated by the right trainers. Trainers need to facilitate rather than teach or train. They do not only need technical skills but must be open minded and need to take adult education seriously.

2 Training material development

Training material suitable for local needs and language should be prepared together with local partners in a participatory manner. Needs and challenges should be assessed within the project region(s), and content and material continuously developed. This opens the possibility to adapt the material to the needs of the farmers and to respond to slight changes in the curriculum.

Contextualisation and local adaptation of techniques and methods should be kept in mind to have a high-quality outcome of the FFS.

3 Exchange visits

Often more than one FFS is held during an implementation process. It is likely that groups develop slightly different approaches to tackle similar challenges or that groups choose different methods that are practiced at the training fields. Exchange visits offer the possibility to widen the experiences and solutions that are shared.

During exchange visits farmers from one field school visit another group of farmers at a FFS in a different region. Everyone can learn from a different experience and the outcomes of another group. This way good practices and success stories can be shared, and each group gets new input in a bottom-up approach.

4 Important aspects of FFS

FFS have been proven to have successful outcomes all over the world bringing together aspects of agroecology, adult learning methods and community development. Overall, there are some aspects that need to be considered to have successful outcomes:

- Gradual learning process: Changing processes and mindsets needs time and enough space within the workshops.
- Farmers need to take the lead and define the programme.
- The learning process should be done in a structured and practically oriented process with regular meetings.
- Group processes need to be established. Therefore, training should focus on:
 - practical group work with exercises in the field
 - critical and analytical skills
 - planning skills
 - evaluation and feedback skills

Drylands Development Programme (DryDev): Building resilient communities in dryland areas of Ethiopia through integrated landscape restoration

Solution published in	English
Solution Provider	Rob Kelly, World Vision Ethiopia
Location	Tigray, Ethiopia Oromia, Ethiopia
Challenges addressed	Drought, Erratic rainfall, Floods, Increasing temperatures, Land and forest degradation, Loss of biodiversity, Conflicting uses / cumulative impacts, Erosion, Ecosystem loss, Invasive species, Unsustainable harvesting incl. Overfishing, Infrastructure development, Lack of alternative income opportunities, Lack of technical capacity, Poor governance and participation, Lack of food security, Unemployment / poverty
SDGs addressed	    
Other topics addressed	Governance and Policy, Gender, Economy and Finance, Agroecology and sustainable agriculture , infrastructure, water , mitigation, local and indigenous communities , NDC / NAP, M&E, planning, capacity building, tools/instruments , science/research, communication, Covid 19
Summary	DryDev addresses the threat of dryland degradation due to climate change and unsustainable natural resource use by using ▪ Actions that conserve and protect natural assets, such as water-harvesting, gully reclamation. ▪ Actions that boost on-farm productivity through relevant training, such as climate-smart agriculture, and to mobilise community groups, building skills in governance and problem-solving. ▪ Actions that link smallholders with profitable value chains, markets, and financial services to improve income. Gender inclusion through women's participation and empowerment is key.

Impacts

- Landscape restoration contributed to significant transformation: dietary diversity increased three-fold (1.89 to 5.07); hungry months per year halved (3.4 to 1.6); >90% of households reported no household hunger; average household income doubled (USD 716 to USD 1,286 pa); average household expenditure doubled (USD 470 to USD 1,080 pa); and 8-70% of food-aid-dependent households per sub-watershed became independent from food aid.
- Success depended on proper sequencing and integration of approaches. Farmer managed natural regeneration (FMNR) proved a game-changer, as it has a very high success rate, is low-cost, rapid and scalable. FMNR involves mindset and behaviour change, reducing the drivers of deforestation (such as burning or overgrazing) and adopting bylaws to prevent this behaviour in the future.
- Communities must benefit from land restoration. DryDev put restoration areas under control of communities and ensured they benefited.

Organisations involved This solution is being implemented by World Vision Ethiopia.



