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CASE STUDY

Upscaling community resilience through Ecosystem-based Disaster Risk Reduction in Uganda

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Prepared by the Partners for Resilience Uganda Team: Marion Iceduna and Cornelia de Winter-Platz with support from the UNEP Eco-DRR team: Malikah Amril and Mikhail Fernandes.

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Design and Layout: Ahmad Reza Amiri

EXECUTIVE SUMMARY

Since 2019, the United Nations Environment Programme (UNEP) in-collaboration with Partners for Resilience (PfR) have developed and implemented scalable Ecosystem-based Disaster Risk Reduction (Eco-DRR) models working alongside various governments and their respective communities in strengthening their capacity and shaping Eco-DRR policy interventions.

This case study highlights Eco-DRR interventions in Uganda focused on ecosystem restoration and protection in the Aswa river Catchment, specifically in Middle Moroto secondary sub catchment (Otuke and Alebtong districts), Upper Agago secondary sub catchment (Abim and Agago districts), and Upper Pager Matidi secondary sub catchment (Kotido district). The key risk being addressed within this context is frequent and prolonged droughts in upstream areas and flooding in midstream areas. To address this, the project aims to strengthen resilience to drought and flooding of 160,000 vulnerable women and men in 5 districts of Eastern Aswa Catchment in northern Uganda. Specifically, the project seeks to scale up Integrated Risk Management (IRM) and inclusive risk governance through improved catchment-based water resources management that is risk-informed, gender- and ecosystem-sensitive.

A model for upscaling community resilience has been developed through three core components of Eco-DRR: Ecosystem Restoration/Protection, Disaster Risk Reduction, and Climate Smart Livelihoods. In Uganda, there is a greater emphasis on Ecosystem Restoration and Protection through the micro-catchment restoration and establishment of guidelines for improved drought and flood management. The project further focuses on the establishment of micro-water catchment committees and national guidelines for improved drought and flood management. For capacity building, Community-based Organisations (CBOs) were trained on Integrated Risk Management (IRM). Other groups trained includes Village Saving Loan Association (VSLA) groups, district governments, and Aswa Catchment management committee members. 81 CBOs trained on IRM and 109,388 beneficiaries reached of which 50% are women. A Cost-benefit Analysis (CBA) performed by the University of Massachusetts Amherst demonstrated that the benefits of Eco-DRR and resilience enhancement interventions outweigh the value of their initial costs.

This case study lays the foundation for demonstrating the need for large-scale implementation of Eco-DRR in advancing the implementation of the Sendai Framework for Disaster Risk Reduction and the Sustainable Development Agenda. The content for this case study has been developed by the United Nations Environment Programme (UNEP) in collaboration with Partners for Resilience (PfR) – a global alliance between the Netherlands Red Cross, the Red Cross/Red Crescent Climate Center, Cordaid, Wetlands International and CARE along with partner civil society and Community-based Organisations in the countries where they work.

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LIST OF ACRONYMS

3R	Retention, Recharge, and Reuse
CARE	Cooperative for Assistance and Relief Everywhere
CBA	Cost-Benefit Analysis
CBO	Community-based Organisations
CORDAID	Catholic Organization for Relief and Development Aid
CSO	Civil Society Organisation
DG-INTPA	Directorate-General for International Partnerships
Eco-DRR	Ecosystem-based Disaster Risk Reduction
EC	European Commission
FAPAD	Facilitation for Peace and Development
FINASP	Facilitation for Innovative Actions and Sustainable development
FMNR	Farmer Managed Natural Regeneration
GIS	Geographic Information System
GPS	Global Positioning System
Ha	Hectares
IRM	Integrated Risk Management
IWRM	Integrated Water Resources Management
MoWE	Ministry of Water and Environment
NFA	National Forestry Authority
NPV	Net Present Value
OMB	US Office of Management and Budget
PfR	Partners for Resilience
UNEP	United Nations Environment Programme
VSLA	Village Saving Loan Association
ZARDI	Ngetta Zonal Agricultural Research and Development Institute

INTRODUCTION

This case study documents the experiences, results, and lessons learned from the Eco-system-based Disaster Risk Reduction (Eco-DRR) project undertaken by the United Nations Environment Programme (UNEP) with the Partners for Resilience (PfR) members CARE International in Uganda, CORDAID, and Wetlands International, with funding from the Directorate General for International Partnerships (DG-INTPA), European Commission. The objective is to strengthen community resilience through Eco-DRR activities in selected areas of Uganda. The project was implemented from May 2019 to June 2022 in six micro-catchments (Odongi, Loyorit, Angaro, Baya, Okee, and Kacheri) of the Aswa River catchment, particularly in sections of Otuke, Alebtong, Agago, Abim and Kotido districts in Northern Uganda. These areas were selected because they experience frequent and prolonged droughts due to increasingly unpredictable rainfall patterns which have a detrimental influence on agricultural land usage. As a result, the growing season shortens, agricultural productivity declines, and water resources are depleted. This further reduces food and nutrition security, increasing mobility of communities and accentuating natural resource-based conflicts and ecosystem degradation.

Overall objective: Strengthened resilience to drought and flooding of 160,000 vulnerable women and men in 5 districts of Eastern Aswa Catchment in Northern Uganda.

Specific objective: Scaling up Integrated Risk Management (IRM) and inclusive risk governance through improved catchment-based water resources management that is risk-informed, gender- and ecosystem-sensitive

Project Outcomes:

- Increased ability of communities to anticipate, absorb, adapt, and transform towards the impact of hazards such as drought and floods.
- Enhanced capacity of district local governments to improved, inclusive and effective multi-stakeholder governance at catchment level to foster sustainable development that takes a landscape approach, is risk-informed and eco-sensitive.
- Enhanced capacity of Civil Society Organisations (CSOs) and the private sector to improved, inclusive and effective multi-stakeholder governance at catchment level to foster sustainable development that takes a landscape approach, is risk-informed and eco-sensitive.
- Demonstrated the effectiveness and learning on Integrated Risk Management (IRM) with Civil Society stakeholders and governments at local, national, regional, and global level in a resource package that consolidates good practices and facilitates the replication and scaling up of the Eco-DRR approach.

Unsplash/Keith Kasaija

UGANDA PROJECT LOCATION

The project is implemented in 5 districts of Eastern Aswa River Catchment in Northern Uganda

Table1: *Expected results/targets.*

Number of community-based / local level organisations that have been trained to implement Eco-DRR activities	40
Number of hectares of ecosystems restored or protected as a result of Eco-DRR field project implemented	40,000 Ha
Number of people who are benefiting (directly or indirectly) from community-based model of Eco-DRR field project	160,000

Key Implementing partners: CARE Uganda, Wetlands International Eastern Africa, Facilitation for Peace and Development (FAPAD), Facilitation for Innovative Actions and Sustainable development (FINASP), CARITAS Lira and CARITAS Kotido, National Forestry Authority (NFA), Ngetta Zonal Agricultural Research Institute (ZARDI).

1

Rationale

Uganda is experiencing increasing variability in rainfall and temperature, presenting an additional stress to the country's development, particularly given its high dependency on rain-fed agriculture.

1.1 Drivers of Risk

Uganda is experiencing increasing variability in rainfall and temperature, presenting an additional stress to the country's development, particularly given its high dependency on rain-fed agriculture.

The North and Northeastern parts of Uganda experience frequent and prolonged droughts and floods due to increasingly unpredictable rainfall patterns. These have adverse impacts on agricultural land use, catalysing the mobility of, in particular, cattle-keeping communities in search of grazing and watering areas during prolonged dry spells,

The micro-catchments of the Aswa River in Northern Uganda suffer from excessive flooding during the rainy season and prolonged drought during the dry season. A micro-catchment is a hydrological unit that drains into a common outlet. Most of the downstream communities have resorted to encroachment in the wetlands to grow rice, and graze animals. However, the practises are unsustainable, and creates further risks of crop losses, exacerbating the food insecurity in the area.

Natural resource-based conflicts are evident during the dry season, when communities from the drier areas of the catchment in Karamoja migrate with their livestock in search for water and pasture downstream in Agago and Abim districts. The COVID-19 pandemic has created a multi-faceted crisis. As women are drawn away to take care of sick relatives, household income and savings in the Village Savings and Loans Associations (VSLA) groups have reduced, pushing communities to further encroach on fragile ecosystems and cutting of shea-nut trees. These challenges, coupled with poor catchment-level coordination and the non-functioning of water resource management structures, worsen community vulnerability to shocks and stresses. Through the project implementation period, other emerging challenges include:

- Land ownership disputes among farmers, institutions, and ethnic groups slowed the implementation of livelihood and afforestation activities. The project team was able to offset this challenge by collaborating with religious and opinion leaders to strengthen awareness around Eco-DRR and ensure that leaders are exemplary in adopting restoration and protection activities.
- The Uganda National Water Policy puts emphasis on the coordinated planning and management of water and related resources from a catchment perspective. However, while the policy objective is clear, the practise of coordinated management linking the micro-catchment to the catchment level is still needed.
- The project sites in Abim and Kotido Districts suffered a locust invasion, although this was short-lived and did not cause devastating impacts on people's livelihoods.
- There were cases of political interference due to the election campaign period in early 2021. Some political leadership positions changed, during the project implementation requiring the project team to re-orient the new leadership for purposes of continuity and sustainability of the project models. To some extent, these political changes also affected the implementation of the field monitoring that was planned for the political and technical leaders to enable them to touch base with field activities implemented by the different partners.

