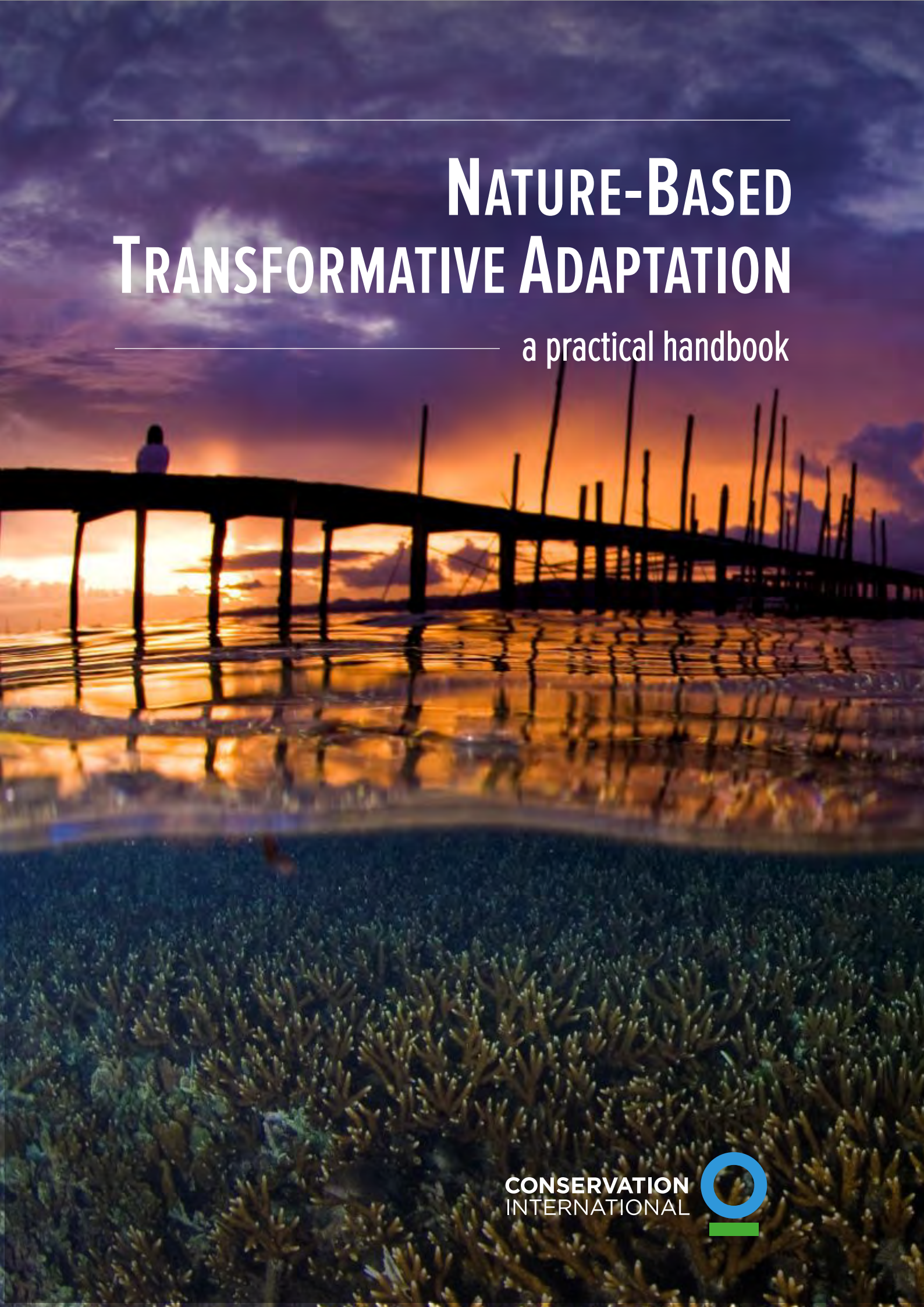

Nature-Based Transformative Adaptation

a practical handbook

CONSERVATION INTERNATIONAL

Cover page: How can we be better prepared to respond to major shifts driven by climate change, such as massive coral reef bleaching?

Cover photo: Sunset in the Bird's Head Peninsula in Raja Ampat, Indonesia

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Contents

Foreword

If we don't stop climate change, little else will matter. Addressing the root causes of climate change (mitigation) and assisting vulnerable populations to build resilience to its impacts (adaptation) are essential to CI's mission of safeguarding nature for human well-being. Current greenhouse gas emission trends put the world on course for a 3.7-4.8°C temperature increase by 2100, which would result in catastrophic impacts. Even with the commitments made under the Paris Agreement, mitigation efforts fall short of the cuts required to limit warming to a relatively safe 2°C or 1.5°C. Further, even if all emissions are stopped immediately, impacts will continue for many centuries due to cumulative historic emissions.

Both mitigation and adaptation will require changes across all sectors of our economy and society. Nature is an often-overlooked, irreplaceable asset in combating climate change. The science is clear on the mitigation potential of natural ecosystems: protecting and restoring tropical forests and mangroves could account for at least 30 percent of global action needed to avoid the worst climate scenarios. Natural ecosystems also provide an invaluable service to help communities adapt to the effects of climate change that are already happening. For example, natural ecosystems provide buffers from storms and secure freshwater sources. Therefore, **we know that we will not be able to confront the climate change challenge without nature.** Reducing the adverse impacts of a changing climate, securing ecological vitality, and supporting human well-being will require that nature-based solutions are implemented to their fullest potential.

Transformative adaptation is a particularly critical strategy to consider as the impacts of climate change become ever more severe. This approach provides solutions that are commensurate to the challenge: by promoting deep, systemic, and sustainable change with large-scale impact. Some sectors have more advanced experience with climate-related transformative change, such as the precipitous advances in renewable energy. In the context of nature, however, the global community requires more understanding of the concept and methodologies, as well as implementation examples, in order to advance uptake of this critical strategy for adaptation.

This booklet aims to improve understanding of what transformative adaptation is, and how to identify, design, and implement initiatives that support transformative adaptation to climate change based on nature. With an improved understanding of transformative adaptation, project managers and policymakers can be better positioned to incorporate this type of adaptation when designing adaptation programs, plans, and initiatives. The booklet also provides examples of transformative approaches based on nature that can support climate resilient development pathways on the ground.

We hope that this foundational research can inform policy processes and decision-making at all scales, and provide concrete examples of how communities can make strides towards a new development paradigm and build a more resilient future for humanity.

Shyla Raghav
Vice President, Climate Change

1 Thinking about Transformative Adaptation

1.1 What is adaptation?

Climate change is increasing temperatures and altering rainfall patterns in many regions, leading to more frequent and intense extreme weather events, such as droughts, floods, and cyclones. These changes have a major impact on the well-being of people and nature, including decreased agricultural yields, lack of clean water, damages to infrastructure, and shifts in species composition. In many parts of the world, the impact of climate change has already been observed. Even if we manage to drastically reduce the carbon emissions that cause climate change today, it will take time for the climate to stabilize. Therefore, there is a need to find ways to help people and nature to adapt to the changes that are already occurring and will continue to occur.

Adaptation is an adjustment in social or ecological structures and processes to respond to the actual or expected impact of climate change. The aim of adaptation is to prevent or reduce the risks that climate change can cause. For example, coastal communities can build walls to protect against sea-level rise, people in cities can increase green spaces to reduce heat islands, farmers can plant drought resistant crops, and businesses can subscribe to flood-damages insurance. In addition, adaptation can take advantage of opportunities that may arise because of climate change. For example, farmers can plant different crops that could not previously grow in their areas. Adaptation strategies can involve both individuals and collective adjustments in social behaviours, physical infrastructure, ecological properties, or governance mechanisms.

There are different adaptation options, depending on the sector, region, and capacity of people to respond to climate change. Because the impact of climate change is different across the world, responses need to be specific to the local context. Several systems are in transition and need to adapt due to climate change, such as the energy, land, urban, and industrial sectors. Climate scientists, in the latest IPCC special report (IPCC 2018), raised the urgent need to adapt in response to an expected 1.5 °C increase in temperature above the pre-industrial levels. Different types of adaptation are required. This includes a range of changes spanning from sustainable land management to resilient building codes, from climate information services to social protection policies.

Figure 1. A young boy in Cambodia travels in an improvised boat from one house to another. ©Conservation International/Sitha Som.

1.2 How to adapt?

There are several strategies that people can use to respond to the impacts of climate change. People can modify social behaviours, physical infrastructure, ecological properties, or governance mechanisms. There is no 'one-size-fits-all-solution' because the adaptation options are highly dependent on the context and capacities of the system that is affected. However, climate change responses can be loosely categorized into four major types:

The more transformative the adaptation strategy, the higher the human inputs and re-organization required. Transformative adaptation fundamentally changes systems' properties and functions to address the root causes of vulnerability. Implementing transformative adaptation requires significant investments of time, money, and skills. Therefore, it is harder to implement transformative adaptation compared to other response strategies (Fig. 2)

Inaction
Lack of strategies to respond to the impact of climate change, which is disregarded, and lead to harm or damage to people and nature.

Coping strategies
Strategies to resist the impact of climate change and aim to maintain a similar state or business-as-usual functioning of people and nature.

Incremental adaptation
Strategies to accommodate the impact of climate change through minor alterations that build resilience of people and nature.

Transformative adaptation
Strategies to overcome the impact of climate change through fundamental shifts in states and interactions of people and nature that address the root causes of vulnerability in the long-term.

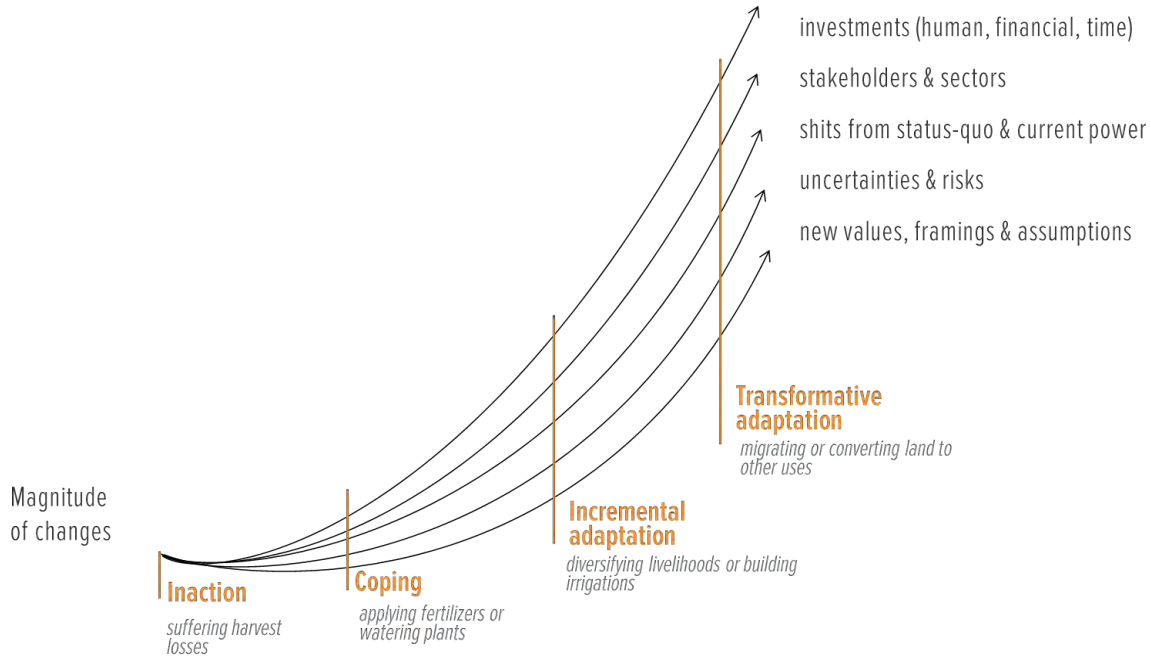


Figure 2. Four types of response strategies to the impact of climate change along a gradient of increasing magnitude of changes. Examples from the agricultural sector in italic (Fedele et al. 2019).