READ FULL SOLUTION



Supporting young landless farmers is critical in landscape restoration



Savings groups receiving coaching during their monthly meeting

Building Blocks:

Solution elements for replication

1 Actions that conserve and protect natural assets

Open-grazing and over-cutting in dryland areas reduces vegetative cover, making them prone to erosion and causing downstream flooding. DryDev introduced FMNR as a low-cost community-led approach that built consensus on how to manage and govern open-grazing areas through local by-laws (including fines for non-compliance). FMNR uses selective pruning to assist recovering trees and stumps. In denuded areas where root stocks are not present, enrichment planting was undertaken to maximise vegetative cover in the protected areas.

Physical structures were also used, such as terraces, trenches, half-moons, check-dams and gully reclamation structures.

Biological and physical structures in open grazing areas (now protected) led to rapid vegetative recovery, recovery of springs and the rise of groundwater. Smallholders improved their water access for household needs, for small crops and fruit trees, and for animals.

2 Actions that boost on-farm productivity through relevant training to enhance capacities

The technical capacities of smallholder farmers need to be strengthened in ways that are suitable to their situation and of relevance to their context. DryDev did this by focusing on skills needed to improve productivity in dryland environments, such as climate-smart agriculture, on-farm water-harvesting, and small-scale irrigation.

Similarly, newly formed groups need capacity development in governance, organisation and management skills, problem-solving, and coaching on how to best link with external players and government actors.

3 Actions that link smallholders with markets and financial services

Value chain development and integrated market systems development were essential tools to link environmental restoration with economic resilience. Farmers were mobilised and organised into groups, associations and cooperatives; groups organised around selected value chains, with groups enabled to sign contracts and share resources and capacities. Improved bargaining was made possible due to the confidence in producing a harvest, thanks to sufficient water.

Using a participatory and experiential learning approach to incentivise and increase the adoption of Ecosystem-based Adaptation (EbA) measures in Eastern Uganda

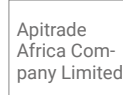
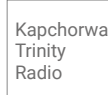
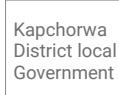
Solution published in	English
Solution Provider	Jaymee Silva, The Mountain Institute
Location	Kapchorwa District, Mt Elgon Region, Eastern Uganda
Challenges addressed	Drought, Erratic rainfall, Floods, Increasing temperatures, Land and forest degradation
SDGs addressed	      
Other topics addressed	Governance and Policy, Gender, Economy and Finance, Agroecology and sustainable agriculture, water, mitigation, local and indigenous communities, NDC/NAP, M&E, planning, capacity building, tools/instruments, research/science, communication, Covid 19

Summary Uganda's Sanzara parish lies in the rain shadow of Mt. Elgon, exposing it to both prolonged drought and increased flooding due to changing precipitation patterns. These conditions, coupled with a growing population, have affected the agricultural potential of the area, causing chronic food insecurity, abject poverty and a high rate of ecosystem degradation. This solution is about incentivising adoption of EbA measures in Sanzara Parish.

Impacts

- Over 100,000 trees were planted (80% survival rate), and 3,450 meters of soil and water conservation structures established to control soil erosion and flood water on farms.
- Sipi River's water quality improved, with decreases in chemical oxygen demand, turbidity, and nitrates of 39%, 10% and 36%, respectively.
- With improved access to clean water, women and children were spared the dangers associated with traveling long distances to fetch water.
- Adoption of soil and water conservation practices improved land productivity and increased yields, which improved food security and household incomes: 15% of the community had shifted from the "very poor" category to "average" within two years.
- The community provided land on which a demonstration centre was established. This increased the number of adopters, as well as provided the basis for the creation of a revolving fund governed by the community.

Organisations involved This solution is being implemented by Instituto de Montaña.