1.2. Strategies for Addressing Drivers of Risk

Project activities are implemented at community and catchment levels. The overall rationale for the combination of community-level and catchment-level activities is based on the *Landscape Approach to Disaster Risk Reduction*[1], basing community-level interventions on a broader catchment-level assessment of impending hazards and solutions. This approach aligns well with the catchment-based *Integrated Water Resource Management Framework* of the Ministry of Water and Environment (MoWE), anchored in the national water policy. As such, the Eco-DRR project demonstrates the need to empower micro-catchment level structures to bridge this coordination role, for example, through bottom-up planning processes leading to the development of micro-catchment plans, that can be used as tools for lobbying the local government.

The activities below address the challenges described above and provide a basis for upscaling:

- **Demonstrating model projects** in different micro-catchments of the Aswa River. The activities implemented so far include promotion of eco-based enterprises such as apiculture, establishment of Water Retention, Recharge, Reuse (3Rs) structures around rehabilitated boreholes for improved access to drinking water, surface water dam construction for livestock, tree growing on private and public land for restoration and food security improvement with fruit trees, wetland buffer protection, and Farmer Managed Natural Regeneration (FMNR). These were coupled with trainings and awareness raising in IRM, VSLAs, gender and inclusive governance. Additional model projects recently completed include the promotion of small-scale irrigation technologies for high-value crops in collaboration with the Ngetta Agricultural Research Institute (ZARDI), establishment of green houses to reduce drought risks, promoting the protection of shea nut trees and the processing of shea nut products as an eco-enterprise, the establishment of improved pasture demonstrations, and the research and publication of traditional early warning information. These models demonstrate how a combination of local indigenous knowledge and scientific approaches to a landscape facilitate optimal use of natural resources and the resilience of communities.
- **Bottom-up planning processes** in different micro-catchments empowered communities to identify issues within their scope. Subsequently, local solutions were proposed and action was taken to include holding the duty bearers accountable for carrying out the agreed actions. Micro-catchment planning and implementation was intended to generate evidence for advocacy regarding existing policy gaps that have rendered catchment-based Integrated Water Resources Management (IWRM) ineffective. Some of these weaknesses include limited catchment-level coordination, weak inter-sectoral coordination, and non-functioning of water resource management structures. The project team will continue to work with the Ministry of Water and Environment (MoWE) in developing a case for Micro-catchment-based Restoration and Protection for Disaster Risk Reduction. This is envisaged through the analysis of policy gaps and the development of policy recommendations for engagement at the national level.
- **Strengthening the capacity of Catchment Management Organisations.** Several trainings in stakeholder collaboration and Integrated Risk Management were undertaken with the Aswa Catchment Management Organisation. The Aswa Catchment Management Organisation is composed of both the technical and political leadership of the districts that make up the Aswa Catchment. It is anticipated that the knowledge will enable these leaders to make risk-informed and ecosystem-sensitive decisions in their areas.

1. CARE and Wetlands International: A Landscape Approach for Disaster Risk Reduction in 7 Steps

- **Mainstreaming Eco-DRR approach** into sub-county, district and national development plans, programmes and policies through feeding the experience from the project into national and regional dialogues. At the subnational level, Eco-DRR has been integrated in the Otuke District Development Plan for 2021 – 2025. The project team successfully influenced the inclusion of actions relating to restoration and protection of water catchment areas to monitor incidences of flash floods. The District Development Plan will provide strategic direction for the implementation of district priorities for the next 5 years, and this will ensure the sustainability of the proposed actions on restoration and protection of water catchments beyond the Eco-DRR project lifespan.
- **Involving the private sector in the development of viable ecosystem-based livelihood options** and supplying the necessary inputs. The project team has engaged with a private sector entity (Green and White Enterprises) based in the region to support local farmers in different Eco-enterprises. They participated in the IRM trainings organised by CARE Uganda through the Eco-DRR project, and this has resulted in better support to beneficiaries. For example, with support from CARE Uganda, they delivered trainings to VSLA groups in beekeeping, shea-nut processing, and handy-crafts specifically tailored to meet the different gender and vulnerability needs across the landscape and to enable farmers to make informed choices about the enterprises to take up. Through Wetlands International, the private sector actor was engaged to support bee farmers in Abim District with both technical trainings and production inputs, including beekeeping start-up kits and constant improvement of the beekeeping model based on emerging risks and existing vulnerabilities.
- In line with restoration and protection of ecosystems, **the team adopted a multi-thronged approach** presented in Table 2 below with actions planned to achieve the 40,000-ha target. At least two to three restoration/protection actions were applied in each of the six micro-catchments, tailored to each ecosystem type. The main hazards addressed by the restoration and protection agenda are flash floods and prolonged droughts, and to a limited extent, wildfires, which are predominant in the pastoral areas and rangelands.

Table 2: *An overview of the various actions and types of ecosystems.*

Ecosystem	Restoration Actions	Protection Actions
Rangelands	○ Integrated pasture production and management (multiplication of improved pastures with specific forage grasses such as *chloris gayana* and *brachiaria*)	○ Adoption and enforcement of community bylaws for controlled grazing. ○ Community mass sensitization. ○ Establishment of fire lines
Wetland/Riverine	○ Demarcation and restoration of depleted wetland areas (through natural regeneration, assisted natural regeneration). ○ Participatory development and implementation of (gender-sensitive) wetland restoration plans. The plans clearly show the number of hectares to be restored and the actions planned to attain those hectares. ○ Promote viable eco-based livelihood options to prevent the local communities from further encroachment and encourage sustainable livelihood practises such as shea-nut processing, beekeeping, and irrigated farming.	○ Delineating critical zones; buffer zones for protection and production zones for promotion of wise wetland use activities. ○ Community-based monitoring of illegal activities in the wetland ecosystem to curb encroachment. ○ Adoption and enforcement of community by-laws for wetland protection. ○ Community mass sensitization.

Ecosystem	Restoration Actions	Protection Actions
Forest Land	○ Promotion of farmer-managed natural regeneration (FMNR) practices. ○ Establishment of woodlots on private and public land. ○ Promotion of live-fencing with Kei apple trees in 4 model villages: this involved fencing of homesteads (*manyattas*) and community gardens. ○ Promote viable eco-based livelihood options (shea-nut processing, beekeeping, irrigation) to prevent local communities from further encroachment.	○ Protection of existing shea nut trees and enforcement of by-laws on shea nut tree cutting. ○ Tree planting along the boundaries of protected areas. ○ Community-based monitoring of illegal activities in forest ecosystems to curb encroachment in collaboration with NFA.
Farmland	○ Water Smart Agriculture based on the 3R (Retention-Recharge-Reuse) approach in the upstream, midstream, and downstream areas of the micro-catchments. ○ Promotion of agro-forestry on individual farms. ○ Promotion of irrigation technologies in the upstream and mid-stream areas of the micro catchments (solar driven; treadle pumps and bucket kits).	○ Promotion of FMNR practices on private farmland. ○ Promotion of agro-forestry on individual farms and fire lines to protect farmlands.
Water– catchment protection	○ Rehabilitation of non-functional water hand pumps and shallow wells. ○ Rehabilitation of non-functional valley dams. ○ Construction of a subsurface dam.	○ Fencing off water ponds and functional hand pumps using vegetative fibre materials such as *Milk bush* and *Sisal*. ○ Protection of functional valley dams with vegetative cover, establish and build capacity of water user committees.

2

Success Story

"Commercial beekeeping improves our livelihoods and supports the protection of our forests and water streams, preventing drought and flooding"

Honey production and honey hunting are traditional practices for the communities in the Karamoja sub-region of Northern Uganda; however, commercial beekeeping is still in its infancy. Men are accustomed to making traditional log hives from indigenous trees in the forests, particularly on the hillsides. Beekeeping is a highly promising livelihood venture owing to the naturally occurring large bee population, particularly in the hundreds of hills and forests across this region. However, such eco-enterprises face several challenges, including, but not limited to, scarcity of bee forage due to extensive degradation of the ecosystem through burning (which is a common practice in the pastoral communities in quest for fresh pastures for their animals), a lack of knowledge, skills, and equipment to produce and harvest quality honey to meet competitive market standards, and the use of rudimentary hives. These factors have limited the participation of women in apiculture activities because of the social norms surrounding the perception that bees are harsh and cannot be managed by women.