1.3 Why transformative adaptation?

Some current **climate change responses need to go beyond business-as-usual** to maintain people's well-being in the long-term under the expected impact of climate change. Coping or incremental adaptation may be insufficient, fail, or be counterproductive in the face of new climate conditions. For example, as climate change increases sea levels and the occurrence of extreme weather events, the adaptations of coastal communities, such as repairing damaged infrastructure or building higher seawalls may be compromised. In this case, planning transformative adaptation might be more appropriate to deal with the expected future changes in climate. An example of transformative adaptation for this situation could be assisting the relocation of people, converting the use of the coasts to mangrove and salt tolerant species, or introducing building codes for flood resistance.

Why consider transformative adaptation?

- To address root causes of climate-related vulnerabilities
- To plan anticipatory and long-term adaptation
- To avoid ineffective adaptation and maladaptation
- To implement the only remaining adaptation option

Transformative adaptation might be the most appropriate solution in case of major shifts in social and ecological conditions driven by climate change. Transformative adaptation can help shift from accommodating change to deliberately implementing more sustainable and forward-looking strategies. This type of adaptation strengthens the capacity of people and nature to adapt in the long-term and addresses the root causes of vulnerability. However, so far, we have rarely considered transformative adaptation in plans or strategies to reduce the impact of climate change. Part of the reason is due to the high investments of money, time, and skills, as well as the power dynamics that are required to change from business-as-usual responses. In addition, there is a lack of information on what transformative adaptation entails, when to consider this type of adaptation, and what it looks like in practice. This hinders the use of transformative adaptation, missing opportunities to invest in long-term solutions that effectively reduce climate change risks.

In the following chapters, we present **what transformative adaptation means in practice** based on a review of theoretical and empirical studies. We first introduce a conceptual understanding to differentiate transformative adaptation from other types of adaptation based on a review of scientific literature (Chapter 2). We then describe an overall strategy to use nature to adapt to climate change (Chapter 3). We complement this theoretical discussion with concrete examples based on Conservation International's experience implementing projects related to the use of nature to help people adapt to climate change in transformative ways (Chapter 4). In addition, we present a brief overview on the major financial initiatives that are supporting transformative adaptation (Chapter 5). Finally, we present methods to help design projects or plans that consider transformative adaptation (Chapter 6).

With an improved understanding of transformative adaptation, project managers and policy makers will be better positioned to consider this type of adaptation when designing adaptation programs, plans, and initiatives so they are adequately addressing the challenges posted by climate change (e.g. National Adaptation Plans, Nationally Determined Contribution, and GEF/GCF Adaptation projects).

2 Identifying Transformative Adaptation

2.1 What characterizes transformative adaptation?

The concept of transformative adaptation has been described in several ways, depending on the system of interest (e.g. the ecological, financial, socio-cultural, or governance system). However, there are several similarities across systems. A recent review of 80 scientific papers identified six recurring characteristics of transformative adaptation (Fedele et al. 2019[1]). Transformative adaptation was often described as being re-structuring, path-shifting, multiscale, systemwide, innovative, and persistent. Each characteristic represents a specific adjustment in a system that is adapting to climate change. When an adaptation strategy encompasses or has the potential to encompass these six characteristics in a comprehensive way, it is most likely to result in transformative adaptation. The six characteristics are presented in the table below with examples related to the interactions between people and nature, i.e. from a social-ecological systems perspective (Table 1).

Table 1. The 6 characteristics of transformative adaptation and examples related to the interactions between people and nature, i.e. from a social-ecological perspective (based on Fedele et al. 2019).

	**Re-structuring** altering fundamental features or interactions in ecosystems and societies	*Changing croplands with sedentary farmers to communal grasslands with pastoralists.*
	**Path-shifting** shifting the current trajectory of a social-ecological system towards a different direction.	*Shifting from subsistence to market-based livelihoods.*
	**Multiscale** spanning multiple spatial, jurisdictional, sectoral or trophic scales.	*Involving local, regional, national agencies in forest management.*
	**Systemwide** triggering systemic changes at large scale.	*Covering entire watersheds or landscapes.*
	**Innovative** introducing new functions or states for that location.	*Introducing early warning system for climate-related hazards in places that did not have that previously.*
	**Persistent** leading to long-term impacts, even if not necessarily irreversible.	*Institutionalizing land-use policies or management committee.*

[1] Fedele et al. 2019 (Env. Sci. & Pol.) Transformative adaptation to climate change for sustainable social-ecological systems

2.2 When to consider transformative adaptation?

Transformative adaptation can be the most appropriate strategy in the context of major climate change impacts affecting particularly vulnerable people or assets. In certain situations, other adaptation strategies that maintain the current state might be more suitable but it is likely that these situations will become less common with climate change. As climate change impact increases, coping strategies or incremental adaption are likely to be ineffective. Poorly designed adaptation strategies might fail, causing not only loss of money, but also degradation of nature and disruption of livelihoods. For example, building irrigation or dikes to reduce the impacts of drought can increase greenhouse gas emissions and reduce water supply downstream. Similarly, expanding agriculture by cutting down forests can help people by providing emergency if flood damage crops, but also create erosion in the long-term.

There are three scenarios when transformative adaptation should be considered in adaptation plans or projects. First, when climate change impacts are expected to be particularly severe (e.g. in mountains, coral reefs, drylands); second, when existing adaptation strategies are already reaching their limits (e.g. in rural areas, marginal agricultural land); and third, when losses and damages have already happened (e.g. in coasts under sea level, dried out wetlands, unproductive lands). Under the three scenarios described above, transformative adaptation is better suited than other strategies and can be implemented to address one or more of the following: i) to anticipate radical climate change impact to reduce future vulnerability, ii) re-direct ongoing climate change impact and adaptation to effectively reduce current vulnerability, and iii) recover from radical climate change impacts to new viable states.

When to consider transformative adaptation?

In places expected to be severely impacted by climate change
(e.g. high mountains, coastal zones, coral reefs, dry lands, wetlands)
- High risk of failure of other adaptation strategies

In places reaching adaptation limits
(e.g. rural areas, marginal agricultural land, low-lands)
- High risk of maladaptation and further degradation

In places already degraded by climate change
(e.g. coasts under sea level, dried out wetlands, degraded lands)
- Only viable adaptation strategy under new conditions

Examples from around the world indicate that adaptation is an iterative process, and can occur through bouts of trial and error. Adaptation pathways describe how people can continuously take and evaluate decisions related to adaptation and its different outcomes (Figure 3). Such pathways illustrate key decision and intervention points that influence the transition of a system toward a desired direction under several uncertainties. They help underscore adaptation as a dynamic process that is happening through time, in which certain decisions are influenced by previous choices and circumstances. For example, a fishing community may adapt to increasingly severe cyclones and associated high water levels following different pathways, whether repairing damaged houses, increasing the height of the poles of stilt houses, or changing livelihoods that lead to different outcomes for well-being through time (Fig. 3).

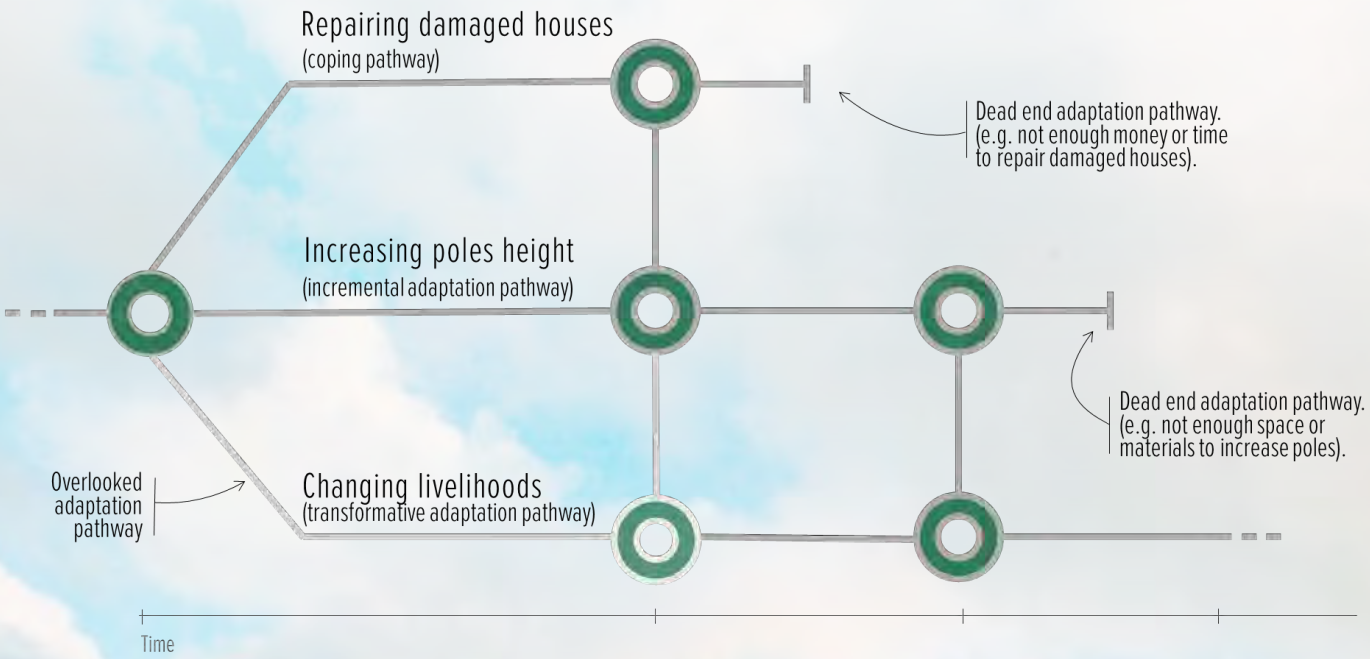


Figure 3. Three alternative pathways of responses by fishing communities to climate change leading to different outcomes.

© Aditya Siva

3 Using Nature for Transformative Adaptation

3.1 What is Ecosystem-based Adaptation?

An approach called ecosystem-based adaptation (EbA) has emerged among practitioners in the past few years. This approach refers to the "use of biodiversity and ecosystem services as part of an overall adaptation strategy to help people adapt to the adverse effects of climate change" (UN Convention on Biological Diversity 2009). This approach includes the conservation, restoration and sustainable management of ecosystems, ecosystem services and processes, as well as maintaining biodiversity to address climate-related risks (Figure 5). EbA measures aim to strengthen the delivery of ecosystem services and processes that support human well-being in the face of climate change. For example, restoring forests can help people adapt to climate change by increasing livelihood diversification and providing alternative sources of food during extreme weather events. Reforesting slopes can reduce erosion and protect water supply in case of major changes in precipitation. Conserving mangroves can protect coastal settlements from storms and waves.

Ecosystem-based adaptation can complement or substitute other adaptation strategies based on hard infrastructure. EbA and hybrid measures often provide solutions to multiple climate change-related hazards at lower costs and risks, while providing several additional advantages over hard infrastructure. For example, while hard infrastructure might have more immediate and visible effects on reducing specific climate change impacts, it can be expensive and deliver few or no co-benefits. In contrast, EbA tends to be more cost-effective, locally available, and generate multiple benefits simultaneously, such as carbon sequestration, livelihood diversification, and biodiversity conservation.

Figure 5. Ecosystem-based Adaptation measures include the conservation, sustainable management, and restoration of nature, such as forests, agroecosystems, grasslands, and wetlands to reduce people's vulnerability to climate change. © Conservation International/Sarah Streyle.

3.2 When is Ecosystem-based Adaptation transformative?

Ecosystem-based adaptation (EbA) can be transformative when designed as part of an integrated approach that fully takes into consideration best practices and future changes. To help people adapt, EbA strategies require healthy ecosystems and sustainable uses. The principles or best-practices of EbA can be linked to several characteristics of Transformative Adaptation (Table 2). EbA measures can include a mix of interventions related to ecosystem management and policies (e.g. protection or restoration of wetlands), but also socio-economic interventions (e.g. livelihoods diversification, payment for ecosystem services, improved value chains), as well as technical interventions (e.g. climate-hazards early warning systems, infrastructure improvements).