READ FULL SOLUTION



The Kawowo Sub County leaders displaying the Sanzara Parish vision map to confirm and agree on the next steps



Mango trees, products of the agroforestry EbA measure in Sanzara Parish

Building Blocks:

Solution elements for replication

1 Participatory community diagnostic and planning

The purpose of this building block is to work with the affected community to identify the major problems and underlying causes using participatory tools. In Sanzara, the process started with a vulnerability impact assessment that combined both scientific and participatory tools to identify potential climate impacts, the rate of ecosystem services depletion, risks, and current adaptation measures. A community map of the most degraded areas in the catchment was developed; based on this, a problem/solution matrix was prepared that provided details about the main climate challenges and impacts, how these affected different categories of people, and a suite of possible restoration and adaptation interventions. This process culminated in a 10-year vision map and a strategy for achieving this vision. Deliberate effort was put into ensuring that mobilisation, timing, and organisation of meetings encouraged all categories of community members (women, youth, elderly etc.) to actively participate. The process put the community members at the centre, thereby promoting ownership of the ensuing vision and strategy. This ownership contributed to a collaborative effort to sustain these interventions with clear action plans and a community-driven monitoring framework.

2 Experiential learning through an EbA demonstration and learning centre

The purpose of this building block is to enhance knowledge and practical skills related to EbA measures, as well as to accelerate the level of adoption of EbA measures. The community provided a two-acre piece of land on which all the EbA measures were demonstrated. Community members provided all the labour at the demonstration site and Kapchorwa District Local Government staff provided technical support. The evidence generated regarding the effectiveness of the EbA measures at the demonstration site helped to catalyse the uptake of EbA measures on farms. Some of the components of this building block include:

- Identification of a central and accessible piece of land that is representative of the issues that are to be addressed through EbA.
- Practical training on EbA measures through on-site demonstration.
- Preparation of an operation plan for the demonstration site, as well as a governance structure (e.g. Sanzara Landowners Association) to manage the day-to-day activities on the demonstration site.
- Preparation of a business plan for the demonstration site, including a plan for how the proceeds from the demonstration site will be used.
- Training of trainers, who will continue to work with individual farmers over time.

3 Provision of incentives to catalyse community adoption of EbA measures

The purpose of this building block is to address the immediate needs of an extremely vulnerable community, therefore enabling them to focus their attention on the implementation of EbA measures. The most pressing needs for the Sanzara community were water and livelihood opportunities. In order to address the water scarcity, a gravity flow scheme was constructed on the River Sipi to facilitate a stronger understanding of the ecosystem's value, and to motivate its restoration through EbA measures. The gravity flow scheme was participatorily agreed upon with the community and the Kapchorwa District Local Government. The community provided the labour for its construction, and the district provided the technical expertise.

In addition, a performance-based cash grant incentive scheme was introduced as a way of providing the much-needed cash for meeting day-to-day needs, while also catalysing the implementation of EbA measures. Households/landowners were supported to develop climate-smart land use plans, depending on the climate change challenges on their land. Cash incentive payments to participating farmers/landowners were then made in four equal instalments, based on their compliance and progress in implementing these plans.

Forest Landscape Restoration and improved natural resource management of the Mogazang Community

Solution published in	English and French
Solution Provider	Mara Lindtner, GIZ
Location	Maroua, Far North, Cameroon
Challenges addressed	Drought, Changes in socio-cultural context, Desertification, Unemployment / poverty, Erratic rainfall, Land and forest degradation, Shift of seasons
SDGs addressed	   
Other topics addressed	Governance and Policy, Gender , Economy and Finance , Agroecology and sustainable agriculture , infrastructure, water, mitigation, local and indigenous communities , NDC / NAP, M&E, planning , capacity building , tools / instruments , science / research, communication, Covid 19
Summary	Desertification threatens the well-being of the rural population in the northern part of Cameroon and climate hazards exacerbate their risks. The elaboration of a map allowed the demarcation of a plot of degraded land for restoration. Adopting a "learning by doing" approach, different techniques to restore soil fertility were tested. Women received training in alternative income-generating activities and construction of improved cookstoves. The initiative contributes to AFR100 objectives (restoration of degraded land, reduction of pressure on remaining natural resources, generation of income).