In the framework of the Eco-DRR project, Wetlands International in partnership with CARE International, Uganda, and Cordaid, are supporting 30 smallholder farmers from the Upper-Agago sub-catchment in Abim District, Northern Uganda, to boost their beekeeping activities to a commercial level with a view of improving their livelihoods and building resilience.

The beekeepers were trained on the current concepts and practises of commercial beekeeping. The trainees were then equipped with 330 baited Kenya Top-Bar Hives (KTBH), metallic stands, and other assorted beekeeping materials. Technical assistance for hive installation and post-training follow-up visits were also provided.

Photo Credit: Unsplash/Bianca Ackermann

A total of 100 beekeepers were selected from three beekeeping associations. From these, thirty-three individual beneficiaries – 15 women and 18 men – were organised in three clusters under the leadership of three champions, each linked to ten other beekeepers.

Building on the existing indigenous knowledge on beekeeping, the groups were trained on improved beekeeping practices, use of different beekeeping equipment and honey harvesting kits, value addition to honey and other bee products such as beeswax, propolis, and bee venom, as well as market access. In addition, restoration and planting of tree species that boost bee forage were integrated in the beekeeping sites, and a community-tree growing campaign was rolled out in the beekeeping sites, with the support of the National Forestry Authority.

As a result of the training, the hives are now set up - both in the national forest reserve and on privately owned forested land, with the aim of contributing to the protection/restoration of 8000 ha of forests and improving the livelihoods of the local communities.

Engaging and supporting the beneficiaries with training helped them gain considerable experience and confidence. Their knowledge, skills, and attitude were much improved, and they looked forward to following the next actions of inspection, colony multiplication in order to ensure that all the hives are colonized. Feedback received during the follow-up monitoring visits indicated that the beneficiaries will successfully apply the acquired skills and knowledge to continue commercial beekeeping using modern technologies. The Bee Champion Extension Service Model will further reinforce learning among beneficiaries. To date, 37% of the 330 hives that were established in total are already colonized.

Field session on apiary selection, installation and management as well as protection from predators and pests. Photo Credit: Wetlands International Africa

Members of Gin Alo Obanga Pe group supported by the Eco-DRR project, harvesting honey from their Apiary site. Photo Credit: Mikhail Fernandes/UNEP

'As a woman, I have benefited a lot from the Apiary project. We can harvest 17 kg of honey from each hive, and right now we have 6 kgs here. Each kilogram sells for 12,000 shillings (3.2 USD), totaling 72,000 Shillings (19.2 USD), and this amount can support us in several ways, like paying for school

Akello Rose, Beekeeping Chairperson, Gin Alo Obanga Women Group, Otudu Village

I am excited about being part of the Bee champions, it has saved myself and my family the hustle of rudimentary beekeeping! In the honey harvest season between January and March, my husband would melt into the night carrying hot coal and fresh shrubs to light up and smoke out the bees from the hives. Once the bees abandoned the hive, he would then pick out the combs by hand. Having no protective gear, he was forced to endure inevitable bee stings. Thanks to the skills and the protective equipment, we can now go about bee keeping with minimum bee stings, and restore our ecosystems as well

Acheng, a female bee champion from Alerek

3

Main components and model

Establishment of micro-water catchment committees and enhancing national guidelines for improved drought and flood management.

3.1. Eco-DRR Components

Capacity Building

Under this component, the focus is on empowering community resource user groups through bottom-up micro-catchment planning, including community mobilisation and awareness raising targeting wetlands and forest adjacent communities, with a focus on enhancing their knowledge and skills in laws and regulations governing ecosystem management, access rights, and responsibilities. This awareness raising was integrated with tailor-made trainings in eco-enterprise development (apiculture and shea nut processing), pasture management, IRM, Farmer Managed Natural Regeneration (FMNR), and water-smart agriculture, coupled with the provision of translated versions of early warning and early action information about flooding and drought risks in collaboration with the National Meteorological Authority through community radio and meetings.

Community participation involved situational analysis of the micro catchments, dialogue meetings with local authorities at the sub-counties and districts, validation meetings with districts and the Ministry of Water and Environment through the Upper Nile Water Management Zone, dissemination of the wetland management plans and bylaws, and promoting learning across catchment management structures.

The project has demonstrated the following results:

- 81 Community-based Organisations (CBOs) trained on Integrated Risk Management (IRM), which combines ecosystem restoration with risk reduction activities.
- 6 Micro-catchment management committees operational and implementing micro-catchment management plans for drought and flood management.
- 60 Village Saving Loan Association (VSLA) groups trained on group governance and eco- enterprises.
- 33 Aswa Catchment Management Committee members were trained on IRM for drought and flood risk reduction.
- 4 district governments have been trained in IRM to integrate climate change indicators and Eco-DRR in their plans and budgets.

Field Implementation

This component involves translating the plans into actions. It also involves actions taken by the communities themselves as a result of the capacity building given by the project. Examples of these actions include Eco-enterprises such as bee honey production, shea nut processing, and production of handycrafts. In addition to these activities, the project also established water management structures through the 3R (Retention, Recharge and Reuse) approach in a bid to increase access to water for both human consumption and for nature, demarcated wetland buffer areas and restored the degraded lands with 22 assorted tree species like *Indian Lilac, Red Mahogany, Ivory Coast Almond, Exotic Mvule, White Teak, Nile Tulip, White Bark Senna, Chinaberry Tree, Ficus, Bamboo, Pine, Eucalyptus, Silk Oak, Apple-ring Acacia, Calliandra, Tamarind, Jackfruit, Avocado, Citrus, Mango, Guava and Kei apple*. Tree-growing was integrated with natural regeneration of the degraded sites, all of which are aimed at increasing community resilience and reducing further encroachment on the fragile ecosystems.

The project has demonstrated the following results:

- 109,388 beneficiaries reached of which 50% are women.
- 29,586 hectares (ha) of land successfully restored and protected around targeted micro- catchments including central forest reserves and private land.
- 470 beehives established to improve the resilience of beekeepers and contribute to protection of 8,000 ha ecosystem in Abim, Agago, Otuke, and Alebtong. The estimated revenue from this initiative is up to 90,000 USD/year.
- 8 shea-nut press and grinder machines established with VSLA groups in Otuke, Agago and Alebtong. Estimated revenue is 2,057 USD/year.
- 3 Solar driven small scale irrigation pumps,10 treadle irrigation pumps and 10 bucket irrigation kits established in Otuke, Alebtong and Agago.
- 6 boreholes rehabilitated and 364 HHs have access to water through a sub-surface dam in Kotido.
- 2 green houses established in Kotido to support commercial horticulture.
- 6 Improved Pasture demonstration/multiplication sites (12 ha) in Kotido.

Advocacy with Government

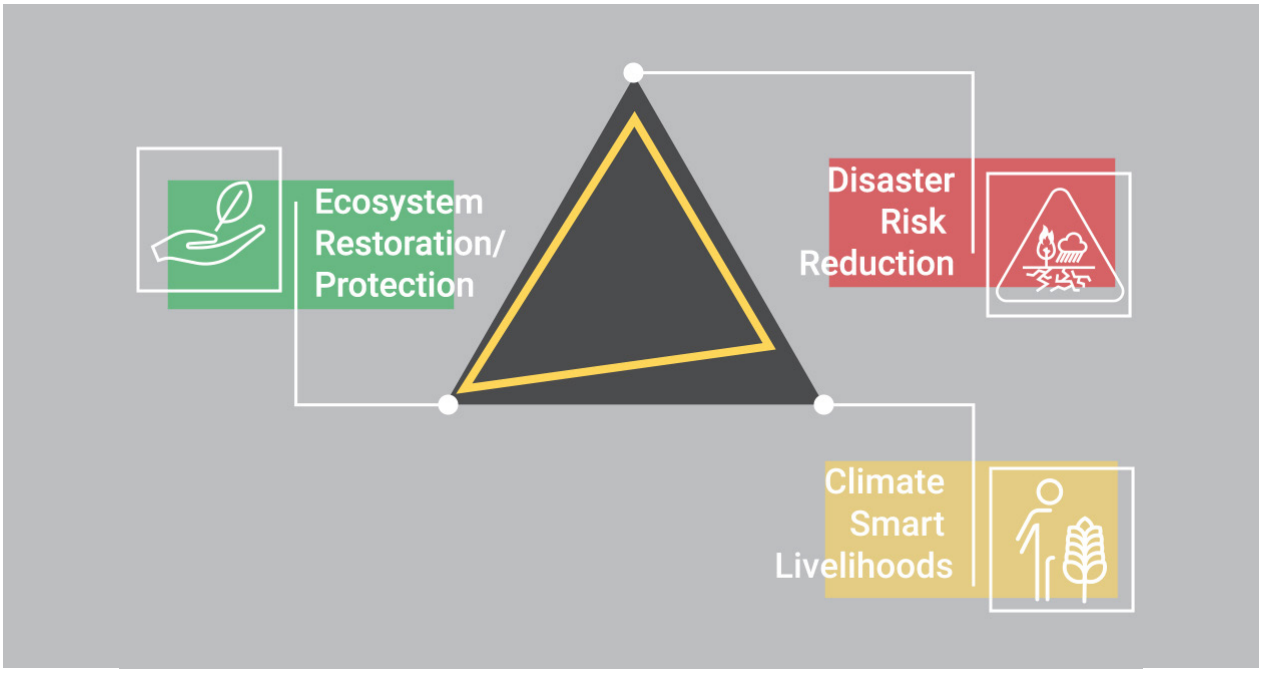
This component of the project involves inclusive stakeholder engagement and participation, with a particular focus on strengthening the district local governments in the project areas to promote the integration of climate change indicators into the district service delivery performance matrix through awareness-raising sessions and supporting expert advice. It also included supporting the community groups to engage with local government to demand for ecosystem governance and climate change related services through monitoring service delivery, community dialogue meetings, mapping, and demarcation of selected resources, encouraging the local CSOs and local communities' participation in planning, budgeting, and tracking the implementation of environmental actions. Enforcement of community by-laws and response to issues raised by the community-based monitors is foreseen, including technical guidance in the interpretation of the relevant government natural resource policies and laws. In Alebtong district, for example, the duty bearers in the Baya wetland micro catchment are more aware of the relevant community bylaws for wetland protection and management, and have prioritised their implementation, thanks to the dialogue undertaken by the implementing CSO partners in this project area. In Abim District, the Micro-catchment committees were capacitated and confirmed to undertake their roles and responsibilities as stipulated in the micro-catchment management organisational manual.