Well-designed EbA projects re-shape unsustainable interactions between people and nature, which is a main feature of transformative adaptation. However, to be transformative, EbA should go beyond managing ecosystems for immediate material benefits or climate-proofing existing development to current conditions. Depending on the context, examples of transformative EbA include changing land uses (e.g. implementing agroforestry, restoring wetlands), establishing social institutions for natural resources (e.g. multi-stakeholder water management committees), revitalising ecological values (e.g. reconsidering farmers' traditional practices) or altering social behaviours (e.g. driving consumers' choices towards sustainable agricultural products).

Table 2. The principles or best-practices of Ecosystem-based Adaptation (IIED 2018, FEBA 2017, Andrade et al. 2012) can support the characteristics of Transformative Adaptation (Fedele et al. 2019).

Ecosystem-based Adaptation principles or best-practices	Transformative Adaptation characteristics
Human-centric based on the use of nature	Re-structuring
Sustainable social-ecological systems	
Avoid maladaptation and trade-offs	Path-shifting
Community-based and human rights-based	
Cross-sectoral and collaborative	Multiscale
Multiple & appropriate geographical scales	
Inclusive with multiple beneficiaries	Systemwide
Based on traditional knowledge and science	Innovative
Mainstreamed and integrated in policies	
Long-term capacities and benefits	Persistent

3.3 What are other transformative adaptations not based on ecosystems?

Transformative adaptation can also be based on social or technical measures, in addition to nature. These measures can be an alternative or complement to nature-based transformative adaptation (Figure 6). A governance example of transformative adaptation is the reform from a centralized to a decentralized disaster management agency that improves the efficiency of humanitarian responses to hazards. Transformative adaptation can also be based on financial innovation, such as the payment of insurance premiums that are automatically triggered depending on hazard intensity (e.g. the number of consecutive days above specific levels of precipitation or temperature). In an example from the energy sector, transformative adaptation might be the societal shift toward more efficient buildings and industrial processes that can save water or energy for other adaptations (e.g. watering, heating or cooling). The introduction of new technologies can also drive transformative adaptation. For example, new early warning systems can improve people's preparedness to climate-related hazards. Other transformative technologies for adaptation include using more resistant construction materials that withstand extreme floods or cyclones. Additional examples of transformative adaptation include new social protection schemes for the most vulnerable people, participatory approaches in co-management of scarce natural resources, or planned human migration or relocations.

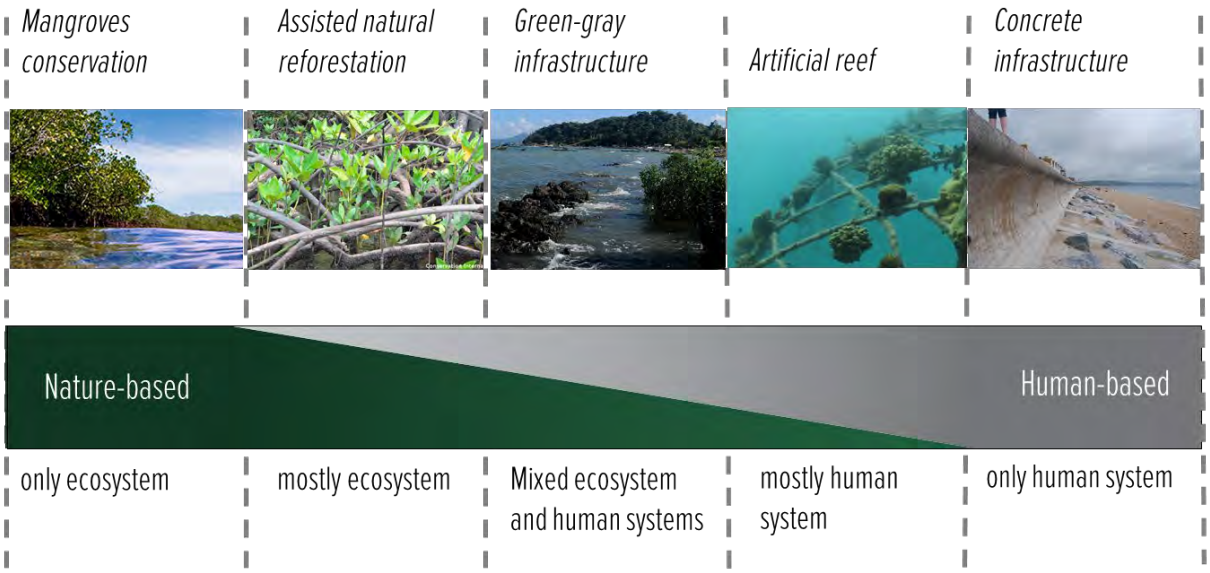


Figure 6. A possible representation of the spectrum of adaptation solutions for coastal protection from nature-based to human-based. © Conservation International/Giacomo Fedele.

4 Implementing Nature-based Transformative Adaptation

To identify practical examples of nature-based transformative adaptation, we assessed the portfolio of **climate change adaptation projects of Conservation International** (CI) that were implemented or under implementation in the last 20 years (2000-2019). We reviewed project documents, evaluation reports, and conducted key informant interviews with project managers. Among the 57 projects related to ecosystem-based adaptation, we identified 6 projects (or combination of projects, i.e. programs or initiatives) that most prominently met the multiple characteristics of transformative adaptation. We deliberately gathered examples from a variety of ecosystems (e.g. forests, agroecosystem, coasts), climate-related hazards (e.g. droughts, floods, cyclones), and adaptation outcomes (e.g. food security, protection of assets, and water & health) that spanned the three tropical continents (see Table 3).

Concrete examples of early successes of transformative adaptation can be a source of inspiration for designing new nature-based adaptation projects. Identifying the most effective transformative adaptation projects and their characteristics can help scale-up or replicate projects in other areas to accelerate the shift toward more resilient development. In the next sections, we illustrate the ecosystem-based adaptation activities of the projects that drove transformative adaptation. We describe how such projects contribute to the six characteristics of transformative adaptation and by how much. We also illustrate how the project beneficiaries changed their adaptation strategies over time toward more transformative ones, i.e. following a different "adaptation pathway". Furthermore, we showcase how the projects improved the ability of local families to adapt to changing landscapes and seascape.

Table 3. Overview of Conservation International's selected adaptation projects based on ecosystems (EbA) that have the highest transformative adaptation potential in different land/seascapes.

Country/ Project	Land/ sea scape	Climate change hazard	Main climate change impact	Stakeholders	Main EbA measure	Main adaptation outcome [2]
Madagascar	Forest-agriculture	Cyclones, Drought, Floods	Reduced agricultural productivity	Small-holder farmers	Climate smart agriculture with agroforestry	Improved food security
Colombia	Mountain wetland	Drought, Fire, Floods	Water scarcity	Water users	Wetland restoration/ protection	Improved water provision
Mexico	Agriculture	Increasing temperatures, plant pests	Reduced coffee productivity	Coffee private sectors (producers, buyers)	Improved coffee cultivations practices	Increased income
South Africa	Grassland	Drought, invasive species	Reduced livestock productivity	Rangeland farmers, pastoralists	Grassland restoration and management	Increased income
Philippines	Coastal islands	Cyclones, Sea level rise	Infrastructure damages	Coastal tourism, fishing and farming communities	Mangrove rehabilitation, bamboo and rocks structures	Assets protection
Kenya	Grasslands	Drought	Migration, human-wildlife conflicts	Multi ethnic groups	Ecosystem-based tourism	Human and wildlife security/ Cultural heritage preservation

[2] Improved food security, improved water/ health, assets protection, maintained culture/human security, improved livelihoods/Income/commodities. Based on Donatti et al. (submitted)

Sustainable Forested Landscapes in Eastern Madagascar

Climate change impact

Small-holder farmers in the eastern coast of Madagascar are affected by climate change that is causing more frequent and intense cyclones, floods, and erratic rainfalls. These extreme weather events have been reducing farmers' yields of rice and cassava, leading to food shortages lasting 6 months on average.

Nature-based adaptation

- Introducing climate smart agriculture practices (agroforestry, irrigation/ drainage, resistant crops, off-season rice, mulching, no tillage, terracing);
- Diversifying livelihoods with ecosystem-based activities defined by communities (beekeeping, fishponds, leaf handcrafts);
- Establishing a climate change trust fund that will support farmers with small grants for investing in climate smart agriculture practices;
- Mainstreaming climate smart agriculture in regional and local development plans.

Adaptation outcomes

improved food security of rural small-holder farmers affected by cyclones, floods, and erratic rainfall (e.g. increase in food security index, decrease in days without food).

Nature-based transformative adaptation

restructuring

- Changing rural farmers livelihoods to be more diversified, resilient, and financially sustainable with climate-smart agriculture.
- Changing local and regional land management plans to include climate change considerations.

path-shifting

- Reversing the trend of forest degradation by shifting away from unsustainable forest uses thanks to improved agricultural practices.
- Shifting from food insecure subsistence agriculture to more resilient market-based agriculture.

multiscale

- Engaging multiple government agencies responsible for land-use management from local level up to national level.

systemwide

- Benefiting directly 142,800 farmers in 73 municipalities.
- Covering ~1,000,000 ha of land in two forest protected areas.

innovative

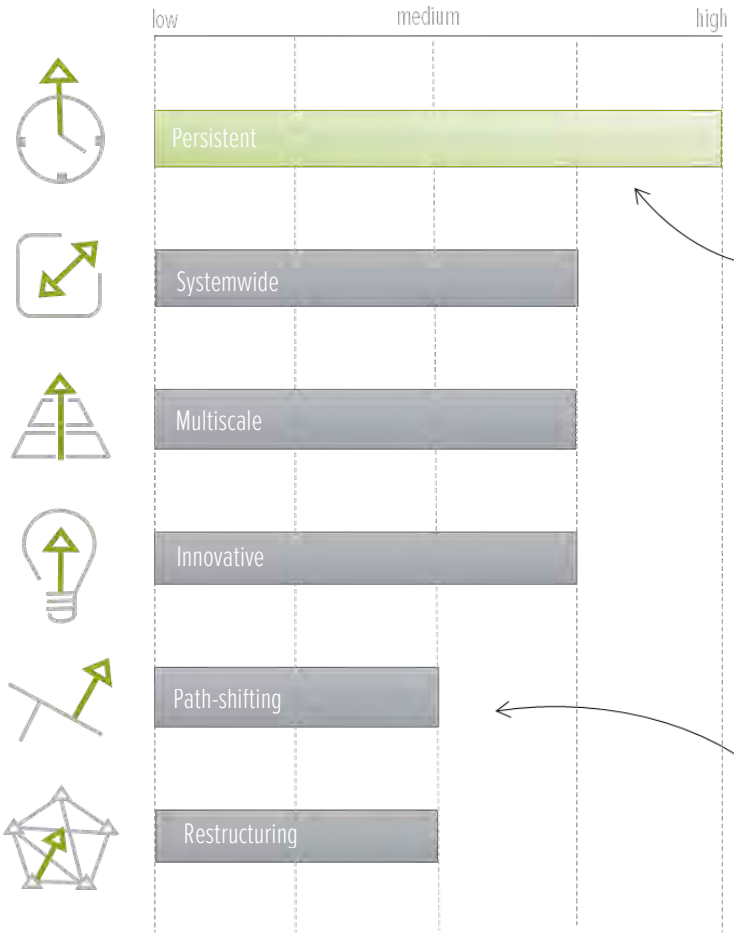
- Creating a non-traditional financial investment scheme that combines funds from public and private sectors for climate-smart agriculture.

persistent

- Strengthening capacities of local institutions to manage forests and disasters.
- Providing smallholder farmers access to larger and longer-term funding to continue the implementation of climate-smart agriculture activities.

How transformative is the proposed adaptation strategy?

Climate-smart agriculture measures in Madagascar have a high transformative adaptation potential, especially because they lead to persistent changes.



see Annex 1 for qualitative assessment scale

High persistence of adaptation benefits because the project builds capacities of local associations, strengthens government extension services, and creates a financial mechanism that enables the use of nature to help farmers adapt to climate change.

Medium restructuring adaptation benefits because the project supports the existing livelihoods of the most vulnerable famers by improving their techniques without radically changing current agricultural practices (yet).

"A clean and green environment is a privilege to boost the rain and farming."