Impacts

- Nearly 10,000 plants were planted, coupled with the construction of water retention bunds.
- Improvement of the microclimate, erosion control and improvement of soil fertility through the planting of tree and plant species (e.g. agave sisal).
- Naturally assisted regeneration with Guiera stems is taking place, which have thrived thanks to the opening of firebreaks upstream of the water catchment area.
- The site is protected against stray cattle and other areas are designated solely to grow fodder.
- High-value species are planted on the restoration plot for future income generation. Women are involved in all stages of different value chains, such as timber, edible fruits and other non-timber forest products.
- The local population applies the acquired capacities in compost production. Women are now able to construct and use improved stoves.
- The managerial and technical capacities of 19 village leaders were strengthened.

Organisations involved This solution is being implemented by Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH.



Agence Nationale d'Appui au Développement Forestier (ANAFOR)

EnviroProtect

Institut de Recherche Agricole pour le Développement (IRAD)

AGIRAF (Mou-sourtoutouk)



afrioo



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Active participation of women and the youth in the village nursery protected by a live fence



Village nursery

Building Blocks:

Solution elements for replication

1 Promoting ownership of the social community-based restoration initiative and the participation of all social classes

An initial meeting between the traditional and religious authorities of Mogazang was held to gather all useful information and raise awareness among the population. As a next step, a socio-economic study was carried out in order to understand the potential social, economic and environmental impacts and challenges of the restoration initiative. The elaboration of a map by the community members under the guidance of the advisory team allowed the demarcation of a plot of degraded land (10.74 ha) for restoration. The reforestation initiative aimed to provide items such as firewood, fodder, food products and medicinal plants. The government owns the selected plot, under the supervision of the Executive Bureau for Development of the village. However, it is managed 'by the people, for the people'.

2 Micro-zoning of the selected plot according to the soil type, the topography and the identification of adapted local plant and tree species

Community members and experts developed a topographic map of the selected plot showing the different soil types and adapted local plant and tree species. Two main soil types and appropriate species have been identified. Depending on these different soil types, a mini-zoning delimited 11 blocks occupied by eight selected species.

3 Development of specific techniques to protect and irrigate the plants

The community tested various techniques to fend off stray livestock following the planting period, including a dead hedge made of thorny branches. These efforts were, however, without much success, and a long dry season presented further challenges as it dried up the community's water sources in 2017 and withered plants. Collecting water with empty cans at the community's water borehole (~ 3 km) was not feasible due to the lack of financial resources. Another system through drip irrigation devices made of used bottles collected in the city was used. Drip irrigation devices were attached to the foot of seedlings. The water was then drawn from barrels and stored on site. This system permitted the seedlings to be watered three times a week, allowing nearly 40% of the wilted plants to grow again. The construction of a permanent plant nursery with an onsite water borehole has been finalised, as well.

4 Promotion of income-generating activities and of improved stoves

The lack of fire and construction wood is a major challenge for the beneficiaries of the initiative. This was tackled by a holistic and inclusive approach:

- Strengthening the beneficiaries' capacities for setting up and managing a social community space, considering the necessary resources.
- The collection and processing of non-timber forest products from the restored plot, such as Neem seeds for oil production (income-generating activities).
- Gender mainstreaming: construction of improved stoves carried out by two trainers/ coordinators: A person who supervises the activities, who then trains relay trainers in the target villages in construction, awareness and means of popularisation of improved stoves and the problem of wood energy. Two types of improved stoves were used: "foyers améliorés 3 pierres", "foyers améliorés Bill-Bill". They increased their source of income, and reduced the use of firewood.
- While the recently planted trees and plants are still growing, 35 women have received training to build improved stoves using clay and straw which are raw materials found in nature (zero cost). This improves the living conditions of the population and reduces the pressure on the remaining natural resources.

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Global Project "Mainstreaming EbA – Strengthening Ecosystem-based Adaptation in Planning and Decision Making Processes"

This project is part of the International Climate Initiative (IKI). The Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) supports this initiative on the basis of a decision adopted by the German Bundestag.

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