The project has demonstrated the following results:

- Promoting the integration of climate change through awareness-raising sessions in Otuke district through local government contributions that supported the Nationally Determined Contributions.
- Supporting CSOs and local community participation in planning and tracking implementation of environmental actions with local government, including enforcement of community by-laws.
- Influencing review of national guidelines on micro-water catchment planning to integrate IRM with Ministry of Water and Environment for replication nationally.

3.2. Eco-DRR Model

Establishment of micro-water catchment committees and enhancing national guidelines for improved drought and flood management



The Eco-DRR model was demonstrated through a bottom-up planning and implementation process (micro-catchment to catchment). The local communities are at the centre of the stage and are empowered to identify, prioritise, and take action on the issues that affect their resilience. These actions are compiled into the micro-catchment management plans, wetland restoration and protection plans. In the different micro-catchments, community representatives, through their committees, are supported to engage with local government to demand for improved ecosystem governance and climate change related services through community dialogue meetings, mapping, and demarcation of selected resources, encouraging local CSOs and local communities' participation, including women's groups, in planning, budgeting, and tracking the implementation of Eco-DRR actions.

Ecosystem Restoration/Protection

- Community-based micro-catchment planning empowers communities, including women's groups, to identify ecosystem degradation issues, engage in the restoration and protection of different ecosystem types, and realise community aspirations.
- Local communities are empowered to engage with the local government for the resourcing and implementation of micro-catchment management plans through the local government's annual plans and budgets.

Climate Smart Livelihoods

- Eco-enterprise promotion (apiary value chain, shea nut processing, small-scale irrigation technologies, and green houses for horticulture) through model farmers and champions.
- Farmer Managed Advisory hubs for the provision of authentic local technologies, seeds, skills, and knowledge in cooperation with Agricultural Research Institutes and the private sector.

Disaster Risk Reduction

- Integration of indigenous and scientific knowledge for improved forecasting; dissemination of early warning and early action information on flooding and drought forecasts to farmers in collaboration with the Ugandan Meteorological Authority.
- Promoting local networks through VSLA that strengthen community social safety nets.

3.3. Common roles or key issues to be considered

It is important to acknowledge that every landscape has its unique political, economic, social, technological, and environmental attributes. These need to be well understood by the implementing team right from the beginning. In the context of Eco-DRR in Uganda, the country team did the following to maximise contextual analysis:

- A comprehensive Baseline Survey[2] with sampled households, Focus Group Discussions (FGDs) and Key Information Interviews was undertaken to gather primary data on key drivers of risk, including a GIS analysis to have a fair understanding of the landscape attributes.
- Inception workshops at national and subnational level were completed, focusing on hazard mapping, stakeholder analysis, and mapping, ensuring that all key stakeholders are well represented. In this project, the stakeholders themselves proposed which areas of the micro-catchment were relevant for the planned interventions.
- Eco-DRR project in Uganda has built on the existing work of Partners for Resilience (PfR) which has over 10 years of presence in the region, with substantial engagement of district officials, local partners and community members.
- A project steering committee, drawn from the bigger Aswa catchment management committee was established, comprised of technical and political representatives from the 5 districts where the Eco-DRR project is implemented. The steering committee is an independent body that meets quarterly and provides feedback to improve the project implementation.
- The project team identified and strengthened the existing community and local government structures and created new structures only if there were no relevant structures in place.
- The project team engaged and empowered the local CSOs who understand the language and culture of the project sites.
- Understanding the community seasonal calendar helped to avoid conflicts with the existing community programs and consider community opinions with respect.
- Engagement of the relevant government offices, such as the Ministry of Water and Environment, Department of Water Resources Management, was central for providing technical guidance, building linkages, and influencing the relevant policies.
- Using the existing government policy to ensure that the project operated within the mandate of the government, for instance we referred to the Aswa catchment Management plan[3] and used the available government guidelines and policies for successful implementation of the project.

2. https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&cad=rja&uact=8&ved=2ahUKEwiY8NSEv7rxAhWRUhUIHYFxCksQFjABegQIAxAD&url=http3%A2%F2%Fwww.careevaluations.org2%Fevaluation2%Fup-scaling-community-resilience-through-ecosystem-based-disaster-risk-reduction-eco-drr-project-baseline-report2%F&usg=AOvVaw BfNjKC83KcS9hT9eYzNre

3. https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&cad=rja&uact=8&ved=2ahUKEwiY-M64wLrxAhUipHEKHRmCAKMQFjABegQIAhAD&url=https3%A2%F2%Fwww.mwe.go.ug2%Fsites2%Fdefault2%Ffiles2%Flibrary2%FAswa2520%CMP2520%Popular2520%Version.pdf&usg=AOvVaw1XrJpaftcdzloGPgSD1owY

3.4. Scalable feature

Ways to replicate the Uganda model:

1. The Eco-DRR project in Uganda was implemented at the micro-catchment level. At the country level, water resources management is informed by the catchment-based water resource management framework, which was introduced under the Ministry of Water and Environment. The catchment-based approach is relevant in addressing the hydrological nature of the disasters targeted in the project areas, including flash floods and drought. As such, restoration and protection of ecosystems were undertaken with the catchment perspective in mind. Operating at the catchment scale also addresses upstream-downstream conflicts, owing to the fact that ecosystems and disasters do not respect administrative boundaries. This model can be scaled up in other countries facing similar hydrological related disasters, by establishing and supporting micro-water catchment committees in the framework of enhancing and influencing relevant national guidelines, including for improved drought and flood management.

2. The Uganda Eco-DRR model can be replicated in other places with the following actions

- **Disaster Risk Reduction: Early warning and early action**

Features include the *integration of local knowledge and scientific information in weather forecasting.* Working closely with the Uganda Meteorological authority, the weather forecast information is translated into understandable formats for the local communities. The information is disseminated through local structures such as the Community based monitors, micro-catchment committees, Village Savings and Loans Associations, and through the local government technical staff at the parish and sub county levels whose capacity has been built. This information has supported farmers to make informed decisions on when to plough the land, when to plant, and when to harvest. In turn, the feedback on accuracy and timeliness of the information is shared with the authority through the local structures for improvement.

- **ER/P: Farmer Managed Natural Regeneration technique**

There are two main features of this technique. The first feature is *Natural Regeneration*, including the growing of trees from living tree stumps, tree roots and seeds in the fields, grazing lands and degraded forests to be re-vegetated. The emphasis is on natural regeneration rather than on planting with the use of tree seedlings raised in tree nurseries. The second feature is – Farmer managed, whereby the emphasis is on farmers or communities managing the regeneration rather than prescriptive and project-directed regeneration. It is the farmers who decide what species to protect, when and how to prune, how to share the proceeds, what to do about infringements on agreed rules, the respective roles of and benefits to women, men, vulnerable groups, etc.

- **Climate Smart Livelihoods: Eco-enterprise development**

It includes *Training in the Eco-based enterprises and provision of startup kits and production equipment on a cost sharing basis with the community groups.* Trainings include (e.g.): training in apiculture value chain: introduction to commercial beekeeping, bee biology, beekeeping and environment, benefits of beekeeping, commercial bee products, entrepreneurship, and markets. Estimated training time of 2 days on an average per group of 25 to 30 people. Training in shea nut processing and value addition: introduction to commercial shea nut production, shea nut and the environment, benefits of shea nut, propagation/management, collection, derivative products of shea-nuts, entrepreneurship, and marketing shea products. Estimated training time of 2 days on average per group of between 25 to 30 people. Training in crafts: sourcing raw materials from nature, benefits of crafts in tourism, culture and business, crafts entrepreneurship, and marketing crafts locally and beyond. Estimated training time of 1 day on average per group of between 25 to 30 people.