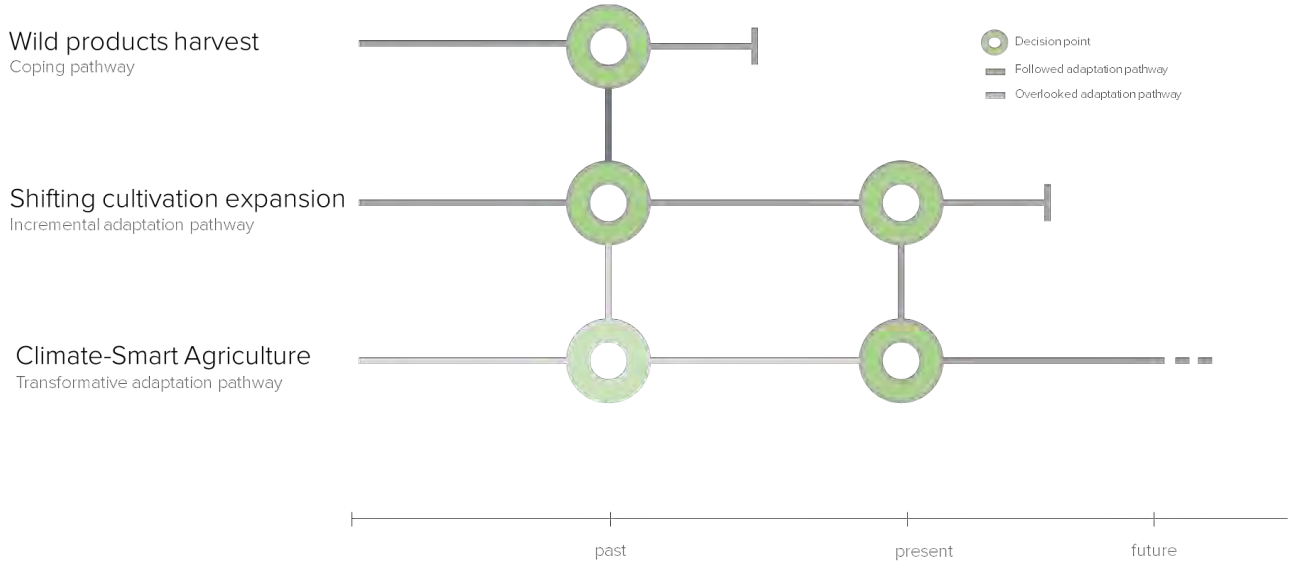
- Farmer
near COFAV protected area

"By reforesting some agricultural lands, farmers have more fertile soils and forest products - improving local food security."

- Zo Lalaina Rakotobe
Chief of Party, GCF project

How have rural farmers adapted to climate change over time?

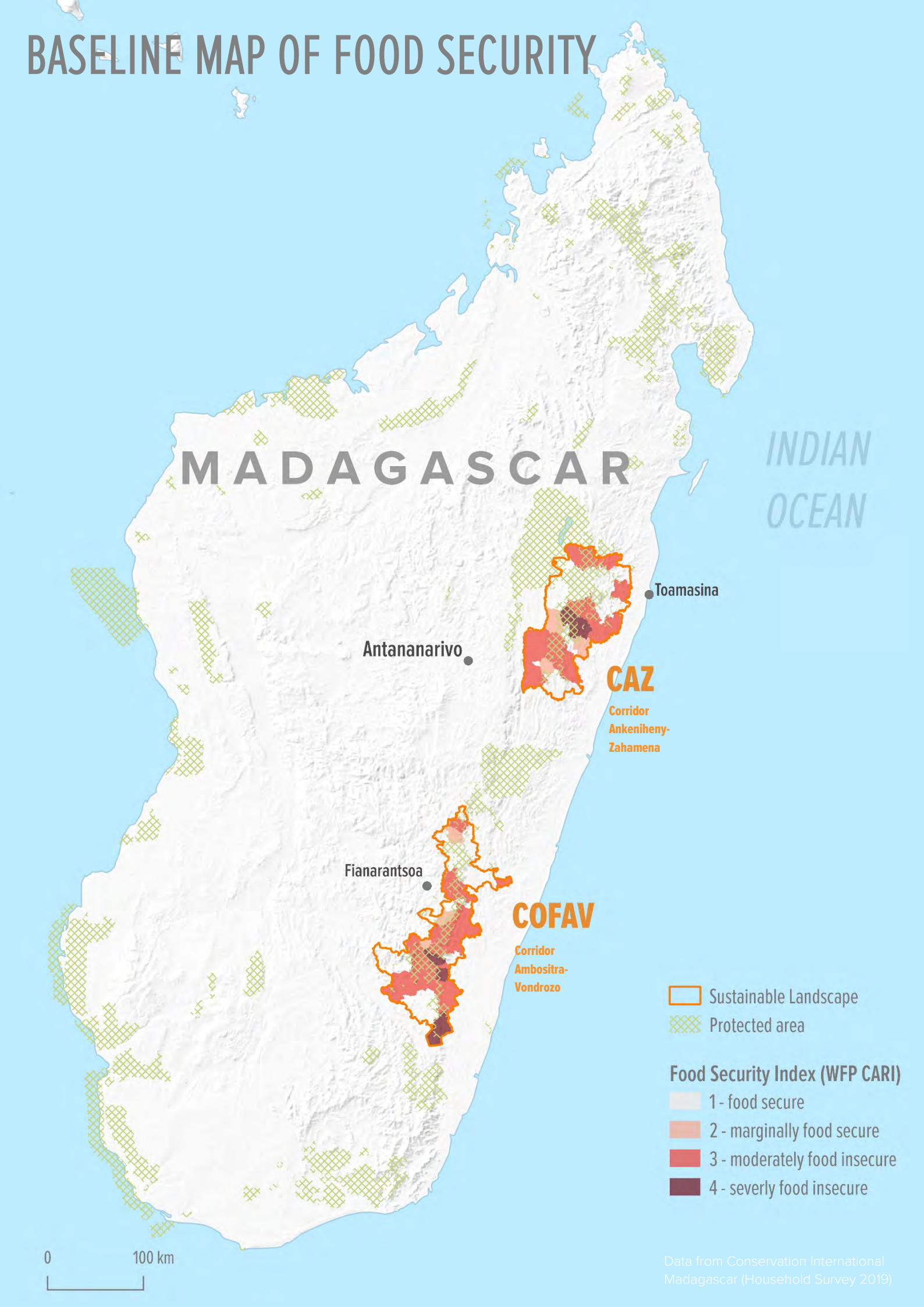
Pathways of responses to climate change toward increased food security (past-present)



How many times were the three generations of the Rafanoarana family able to eat rice during their childhood when affected by a cyclone?

By using climate smart agriculture, small-holder farmers can be more food secure, even in extreme climate conditions.

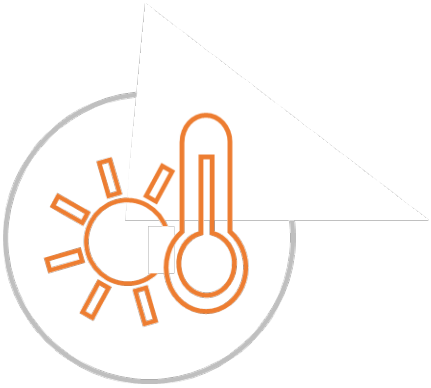
BASELINE MAP OF FOOD SECURITY



Data from Conservation International Madagascar (Household Survey 2019)

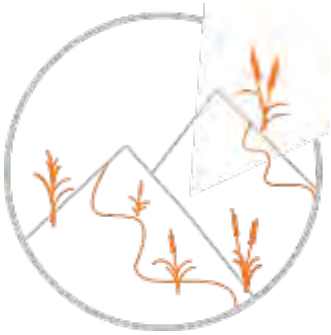
Integrated water management in high mountain wetlands in Colombia

Climate change impact



Climate change and land use are affecting the integrity of high mountain ecosystems and paramos in the Colombian Andes, and key ecosystem services, such as water for the local population and the city of Bogotá and its surroundings. Increasing average temperatures and less predictable rainfall distribution, along with land use transformations, are affecting the habitat of key species in high mountain ecosystems and moorlands (páramo), which in turn lead to their degradation. This is reducing the water provision to farmers downstream and to the city of Bogotá.

Nature-based adaptation



- Restoring and protecting high mountain ecosystems and páramos (replanting vegetation, removing alien species, improving connectivity);
- Introducing silvopastoral and agroforestry systems that mix trees with agriculture (fences with living trees or shrubs, community native trees nurseries);
- Diversifying livelihoods related to wetlands with sustainable, low-water, and climate-resilient uses (e.g. eco-tourism, payment for ecosystem services, fodder banks as dry season feed reserves);
- Updating land-use plans to integrate adaptation with ecosystem-based solutions to protect water provision.

Adaptation outcomes

improved water provision

for small-holder farmers and citizens of Bogotá
(e.g. % increase in water supply during dry periods,
% reduction in water demand in livelihoods)

Nature-based transformative adaptation

restructuring

- Changing behavior of water consumption for agriculture and domestic uses.
- Restoring connectivity and native states of high mountain wetlands (Páramo).

systemwide

- Benefiting indirectly 20% of Colombia population (7 M).
- Covering 3 regions with protected páramos and wetlands that encompass the entire Bogotá watershed.

path-shifting

- Reversing the trend of high mountain and páramo degradation.
- Shifting from unsustainable agriculture to more adapted and diversified agriculture (lower water demand and vulnerability).

innovative

- Introducing climate information systems and participatory monitoring on temperature, water and soil conditions.
- Updating municipality plans about land use to include adaptation and introducing climate risk management.

multiscale

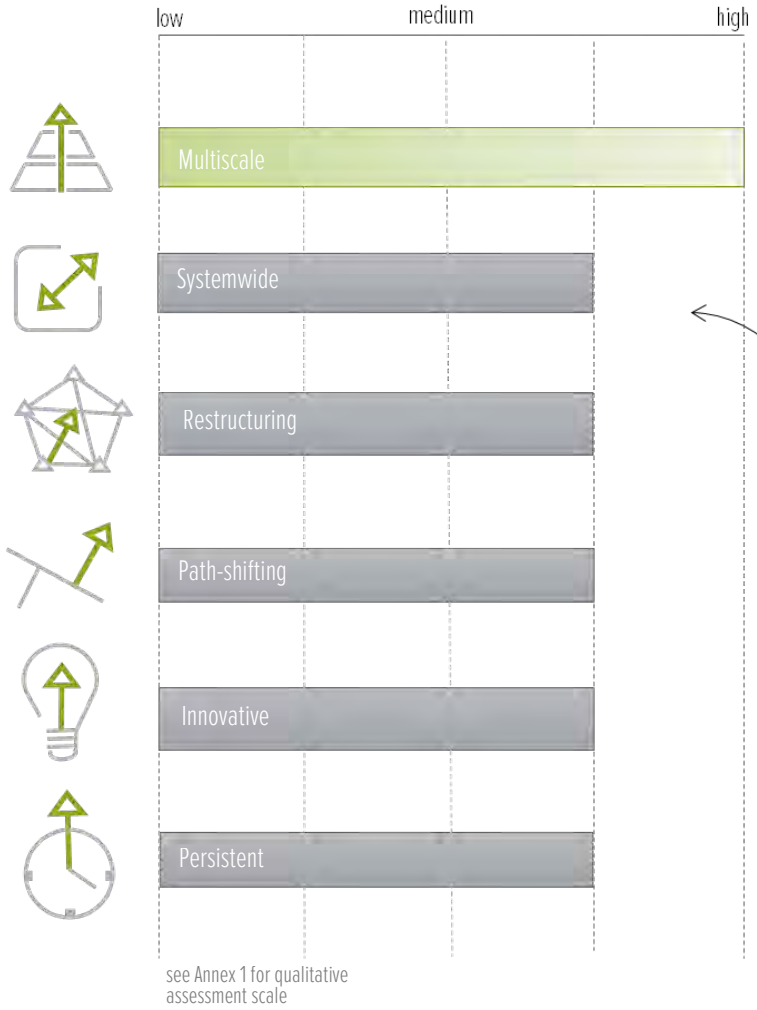
- Involving multiple water users upstream and downstream (from mountain to city).
- Creating a regional forum of multiple water users.

persistent

- Strengthening regional water management institutions to explicitly include EbA into their plans.
- Establishing restoration agreements with family farmers in the watershed.

How transformative is the proposed adaptation strategy?

Wetland restoration and sustainable water use in Colombia have a high transformative adaptation potential, especially because they lead to multiscale changes.



see Annex 1 for qualitative assessment scale

High multiscale adaptation benefits because the project has established participatory multi stakeholder fora with up- and downstream water users that the national government has also applied in other watersheds.

Medium systemwide adaptation benefits because sustainable management practices are being applied in each farm depending on customized plans developed in extensive consultations with each farmer. Although necessary, it takes time to change practices at large scale.

"Having lived here since generations, we understand the system and we are proud to protect where the river is born for other water users downhill."

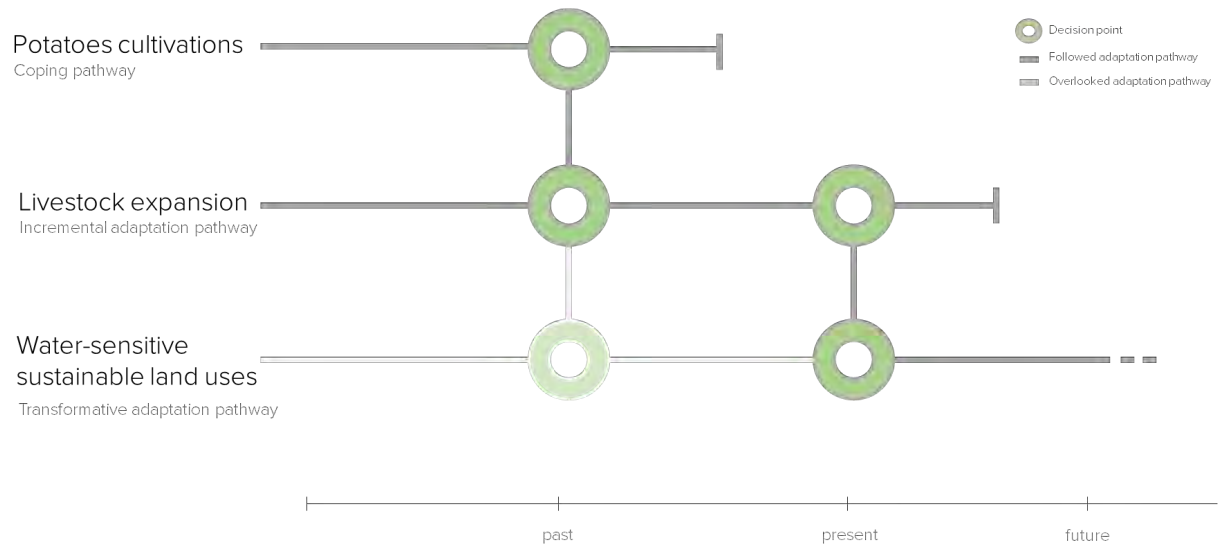
- Don Manuel Rodriguez
Farmer of Finca El Pino

"Because of climate change, we need transformative changes in land management to maintain the provision of multiple benefits for water, biodiversity, livelihoods."

- Angela Andrade
Environmental Policy Director

How have farmers in high mountains adapted to climate change over time?

Pathways of responses to climate change toward improved water availability (past-present)



How long did the three generations of the Rodriguez family need to harvest water during each of their childhoods, when affected by unpredictable rainfalls?

By sustainably managing land nearby the páramo, people in mountains and cities can have continued water provision throughout the year.

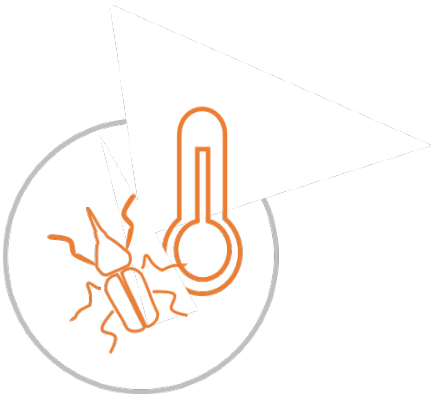
BASELINE MAP OF WATER FLOWS

Data from Ministerio de Ambiente y Desarollo Sostenible, Instituto de Hidrologia Meterologia y Estudio Ambientales Colombia (Oferta hidrica superficial por área hidrográfica. Periodo. 1974-2012)

Sustainable Coffee in Agricultural Landscapes in Mexico

Climate change impact

Climate change is increasing the length of the dry season in Mexico with the rainy season concentrated in fewer months with more intense cold periods. Extreme weather events, such as tropical cyclones, have become more frequent and intense in recent decades, significantly increasing landslides and floods. In addition, climate change combined with poor management practices have increased the outbreaks of pests and diseases, such as coffee leaf rust.



Nature-based adaptation

- Establishing agroforestry systems with shade trees for coffee plantations,
- Diversifying livelihoods associated with coffee (e.g. honey, ornamental flowers, fruits, and collecting timber),
- Improving water management (building biodigesters to recycle water, introducing water efficient coffee processing practices, limiting fertilizers),
- Improving coffee plantation practices (renovating, pruning, using organic fertilizers, creating community-based tree nurseries).

Adaptation outcomes

Increased income of coffee farmers.
(e.g. % increased income from coffee, % farmers with diversified livelihoods)

Nature-based transformative adaptation

- Changing coffee management practices and diversifying livelihoods to increase income.
- Changing coffee processing practices to reduce sediment and nutrient runoff and improve water quality.

- Benefiting directly 1,200 people in 17 communities.
- Covering 2 million ha of Chiapas and Oaxaca.

- Shifting the coffee value chain, from production to marketing, toward more sustainable models.
- Shifting the land management from silos to integrated approaches.

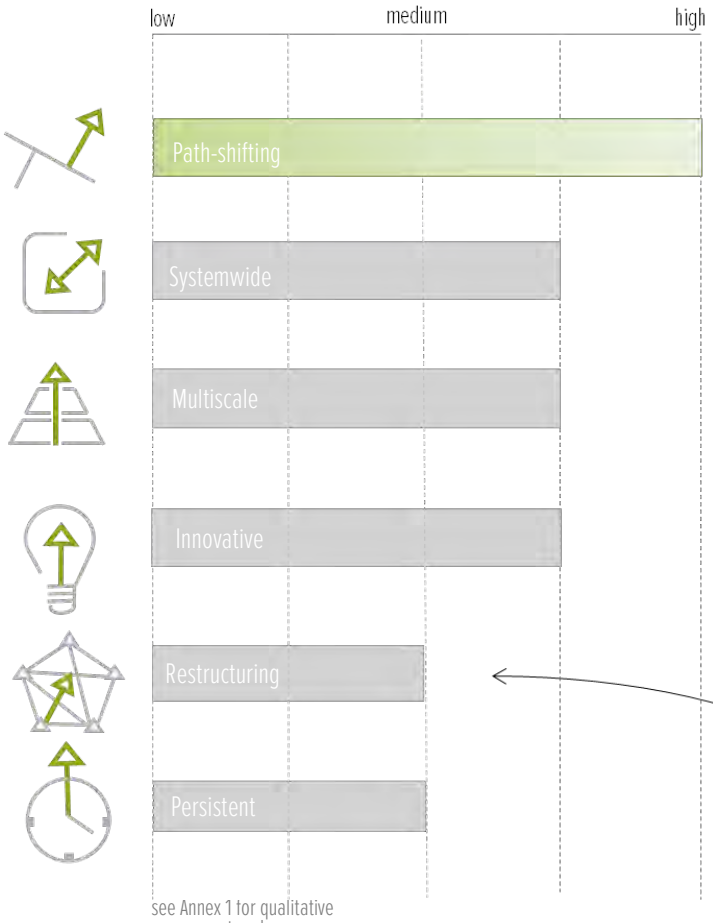
- Introducing multi stakeholders' participatory partnerships (e.g. coffee producers, associations, NGOs, government, private sector).
- Providing scientific knowledge and projections on climate vulnerability and resilience to local coffee farmers.

- Connecting multiple stakeholders along the coffee supply chain, i.e. producers, cooperative, distribution.
- Connecting land managers and land-use plans at regional/landscape level from mountains to coast, across states.

- Strengthening organizations of coffee producers.
- Establishing voluntary conservation agreements with coffee farmers.

How transformative is the proposed adaptation strategy?

Sustainable coffee measures in Mexico have a high transformative adaptation potential, especially because they lead to path-shifting changes.



High path-shifting adaptation benefits because the project is improving value chains for local livelihoods compatible with protected areas.

Medium restructuring adaptation benefits because the project supports current livelihoods and current market opportunities, but do not change business models (yet).

"Coffee is like a raw diamond, through work in balance with nature it gains value."

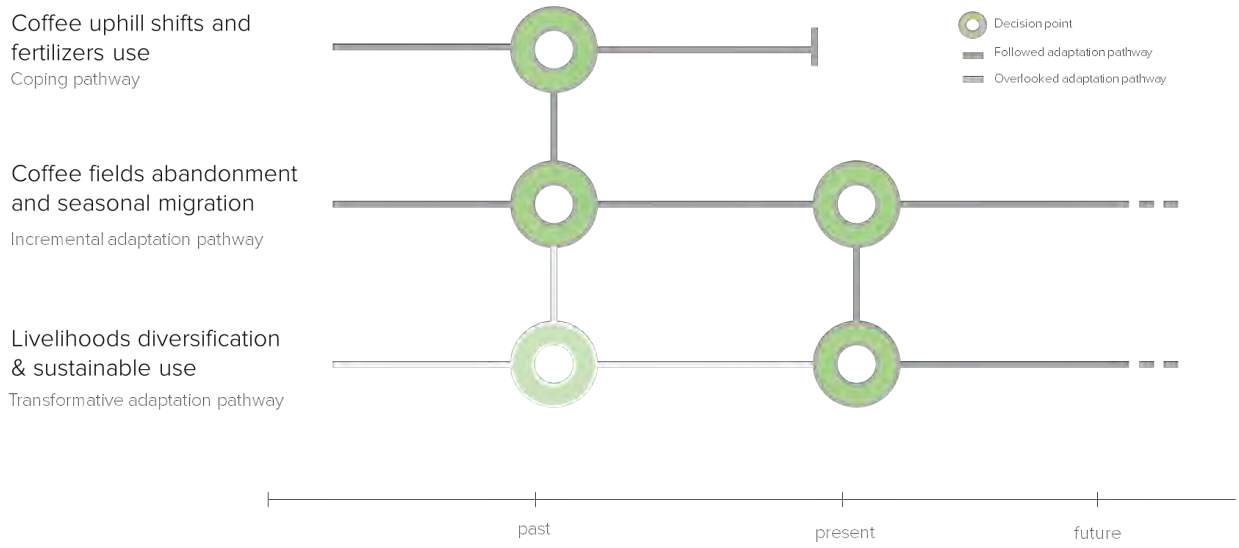
- Don Filadelfo
local entrepreneur of Coffee Pluma Idalgo

"Before, young generations were moving away from rural areas. Now, they have more opportunities to help their families in coffee production thanks to better market links."

- David Olvera
GEF Project Director

How have coffee farmers adapted to climate change over time?

Pathways of responses to climate change toward sustainable income (past-present)



For how many months did the three generations of the Ramos family have to temporarily migrate to look for jobs when their coffee plantations were affected by pests during their childhood?

By sustainably managing shade coffee farms, coffee farmers can maintain local income.

BASELINE MAP OF COFFEE YIELDS

Livestock management in communal rangelands in South Africa

Climate change impact

The impacts of climate change in the dry lands of South Africa include increases in the frequency, severity, and duration of droughts, as well as increased temperatures and reduced rainfall. These changes in climate are increasing the encroachment of woody plants in grasslands and the spread of invasive alien species. This reduces the productivity of cattle because of reduced intake of fodder and higher stress caused by poor quality grazing, reduced water availability, and more frequent livestock diseases.

Nature-based adaptation

- Restoring or maintaining grasslands (removing alien species, managing erosion, nutrient concentration, managing fire).
- Improving livestock management with collective grazing regimes, climate-resilient breeds, and herder-implemented restoration.
- Providing livestock production and market access incentives to enable sustainable livestock production.