The Farmer Managed Natural Regeneration (FMNR) technique is a flagship restoration approach adopted for the Eco-DRR implementation in Uganda. For this project, this technique is now popularly referred to as "Okom champions" in the local dialect (Okom meaning "tree stump"). The approach is cost-effective, as it is based on the regeneration of tree stumps, and wildlings naturally existing trees on the farmer's land, so there is no need to purchase or produce seedlings. The technique also matches with the predominant livelihood of project communities, as the biggest percentage of project participants are farmers, occupying 85% of the land available for restoration. The project team has built the capacity of the local governments by training the District Natural Resources Officers and the Agricultural Production Officers on the concept of FMNR. As a result, we observe interest and uptake by the local governments. For example, the District Natural Resources Office of Otuke integrated the approach in their annual work plan and has allocated a budget line for FMNR. This has contributed to additional hectares under restoration, hence supporting the achievement of the project's restoration agenda. This will also foster the sustainability of the project model after its life span.

In a nutshell, the emphasis of FMNR is on regeneration as compared to new planting:

- It is a low-cost, simple, and sustainable land restoration practice.
- It is a tree management practice, involving the selection, pruning and maintenance of trees.
- It is equally a community empowerment practice, re-greening people's mindsets, and enhancing relationships between communities, nature and their landscapes.
- It is a response to deforestation and the resulting adverse effects on biodiversity and livelihoods.

How to scale up FMNR

- Getting a critical mass of farmers to implement it on their farms
- Getting the FMNR model integrated into plans, programs, and policies of the Government and CSOs
- Getting the relevant development workers on board

The FMNR technique may not easily be adoptable in areas where mechanised agriculture is implemented. This is because the tree stumps are randomly distributed on the farm and can be a limitation to the use of draught power or tractors for ploughing the land. In pastoral communities, grazing animals limit the success of the technique, especially when the seedlings are still young and at risk of being trampled over by the grazing animals.

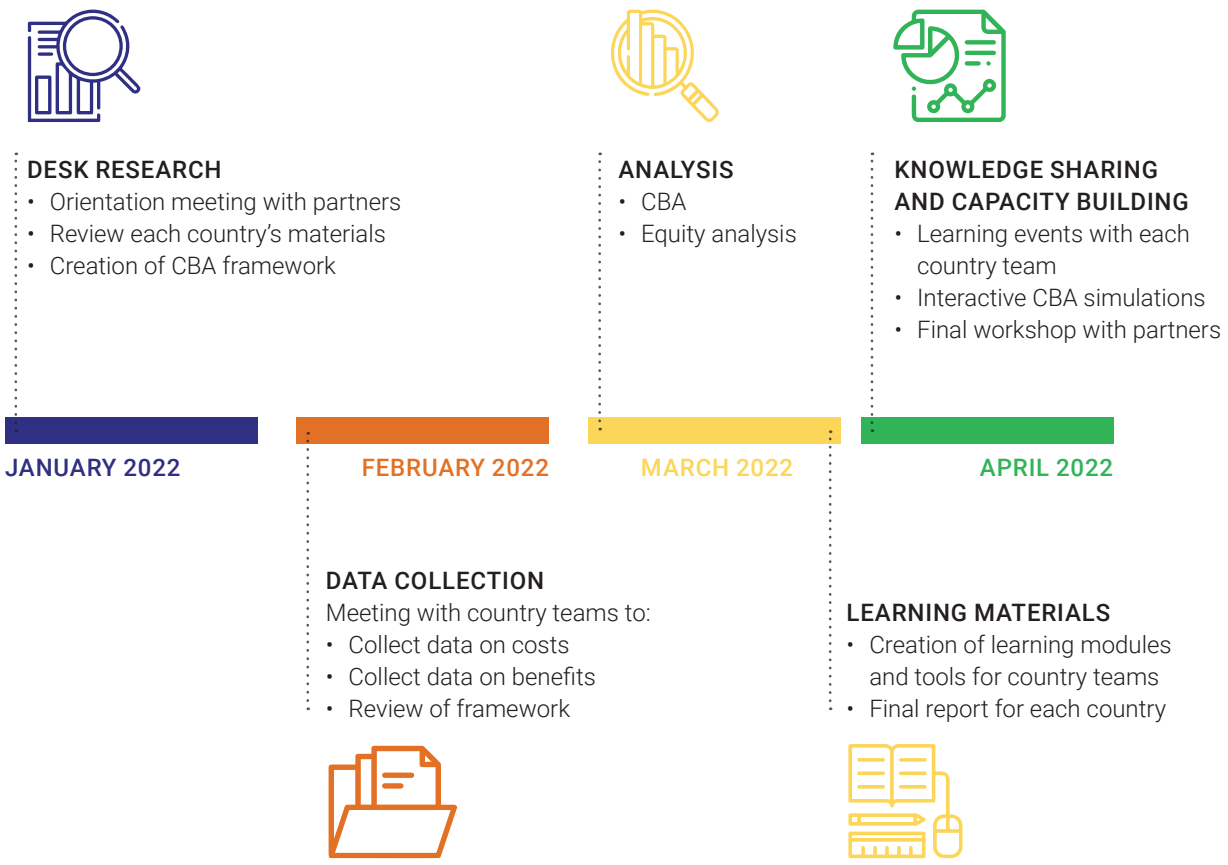
4

Eco-DRR Cost-benefit Analysis (CBA) Study

This study was conducted when the project was still ongoing. The Eco-DRR interventions analyzed in this study, including the size of the target population and the extent of the ecosystems protected and restored have evolved since then. The study presented the estimated economic net benefits of applying the Eco-DRR approach.

4.1. CBA Methodology

The methodological approach adopted in this study includes five components: desk research, data collection, cost benefit and equity analysis, creation of learning materials, and knowledge sharing.



Overall project timeline and methodological approach for efficiency analysis (which includes a cost benefit analysis) and equity analysis

4.2. Strength, Limitations and Recommendations

The economic efficiency assessment of the project through a quantitative Cost-Benefit Analysis (CBA) and a qualitative analysis includes a vast array of non-monetary benefits too. The quantitative estimates show that the benefits of the Eco-DRR and resilience enhancement interventions outweigh their implementation costs. The qualitative analysis complements these findings presenting a rich bouquet of long-lasting benefits associated with Eco DRR's three core components: DRR strategies, Ecosystem Management, and Sustainable Livelihood Practices. **This economic efficiency assessment is corroborated with an equity analysis providing a comprehensive overview of the distributional impacts of the intervention on different socio-economic groups.** The large amount of qualitative data and preliminary quantitative data provided by the country teams contributes to the strength and relevance of our analyses. Despite the time constraints, country teams assisted the research team to the best of their abilities, often collecting new data from the field, thus laying the groundwork for possible future data collection efforts and analysis.

The analysis presented in this report is based on an approximation of the frequency and magnitude of climatic hazard in the region. More precisely, the key figure relevant for this CBA is the yearly average of the economic impact of the damages due to climatic extremes and other hazards. The analysis assumes that the local communities experience damages of 2% of their property value and income. Our estimate for this figure represents a conservative approximation based on World Bank data as well as data provided by the country team.

Ideally the CBA estimation performed in this study should consider:

1. historical frequency (i.e., probability of occurrence) and magnitude of climatic extremes and other hazards in the project region, at least over 30 years,
2. observed correlation between intensity of extremes (e.g., precipitation) and damages to properties,
3. observed correlation between intensity of extremes (e.g., precipitation) and income losses.

Such data would allow better ground the value of the yearly economic damages due to climatic extremes into a robust statistical framework. Due to limited data availability, the above components were not included in the analysis. Moreover, the short time available to complete the analysis did not allow to collect primary data about these components.

Another variable that would need to be better estimated in order to increase the robustness of the CBA is the percentage of damage avoided thanks to the Eco-DRR intervention. Since the project is in its early stages, there is no empirical evidence of the protective power of the nature-based solutions implemented in the project area. In our estimation we assume that the Eco-DRR intervention is able to completely prevent the annual damages to properties and income losses (starting in year 6 after the end of the project implementation).

The quantitative analysis lays the foundation for a possible future broader CBA of the Eco-DRR intervention in this region. Recommendations for future research, if a longer time frame for data collection and analysis is possible, would be to: collect data related to the three components highlighted above and reproduce the CBA estimation; plan a rigorous data collection schedule in the project area to measure the observed efficacy of the local Eco-DRR interventions in limiting disaster risk. In five to ten years, the collected data could be used to perform an empirically rigorous project evaluation.