Adaptation outcomes

Increased income

of cattle farmers and pastoralists.
(e.g. # of jobs created, % increase in income form livestock sales)

Nature-based transformative adaptation

restructuring

- Re-creating livelihood opportunities for livestock farmers on communal lands through restoration and sustainable rangeland management.
- Transforming the supply chain of the red meat sector through markets that require conservation actions.

path-shifting

- Shifting from marginalized and poor communities to communities that are empowered and hold jobs in sustainable livestock production.
- Shifting government job creation investments into climate change adaptation investment.

multiscale

- Involving and connecting stakeholders along the red meat value chain (e.g. small producers, farmers associations, retailers, consumers).

systemwide

- Benefiting directly 1'600 rangeland farmers.
- Covering 3 landscapes with high-biodiversity rangelands (250,000 ha).

innovative

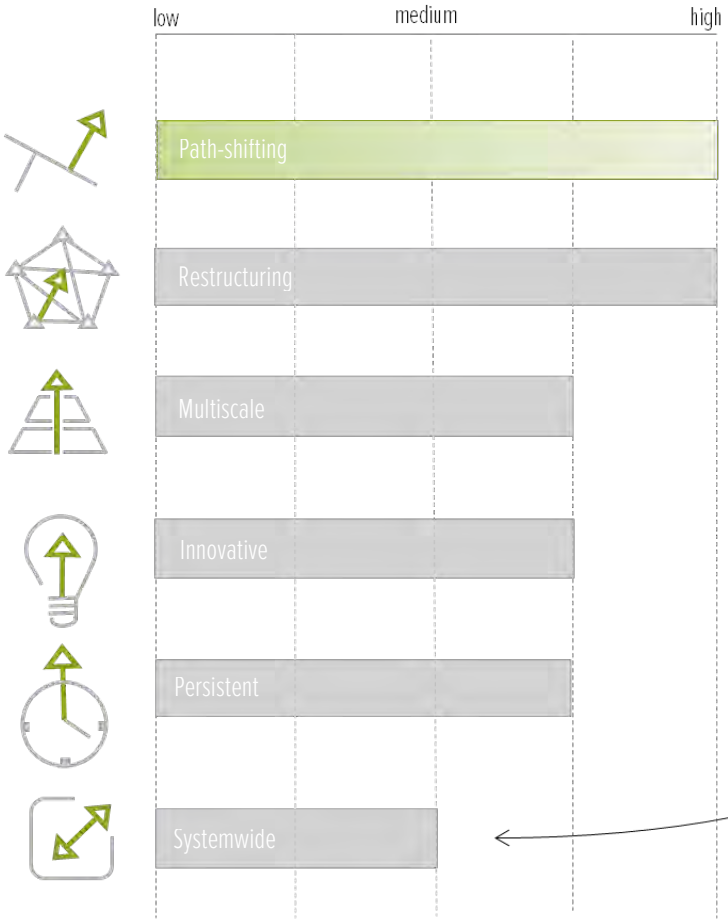
- Introducing new conservation approaches that engage communities and unemployed people as ecorangers.

persistent

- Establishing conservation and agriculture agreement with range farmers associations.
- Institutionalizing long-term monitoring of grassland and cattle by communities and private sector.

How transformative is the proposed adaptation strategy?

Sustainable rangeland related measures in South Africa have a high transformative adaptation potential, especially because they lead to path-shifting changes.



see Annex 1 for qualitative assessment scale

High path-shifting adaptation benefits because the project has connected small scale farmers to market and improved their income from selling while better manging rangelands.

Medium systemwide adaptation benefits because the project is a pilot that started in few areas. However, additional trainers of trainers are expected to expand this approach in other rangelands.

"Growing up here, my life depends on nature... Nature is my life!"

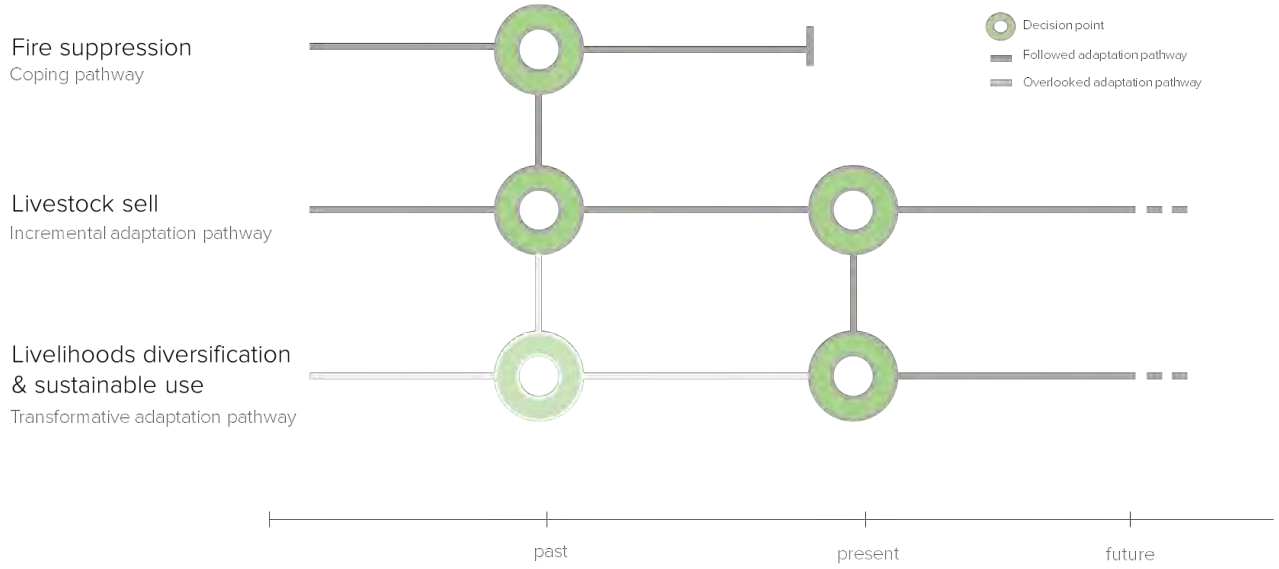
- Pastoralist
near Kruger National Park

"African rangelands habitat coevolved with grazing herds — they depend on each other for a balanced ecosystem."

- Sarah Frazee
former Country Director of Conservation South Africa

How have rangeland farmers adapted to climate change over time?

Pathways of responses to climate change toward improved grassland productivity (past-present)



How much money did the three generations of the Sepane family spend for fodder to get through winter when affected by drought in their childhood?

By sustainably managing rangelands, rangeland farmers can maintain or improve productivity, so that they don't have to spend money for fodder even in extreme climate conditions.

BASELINE MAP OF INCOME FROM LIVESTOCK

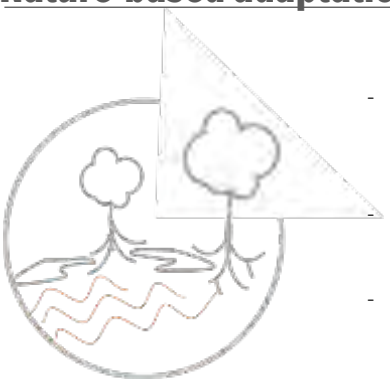
Data based on Mmbengwa et al. (2015) (survey of communal livestock farmers)

Green-gray infrastructure in small island communities of the Central Philippines

Climate change impact

The Philippines are very vulnerable to the impact of climate change as demonstrated by the scale of devastation caused by Typhoon Haiyan in 2013, that caused more than 6,000 lives o be lost and displaced more than 900,000 families.

Nature-based adaptation



- Installing sediment trapping fences and structures for attenuating wave strength built with locally sourced bamboo poles, bamboo mats, coconut coir mats, twine, sand, and rocks.
- Conserving and restoring mangroves, sea grasses and coral reefs, and recreating hydrological connectivity in abandoned fish ponds.
- Diversifying fishing and farming coastal communities' livelihoods with ecosystem-based activities, such as mangrove nursery establishments, ecotourism with mangrove board walks, medicinal plants, coco-based products, and aquasylviculture (i.e. mangroves & aquaculture) and seaweed cultivations.

Adaptation outcomes

Assets protection

of coastal communities.
(% reduction in wave heights and energy,
% reduction of damages to houses/causalities)

Nature-based transformative adaptation

restructuring

- Re-structuring coasts by building green-gray solutions.
- Changing people's settlements and livelihoods with ecosystem-based activities.
- Re-thinking location of settlements.

path-shifting

- Shifting approach for coastal protection from pure gray or green solutions to integrated green-gray solutions.

multiscale

- Engaging local, state, and federal government stakeholders and design standards.
- Involving multiple sectors, such as engineering, environment, and insurance.

systemwide

- Benefiting directly 4,800 individuals.
- Covering 12.5 ha of mangroves in 4 wetland systems.

innovative

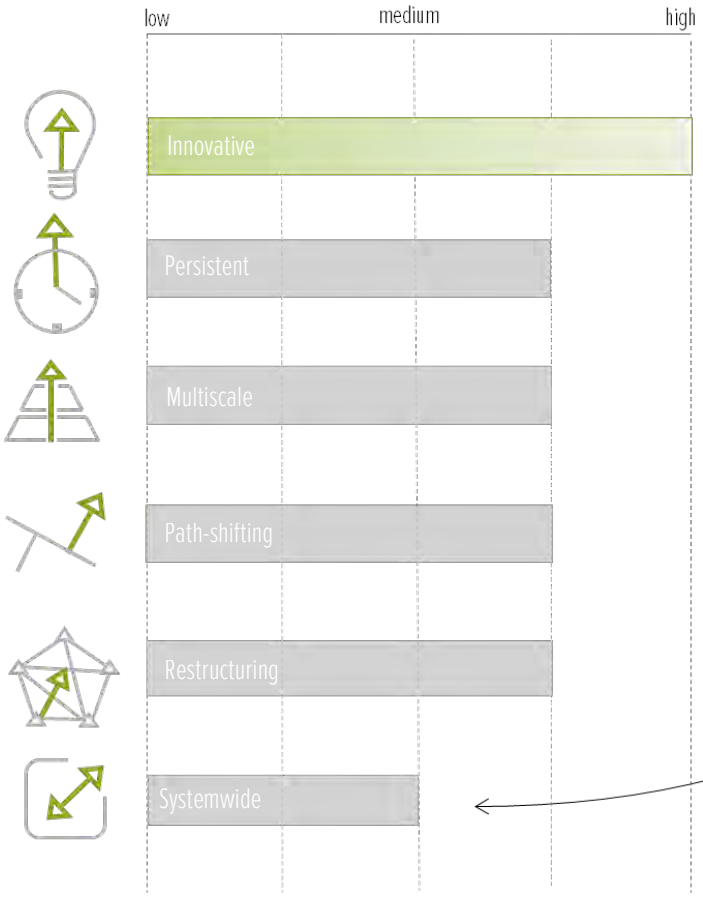
- Introducing new community-built construction models for coastal protection.
- Introducing micro-insurance mechanisms triggered by climate-related hazards.

persistent

- Institutionalizing a national steering committee for coastal protection policies including green-gray solutions.
- Establishing an insurance fund that sustains mangrove management.
- Establishing conservation agreements with coastal communities.

How transformative is the proposed adaptation strategy?

Green-gray coastal infrastructure in the Philippines has a high transformative adaptation potential, especially because it involves innovative changes.



see Annex 1 for qualitative assessment scale

High innovative adaptation benefits because the project has introduced a new green-gray approach to coastal protection that includes private companies, communities, and government.

Medium systemwide adaptation benefits because the project has started in few areas only. However, green-gray solutions are expected to be implemented to control erosion in inland too, expanding water management from the sea to the source.

"The impact of the strong waves could have been lessened by the mangroves that used to line our coast."