4.3. Scenarios

SCENARIO 1:

Benefits include reduction in property damage and income losses Benefits **do not** include carbon capture and pollution reduction

SCENARIO 2:

Benefits include reduction in property damage and income losses Benefits include carbon capture and pollution reduction

4.4. Results

SCENARIO 1: After **5 years** (at a 0.07 discount rate) - when benefits **do not** include carbon capture and pollution reduction but do include reduction in GDP - the present value of net benefits is about **negative 145,050 USD**. After 10 years the present value of net benefits is **252,249 USD**.

SCENARIO 2: After **5 years** (at a 0.07 discount rate) - when benefits include carbon capture and pollution reduction, reduction in GDP - the present value of net benefits is about **16,467,839 USD** (30,861.460 USD). After **10 years** the present value of net benefits is estimated to be above **190 million USD.**

Assumptions

The Cost-Benefit Analysis framework adopts the following assumptions and specifications:

- The present value of net benefits (i.e., Net Present Value, NPV) is estimated over a time horizon of 10 years from the end of the project implementation
- The full costs of the project implementation are paid only once in year 0, which corresponds to the end of the implementation

- The ecosystem associated with the eco-DRR intervention (i.e., forest) reaches maturity after 5 years
- There is a 2% yearly loss in properties and avoided income losses (measured as GDP per capita) in the project area (we also perform robustness check with a 5% yearly loss)
- Until year 5 , while the ecosystem is maturing, there is a progressive increase in benefits (i.e., 10% of benefits the first year, 20% the second year, 30% the 3rd year, 40% the 4th year and 50% the 5th year)
- The ecosystem restored/protected by the Eco-DRR intervention reaches maturity after 5 years, and starting in year 6 it provides full benefits

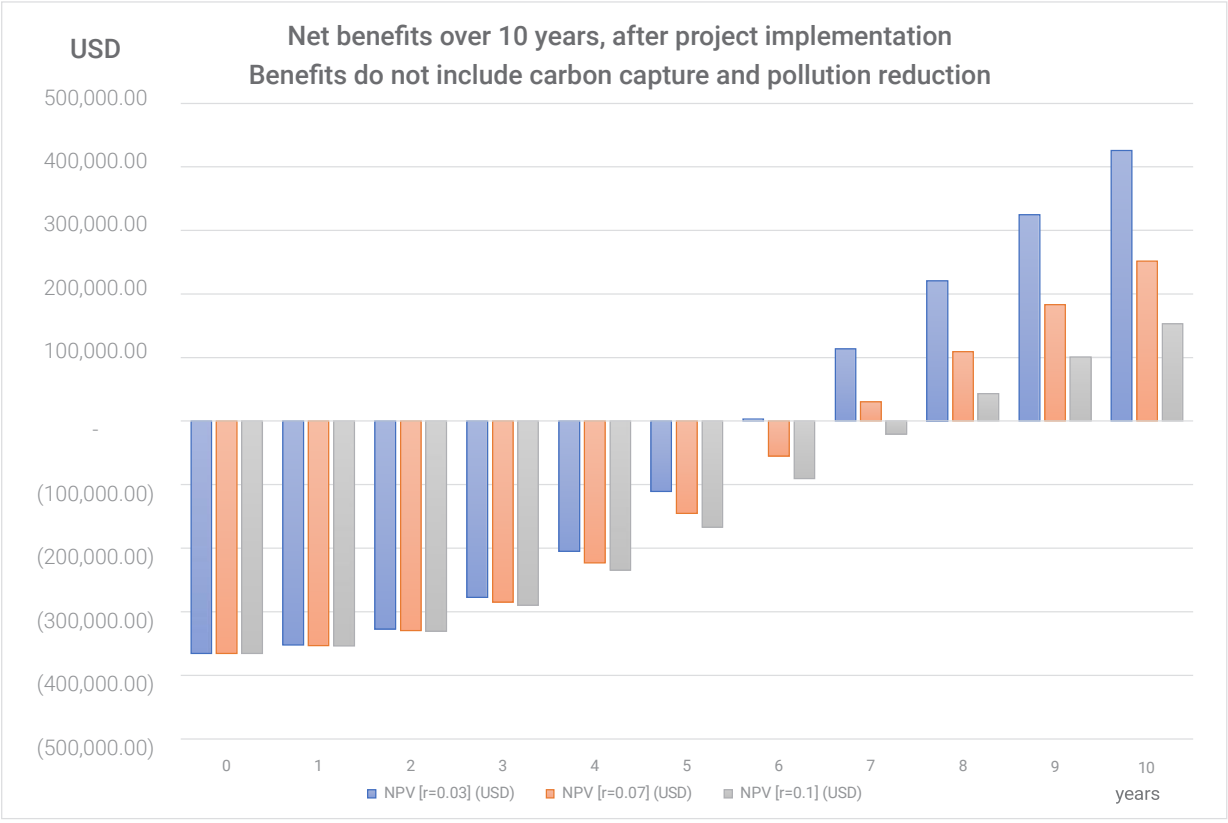
Discount rates

The CBA estimations are performed using three discount rates (i.e., 0.03, 0.07, and 0.1) to allow comparisons across outcomes and robustness checks. Higher discount rate values lead to a lower weight of future benefits and costs in the CBA estimation. Ecosystem-based interventions may generate long-term benefits that might be underestimated with high discount rates. For this reason, it is important to adopt a range of discount rates and perform sensitivity tests. Three percent and seven percent are the discount rates generally recommended by the US Office of Management and Budget (OMB) (Congressional Research Service, 2016; Li, Q. and Pizer, W.A., 2021).

It is worth emphasizing that these estimates are very conservative and net benefits might be much higher than these calculations indicate.

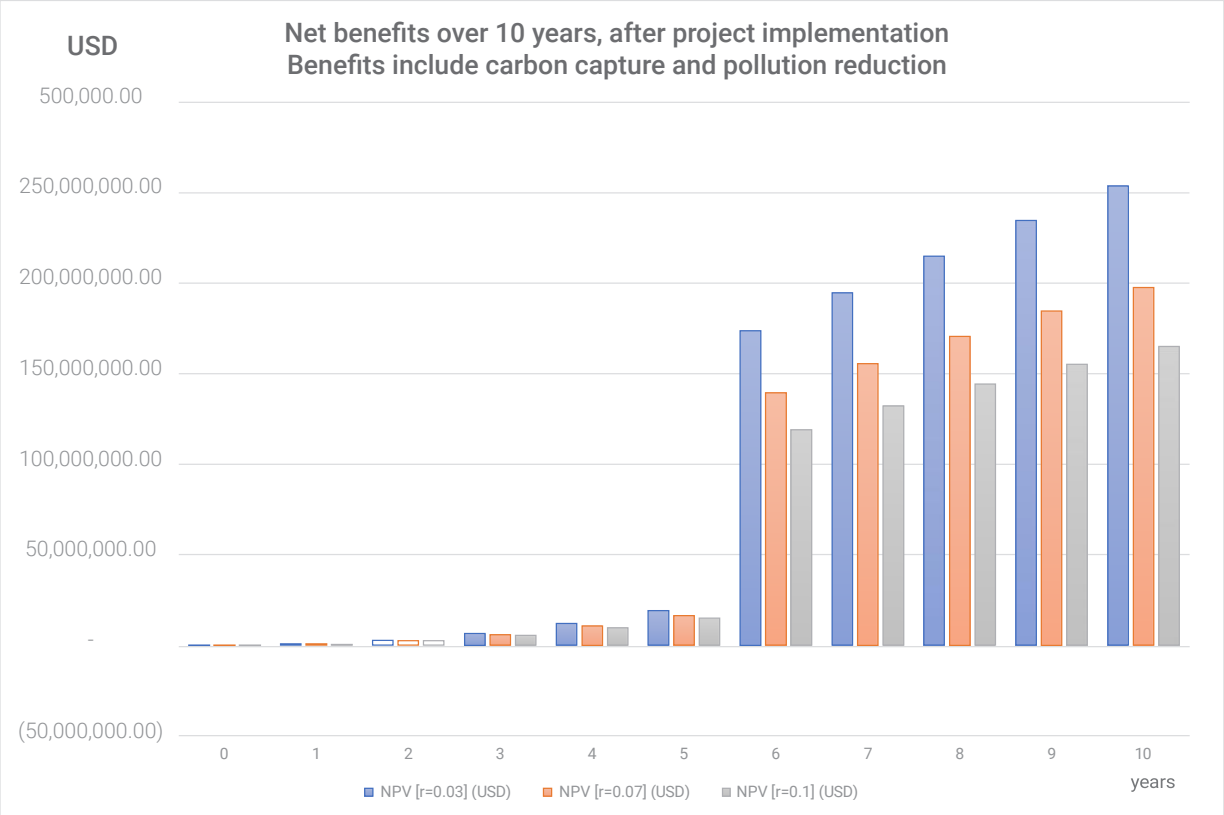
There are two main reasons. First, the CBA assumes a 2% loss in GDP per capita every year in the project area due to weather extremes, however historical data shows higher losses, and weather risk is expected to increase in relation to climate change. Second, the CBA assessment considers only socio-economic benefits associated with reduced GDP per capita losses. Because of lack of data we could not include other important benefits of the Eco-DRR intervention such as, for instance, health improvements and increased agricultural productivity. (discussed in Section 4.2). This means that the interventions could be even more beneficial to local communities than estimated in the quantitative analysis.

Scenario 1



SCENARIO 1 - Present Value of Net Benefits			
Benefits do not include carbon capture and pollution reduction			
Discount rates	r=0.03	r=0.07	r=0.1
year	**NPV (USD)**	**NPV (USD)**	**NPV (USD)**
0	-$365,594.00	-$365,594.00	-$365,594.00
1	-$352,399.44	-$352,892.69	-$353,239.09
5	-$110,795.41	-$145,050.22	-$166,729.84
10	$426,092.75	$252,249.37	$153,158.33

Scenario 2



SCENARIO 2 - Present Value of Net Benefits			
Benefits include carbon capture and pollution reduction			
Discount rates	r=0.03	r=0.07	r=0.1
year	**NPV (USD)**	**NPV (USD)**	**NPV (USD)**
0	-$365,594.00	-$365,594.00	-$365,594.00
1	$641,506.72	$603,858.10	$577,418.49
5	$19,082,404.73	$16,467,839.16	$14,813,100.59
10	$253,813,633.14	$197,575,457.67	$165,076,970.93

4.5. Details about benefits used in the calculations

BENEFITS				
		SCENARIO 1	SCENARIO 2	
Year		USD (3/29/22)	USD (3/29/22)	notes
1	**Reduction in property damages** from avoided hazards (annually)	135,904.00	135,904.00	GDP per capita (World Bank, 2020)
2	**Avoided income losses** reduction of losses from business interruption (annually)			
3	**Carbon stored in trees** (this benefit is not an annual rate)		158,915,196.00	benefits are estimated using the program iTree
4	**Carbon capture and sequestration** (annually)		12,128,208.00	benefits are estimated using the program iTree
5	**Other pollution reduction** (annually)		13,464,875.61	benefits are estimated using the program iTree
		135,904.00	184,644,183.61	

The cost-benefit analysis includes all ecosystem restoration implementation costs (365,594 USD)[4] and the following benefits:

- **Reduction in economic losses from avoided hazards** - reduction in risk of floods and landslides is expected to lead to mitigation of damages to farmland and dwelling places. Additionally, reduced risk may reduce loss of income in case of hazards. We estimated the total values of avoided losses in the project area using demographic information provided by the country team and Uganda's GDP per capita value (World Bank):
    - Total number of people in the project area = 5480
    - Total number of households in the project area = 1096
    - 2020 GDP per capita (World Bank data) = 1240 USD
    - Estimated annual GDP in the project area = 1240 USD/per capita *5480 people in the project region = 135,904 USD
- **Carbon stored in trees**
  Carbon stored in protected and reforested area of 29,726 Ha. This is not an annual benefit; it is a one-time benefit reached at maturity of the forest in year 6. Benefits estimated using iTree.
- **Carbon sequestered thanks to Eco-DRR reforestation efforts.**
  The reforestation target area is 40,000 ha. Area currently reforested: 29,726 Ha -- Benefits estimated using iTree.
- **Pollution reduction thanks to Eco-DRR reforestation efforts.**
  The reforestation target area is 40,000ha. Surface currently reforested: 29,726 Ha. Pollutants reduced: Carbon Monoxide, Nitrogen Dioxide, Ozone, Sulfur Dioxide, Particulate Matter less than 2.5 microns, Particulate Matter greater than 2.5 microns and less than 10 microns -- Benefits estimated using iTree

4. Budget documents provided by the country teams show that the cost of the intervention associated with *Community-based Eco-DRR Planning and Ecosystem Restoration and Protection* activities amount to 365,594 USD. We assume no maintenance after the end of the project implementation (June 2022).

The software iTree Canopy is a global forestry analysis and benefits assessment tool from the United States Department of Agriculture's (USDA) Forest Service. iTree allows to calculate carbon sequestration and storage as well as pollution reduction of a given vegetation area, selected via Google Map. The 29,726 Ha of land protected and reforested in Uganda is estimated to sequester roughly 139,809 tons of carbon annually, and the overall carbon storage capacity for the same area is estimated at 1,832,253 tons. iTree provides estimates of the corresponding monetary values too (available in the table on page 4). Tree methods:

https://www.itreetools.org/documents/650/i-Tree_Methods_gtr_nrs200-2021.pdf

4.6 Equity analysis

In addition to the benefits described above, these vulnerability-reduction and resilience-enhancing interventions promote socio-economic equity, gender sensitivity, and cultural heritage protection in the target communities. Vulnerable groups including women, and children have benefited, and will continue to benefit, from improvements to their economic, social, and health status. This equity assessment examines the equity implications of the interventions along four dimensions: inclusivity, economic equality, participation, and capacity building.

Inclusivity

The interventions have been developed and implemented in an inclusive manner that aligned with the project's goal of capacity building. Local communities were central to the planning and implementation process, engaging women as key participants and beneficiaries to ensure that interventions were gender sensitive. Additionally, indigenous knowledge and practices were incorporated into the interventions, where possible.

Economic Equality

The interventions in Uganda help to fulfill basic needs and improve socio-economic outcomes for women, men and for the communities as a whole. As a result of the disaster-risk reduction achieved through reforestation and soil stabilization, communities will be more resilient to natural hazards and less likely to suffer economic losses through property damage and interruptions to business, strengthening the beneficiaries' rights to a home and livelihood. Reduction in vulnerability to natural hazards, combined with the numerous sustainable livelihood initiatives introduced in these communities (e.g., apicultural activities, tree nursery management, forest management, sustainable agricultural and grazing practices) will also decrease the risk of poverty traps. The poorest and most marginalized individuals will benefit the most from vulnerability reduction. Additionally, children's education will less likely be interrupted due to inaccessible roads preventing them from getting to school. This is particularly impactful for girls, whose ability to complete their education will lead to future economic empowerment and will have positive effects for generations to come.

Other interventions such as reforestation and the dam construction promote basic human needs to clean air, potable water, and food. These interventions also reduce the time women and children spend collecting essential natural resources (e.g., firewood and water), greatly decreasing the opportunity cost and risks associated with doing so. With less time spent on unpaid labor, women now have more time to participate in income-generating activities and children can invest more time in education. Women's safety has increased as well, as traveling long distances from home to secure resources in unsafe conditions puts women and children at increased risk of violence. Ensuring resources are accessible nearby reduces this risk while promoting human capital accumulation and women empowerment. The interventions also promote economic equality by training and empowering women to earn wages through sustainable livelihood practices. For example, the installation and use of modern beehives for apicultural empowered women to participate as well, as these hives are more user-friendly and accessible to women than the traditional hives.