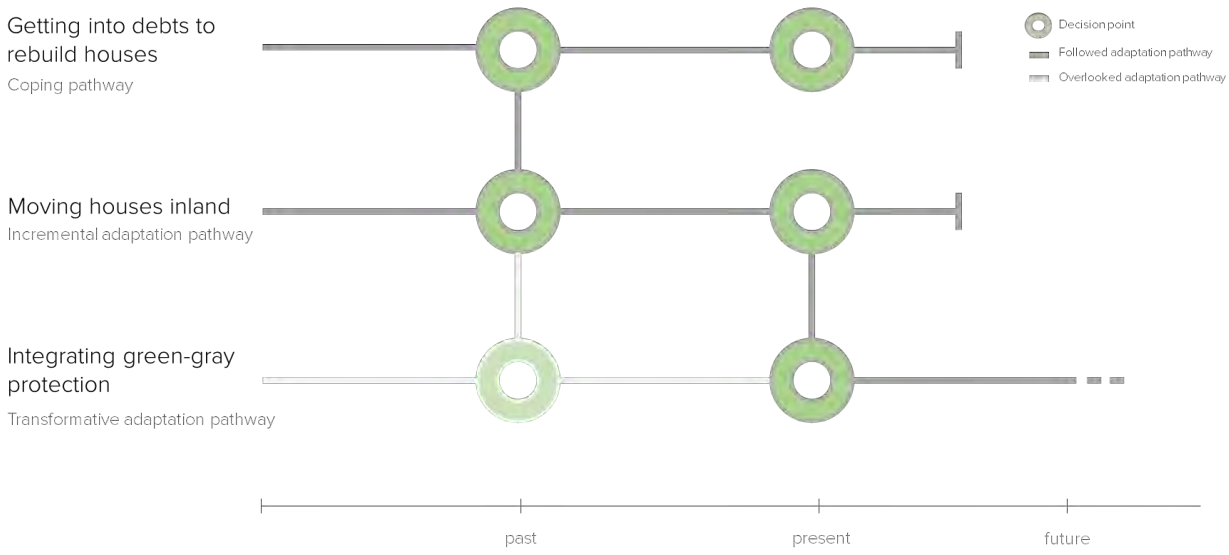
- Fishing woman
in Concepcion community

"Communities once victims of storms are now active responders. To be successful, conservation actions need to build local capacities."

- Maria Josella Pangilinan
Director for Climate Resilience

How have coastal communities adapted to climate change over time?

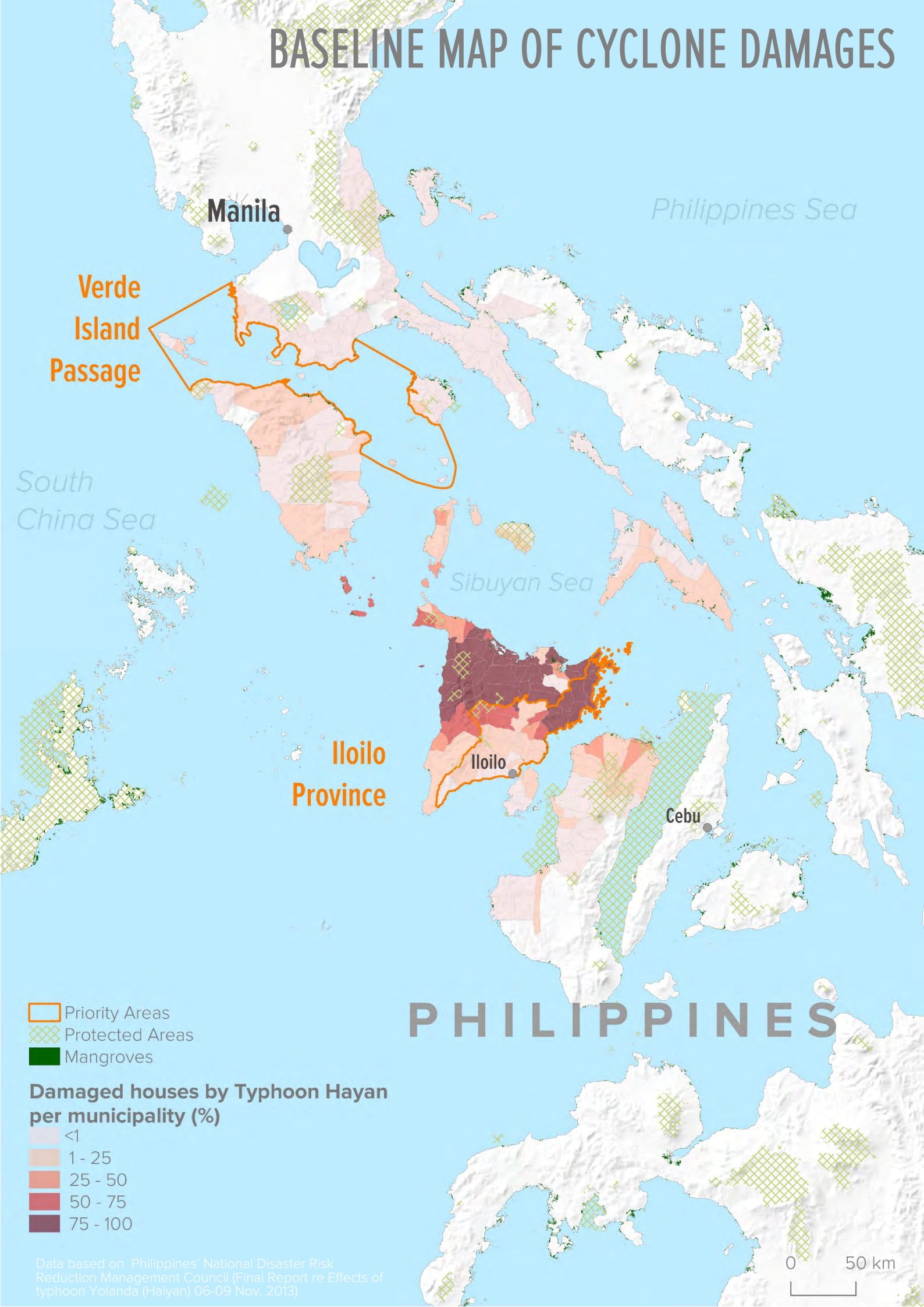
Pathways of responses to climate change for the protection of houses and assets (past-present)



How do the three generations of the Santos family remember the conditions of the shores during their childhood?

Through green-gray solutions, coastal communities can be better protected in cases of extreme cyclones.

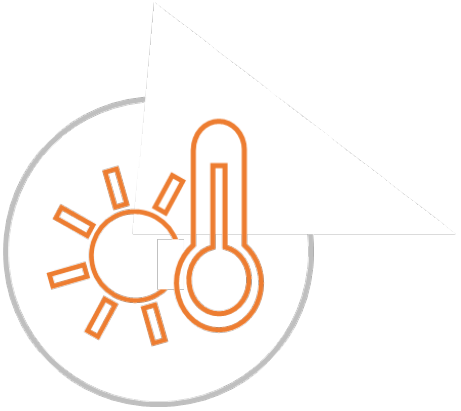
BASELINE MAP OF CYCLONE DAMAGES



Data based on Philippines' National Disaster Risk Reduction Management Council (Final Report re Effects of typhoon Yolanda (Haiyan) 06-09 Nov. 2013)

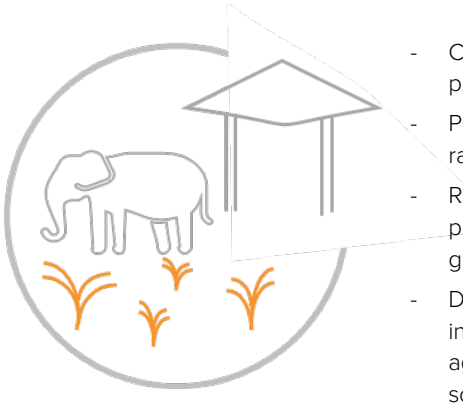
Wildlife eco-tourism in multi-ethnic conservancies in Northern Kenya

Climate change impact



In Kenya, climate change is leading to extended dry periods and severe droughts that reduce water availability and grassland productivity. This causes increased conflicts for scarce resources, wildlife competition, and livestock thefts. During droughts, pastoralists are often forced to herd their livestock further away from their homelands in search of pasture and water. Altogether, the lack of water in communal rangelands, fence construction for isolating wildlife, and immigration of farmers have caused many pastoralists to become sedentary. Sedentary livelihoods based on livestock and crops cultivation can be even more vulnerable to climate change compared to pastoralists.

Nature-based adaptation



- Creating eco-tourism facilities based on wildlife conservation that provide jobs for local communities, such as guides, rangers or scouts;
- Protecting community and wildlife habitat from poachers and livestock raiders with ranger patrols;
- Reintroducing resilient traditional ranching practices (rotational and planned grazing, improved cattle breeds, water harvesting and storage, grass seeds dispersal with elephant dung);
- Discouraging ranching practices that are sources of conflicts by increasing awareness and alternatives (e.g. avoid expansion of agriculture in elephant migration corridors, provision of safe water sources to avoid conflict with wildlife).

Adaptation outcomes

Security of human and wildlife

In communal grassland conservancies.
(e.g. % reduction in human-wildlife conflicts/crimes, % reduction of forced migration)

Nature-based transformative adaptation

restructuring

- Building relationships between pastoralists and rangers by working together on security.
- Re-structuring the co-existence between humans and wildlife.

systemwide

- Involving 24,000 semi-nomadic pastoralists from the Samburu and other tribes.
- Covering an area of roughly 1 million hectares.

path-shifting

- Shifting human migration patterns from forced migration to temporary migration as adaptation.
- Reversing the decline of elephants by reducing illegal killing and conflicts.

innovative

- Establishing the first elephant sanctuary in East Africa entirely owned by a community.
- Offering women with low education jobs and training as elephant keepers.

multiscale

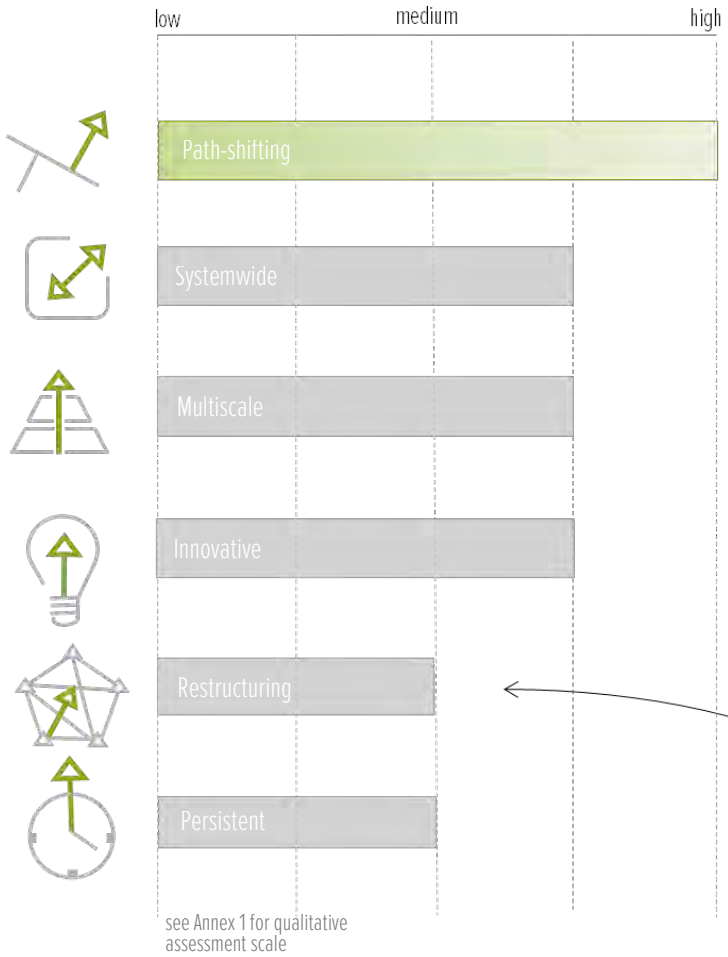
- Linking local rangers to national enforcement network.
- Connecting eco-tourism taxes from the treasury to the environment ministry and other ministries related to natural resource management.

persistent

- Building environmentally friendly infrastructure for eco-tourism.
- Strengthening laws on land tenure and benefits sharing.

How transformative is the proposed adaptation strategy?