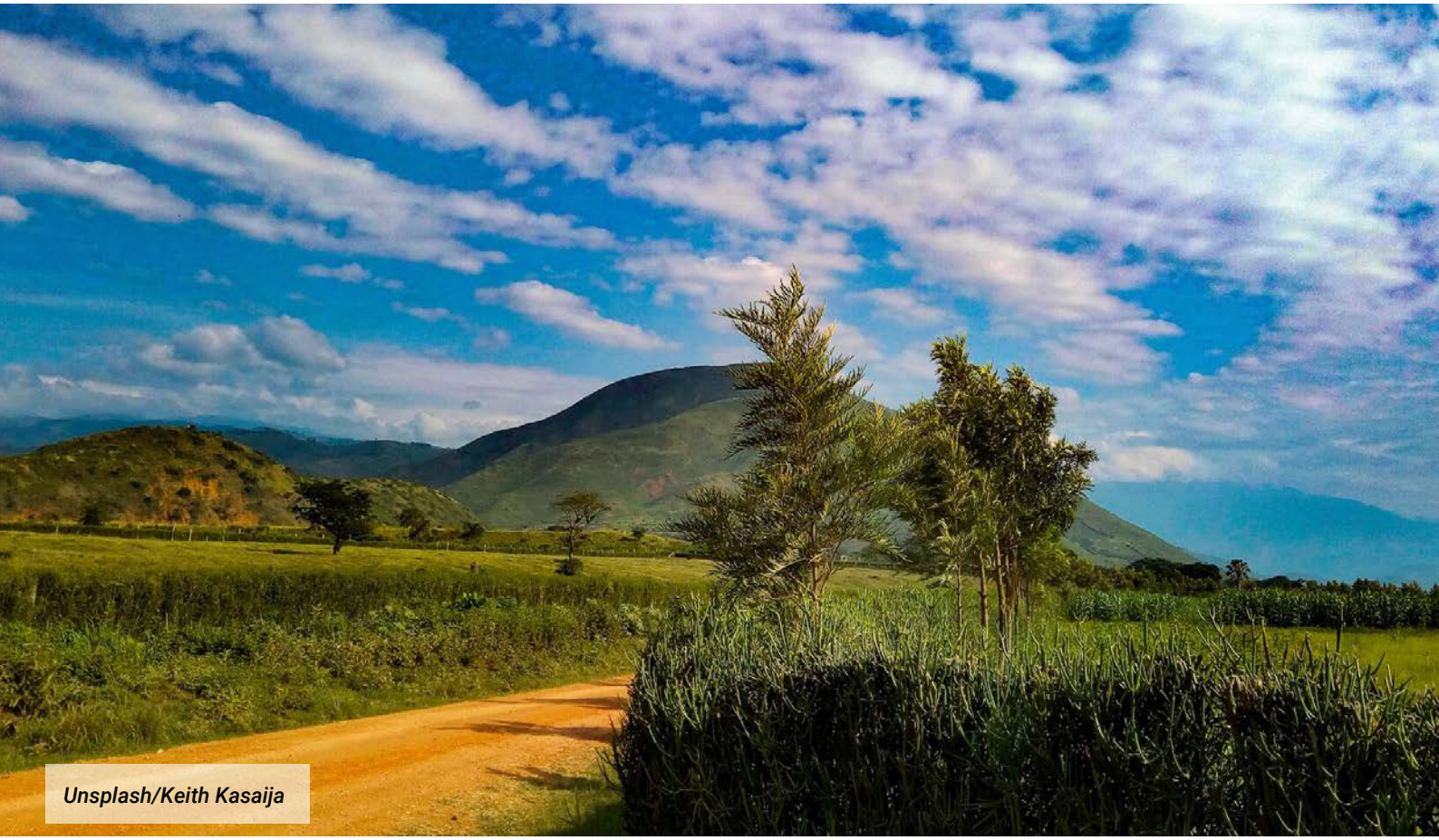
Participation

The participation of affected local communities is central to the interventions in Uganda. Community organisations participated throughout the micro-catchment planning process, including through training and awareness raising efforts, identifying key issues and contributing to the development of action plans, and meeting with local authorities to advocate for sustainable, risk-informed, and ecosystem-sensitive development. Additionally, individual community members have been capacitated through formal training and awareness raising to participate in the interventions. This includes participation in the installation of beekeeping kits, establishment of water management structures, demarcation of wetland buffer areas, and tree planting and maintenance.

Capacity building

The interventions have increased the capacity of local communities and local governments through economic and environmental benefits. The transfer of knowledge through the interventions is supporting communities through sustainable economic growth, women empowerment, enhanced health and safety, and disaster risk reduction. The centrality of training and community participation to the interventions ensures that stakeholders have the necessary knowledge, skills, processes, and resources to continue these sustainable practices in the future, as well as adapt to future challenges that may arise.[1]

1. Vicarelli, Marta, Anamaria Georgescu, Kerry Judge, Asiel Arroyo, Htike Htike Aung, Jennifer Nelson, Jessica Mooring, Nujhat Purnata, Yin Yin Win. *"Ecosystem-based Disaster Risk Reduction and Community Resilience in Uganda: a Cost-Benefit and Equity Analysis"*. (2022) School of Public Policy, University of Massachusetts Amherst, MA, USA.



Unsplash/Keith Kasaija

5

Lesson learned

Strategies and actions to address gender mainstreaming issues such as lower women participation and representation.
Recommendations for the future Ec-oDRR initiatives and upscaling.

5.1. Project lessons learned

- Awareness raising on ecosystem management and restoration should be done using the most effective media and closely linked with the relevant issues that affecting the communities to attract their attention and interest to listen to the broadcasted messages. It is also essential to find the best way to count number of people reached by the messages for monitoring purposes. Reference to government population data could be helpful to provide an estimation. Empowering and enhancing the existing community-based association such as Village Saving Loan Association (VSLA) with environmental protection capacities along with gender inclusive planning can increase resilience and reduce gender violence in households. Similarly, improving the VSLA method by stepping out from traditional approach coupled with diversified ecosystem-based enterprises will strengthen resilience of community livelihoods against disasters.
- Improving pasture management and multiplication of demonstration sites in pastoral communities require intensive awareness raising and training to change pastoralist communities' mindset and behavior who are used to free range and nomadic way of herding. Creating a pool of trainers in this community will facilitate the dissemination of knowledge and skills in pasture management.
- The ecosystem restoration and protection measurement required specific data collection and format which resulted in readable GPS coordinates to generate GIS report. It required guidance and technical support from GIS expert to ensure the data is collected in the right way.
- Strategies and actions to address gender mainstreaming issues such as lower women participation and representation.

5.2 Gender Mainstreaming

During the design of the Eco-DRR project in Uganda, the CARE gender marker was applied to vet the extent to which gender considerations have been met in the design phase. Subsequently, this informed a comprehensive baseline survey to determine the differences in vulnerabilities and capacities of the target communities disaggregated by gender.

As part of the inception activities, different stakeholders across the landscape were invited to discuss plan and agree on the project implementation sites. In this process, hazard maps were developed in a participatory way with stakeholders from the respective proposed sites. Subsequently the project sites were selected based on the gendered experiences of hazard impacts, informed by the most affected areas and the least ready to cope in case disaster strikes.

In the project implementation, there has been deliberate action to invite more women in the capacity building activities, especially at the community level. This also led to more female participation. Economic empowerment of women groups and training women in leadership, including encouraging women to take up leadership positions. In such a patriarchal community, engaging men to support women to grow their enterprises has been an instrumental approach in gender mainstreaming particularly for the Eco-enterprises where productive assets like land are needed. Furthermore, the project supported women to actively participate in district local government planning and budgeting processes, thanks to the capacity building of local women leaders on IRM and support from the Eco-DRR project to have women as part of this process.

Future Eco-DRR projects need to consider undertaking an in-depth gender analysis and Action Planning including resourcing the implementation of gendered actions resulting from a detailed gender analysis. This should be site specific and done at the inception phase of the project. An in-depth gender analysis cannot be replaced by a general baseline study, even when the study has some elements of sex disaggregated data.

5.3. Recommendations for upscaling

- Based on the learning from Eco-DRR project at micro catchment level, there is a need to *integrate risk management* into the catchment management planning guidelines, from an ecosystem perspective. This can be achieved through working with Ministry of Water and Environment and other relevant stakeholders to review the guidelines to include all aspects of Integrated Risk Management (IRM).
- Promoting *market-based approaches* to restoration and protection of Ecosystems. Especially ensuring that the entire value chain of the Eco-enterprise is supported. This will naturally create incentives for more actors to embrace ecosystem restoration and protection.
- *Linking project efforts to existing and potential government programs* like the Parish development model. This will ensure that the project activities will find a sustainable home and can continue to be implemented beyond the project life.
- Strategic linkages and *capacity building of local governments fosters* sustainability of project models. For example, training the local governments in Farmer Managed Natural Regeneration encouraged the integration of the model into plans and budgets at sub county and district level.
- Establishing *learning hubs at the community level* not only strengthens the capacity of community groups but also builds capacity of nearby institutions. For example, the Community irrigation learning hubs established by the Eco-DRR project are also used as centers for practical learning by primary schools in the communities

5.4. Recommendations for future Eco-DRR projects

- In order to effectively capture restoration results, the project implementation period needs to be at least 5 years. Tracking restoration should then follow once the key biodiversity and ecological functions have been achieved. This cannot be easily achieved in 2-3 years.
- Working along and within government frameworks or policies on the management planning of specific ecosystem can contribute to achieving high level results to overcome the limitation of project lifespan and financial resources. This can be done by proposing the improvement of the existing frameworks or policies on ecosystem management planning using the successful experiences and best practices of the project.
- Future Eco-DRR projects should consider undertaking a Political Economy Analysis as part of the baseline study to inform project delivery as restoration projects entail strong behavioral change as well as governance aspects involving multiple actors, power centers and community dynamics, which require time and resources to change. This specific activity needs to be embedded in the inception phase in the first three months of the project.
- In undertaking restoration and protection work, in most of the cases we are dealing with collective resources (wetlands, natural forests, rangelands etc.) which benefit the entire population, but difficult to mobilise people to invest in their protection. Future Eco-DRR projects should consider innovative market-based approaches that create incentives for both communities and private sector to voluntarily restore the natural resource base on which enterprises thrive. This may include targeting support to entire value chain of eco-enterprises right from production to offtake, so that communities appreciate the value of ecosystems even more.

This case study documents the experiences, results, and lessons learned from the Eco-system-based Disaster Risk Reduction (Eco-DRR) project undertaken by the United Nations Environment Programme (UNEP) with the Partners for Resilience (PfR) members CARE International in Uganda, CORDAID, and Wetlands International, with funding from the Directorate General for International Partnerships (DG-INTPA), European Commission. The objective is to strengthen community resilience through Eco-DRR activities in selected areas of Uganda.