Eco-tourism and traditional rangeland management in Kenya have a high transformative adaptation potential, especially because they lead to path-shifting changes.



see Annex 1 for qualitative assessment scale

High path-shifting adaptation benefits because the project has been increasing tourism revenue thanks to improved security, reversing the historical human-wildlife conflicts trends.

Medium restructuring adaptation benefits because the project has not yet changed the high dependency of local people on livestock for their livelihoods.

"In my team, rangers from different ethnic groups work and live together! A few years ago, all this was unthinkable."

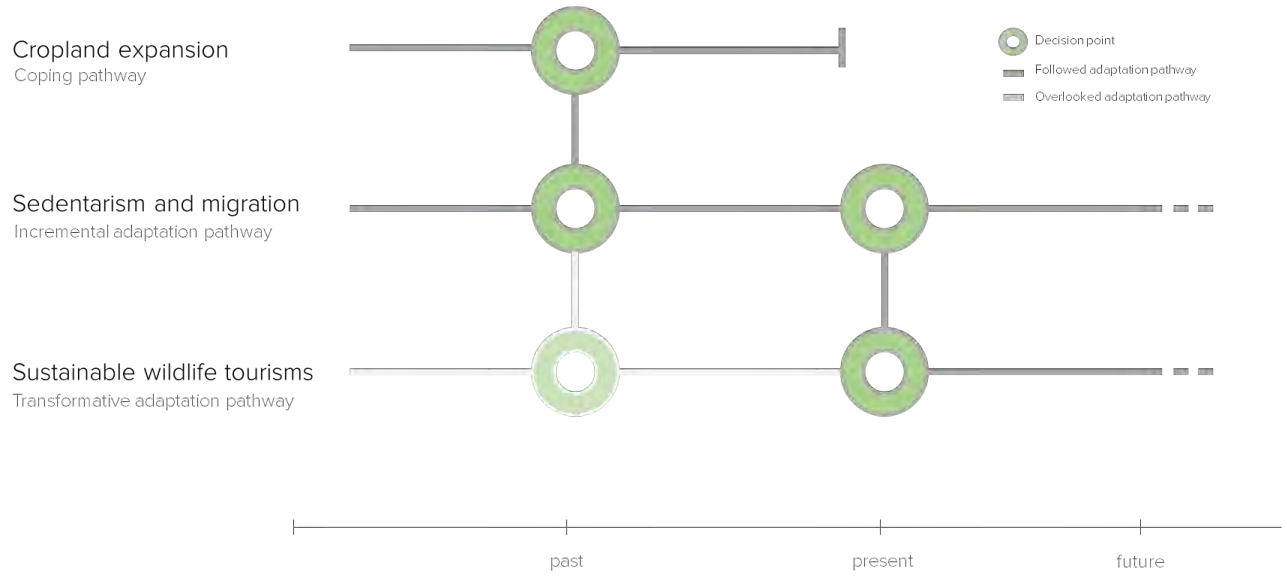
- Rebecca Kochulem
pastoralist

"Tourism development has allowed local communities to realize the benefits of co-existing with elephants, which they now view as an asset rather than a nuisance."

- Matthew Lewis
Regional Director,
Wildlife Trafficking and Enforcement

How have ethnic communities near wildlife areas adapted to climate change over time?

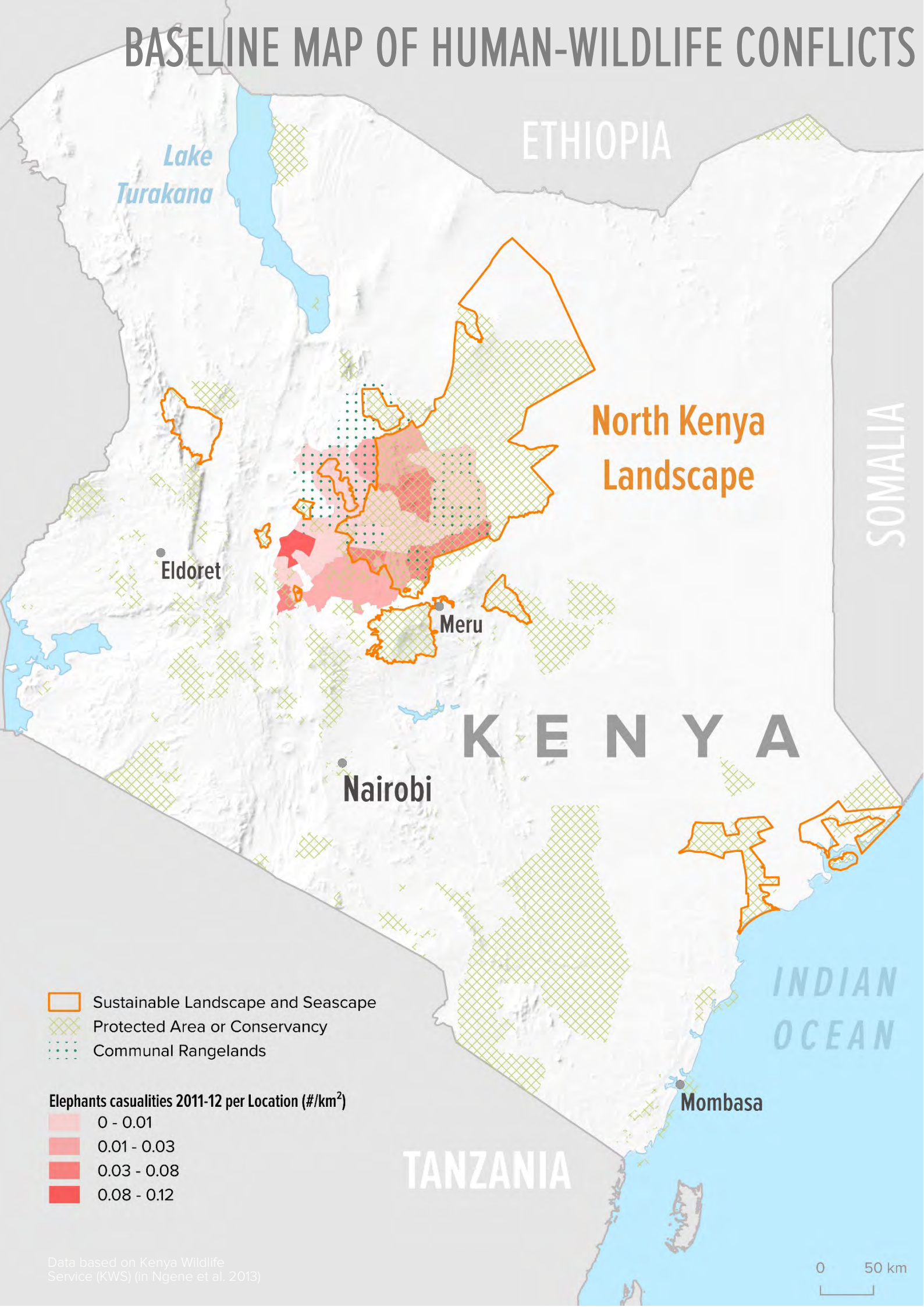
Pathways of responses to climate change toward improved human security (past-present)



How many cows were stolen from the three generations of the Lempere family after a drought during their childhood?

By sustainably managing grasslands with wildlife, ethnic communities can improve their security, even in extreme climate conditions.

BASELINE MAP OF HUMAN-WILDLIFE CONFLICTS



5 Financing Nature-based Transformative Adaptation

5.1 Which public funds invest in transformative adaptation?

Climate finance, i.e. finance for climate change related activities, is crucial to support the implementation of the Paris Agreement and both mitigation and adaptation objectives. The total global climate finance that supports adaptation is estimated to be USD 22 billion in 2015-2016 (i.e. 10% of the total public climate finance). Adaptation actions based on nature, such as adjustments in agriculture, forestry, and land uses account for USD 5 billion (or 21% of the total public adaptation finance). However, public adaptation finance needs to be increased by nine-to-nineteen times to help developing countries adapt to a 2°C future[3]. Among the main barriers for investors are the lack of adequate access to long-term and predictable capital, and the high risks associated with these types projects (e.g. pilots, small scale, limited capacities). In this regard, public finance can help overcome investments barriers for adaptation and reduce the investments gaps.

Three of the most important public multilateral funds that support climate change adaptation are manged by the Global Environmental Facility (GEF), the Green Climate Fund (GCF), and the World Bank (WB). The strategic objectives of these three funds explicitly refer to investing in transformative climate actions or environmental changes, including for adaptation (see Table 4). Similarly, all the three funds have recently assessed how their project portfolio effectively contributes toward transformative climate actions. The definitions and criteria used in the evaluations have similarities and include elements related to the six characteristics of transformative adaptation presented here. They all explicitly refer to at least four out of the six characteristics (path-shifting, multiscale, systemwide and persistent). More explicit and operational definitions of transformative adaptation can help funds to prioritize and assess climate actions.

Table 4: Overview of the three major multilateral funds supporting climate change adaptation, the green climate fund (GCF) the Global Environment Facility (GEF) and the Climate Investment Fund of the World Bank (CIF WB), and their reference to transformative adaptation.

	GCF	CIF WB	GEF
Adaptation Finance[4]	5.1 B USD	2.0 B USD	1.6 B USD
Evaluation study referring to transformative adaptation	2017 by Independent Evaluation Unit (IEU)	2019 by ITAP and Transformation Change Learning Partnership (TCLP)	2017 by independent evaluation office (IEO)
Strategic approach to transformative adaptation	Fund objective and funding criteria	Fund objective and learning initiative	Vision for 2020
Definition and characteristics of transformative adaptation	*"paradigm shift towards low-emission and climate-resilient development pathways"* [5]	*"Strategic changes in targeted markets and other systems with large-scale, sustainable impacts that accelerate or shift the trajectory toward low-carbon and climate-resilient development"*. [6]	*"engagements that help achieve deep, systemic, and sustainable change with large-scale impact in an area of global environmental concern"*[7]
Re-structuring	-	-	Depth of change
Path-shifting	Resilient pathways	Relevance to low-carbon and climate-resilient development	Relevance to global environmental issues
Multiscale	Scalability	Large scale	Scale
Systemwide	Replicability	Systemic change	Depth of change
Innovative	Innovative	-	-
Persistent	Sustainability (market and institutions)	Sustainability (robustness of changes)	Sustainability

[3] UNEP 2018. The Adaptation Gap Report 2018. United Nations Environment Programme (UNEP), Nairobi, Kenya

[4] Based on pledges from GEF 2018; CIFs 2018; GCF 2019 (estimated with 50% to adaptation)

[5] Board Decision GCF B.09/05 Initial investment framework.

[6] https://www.climateinvestmentfunds.org/evaluation-and-learning

[7] GEF Independent Evaluation Office (GEF IEO), Evaluation of GEF Support for Transformational Change, Evaluation Report No. 122, Washington, DC: 201

5.2 How does the private sector invest in transformative adaptation?

The private sector accounts for 54% of the global climate finance for 2015/2016 (Figure 7). Private sector investors encompass a variety of actors, including individual investors, private venture capitalists, or institutional investors (e.g. pension funds, insurance companies). However, due to tracking challenges, the private sector investments for adaptation and more specifically nature-based investments remain unknown. The private sector plays an important role in complementing constrained public finance for adaptation by leveraging innovation, expertise, and financial resources. In addition, the private sector itself is increasingly responsive to the risks and opportunities resulting from climate change. Often private companies invest in adaptation measures to reduce the climate risk of physical damages to their business assets, operations, and supply chains. However, private sector adaptation strategies using nature remain very limited (3%)[8].

Private sector investments in adaptation typically use the same instruments of traditional business investments. The main opportunities of engagement include lending funds for initiating adaptation, developing technologies and services to reduce climate vulnerability, and providing insurance to manage risks. Private investments for nature-based adaptation might be more likely to occur as co-benefits, for example resulting from saving measures that reduced the use of water or electricity that can be used for other adaptation purposes. Such adaptation benefits can be explicitly part of impact investments that aim to generate social and environmental impact alongside a financial return. In addition, preserving ecosystems might also be a form of insurance against future climate change risks. Studies have revealed private interests related to nature for some specific activities, namely climate-smart agriculture, eco-tourism, and improved water and forest management.

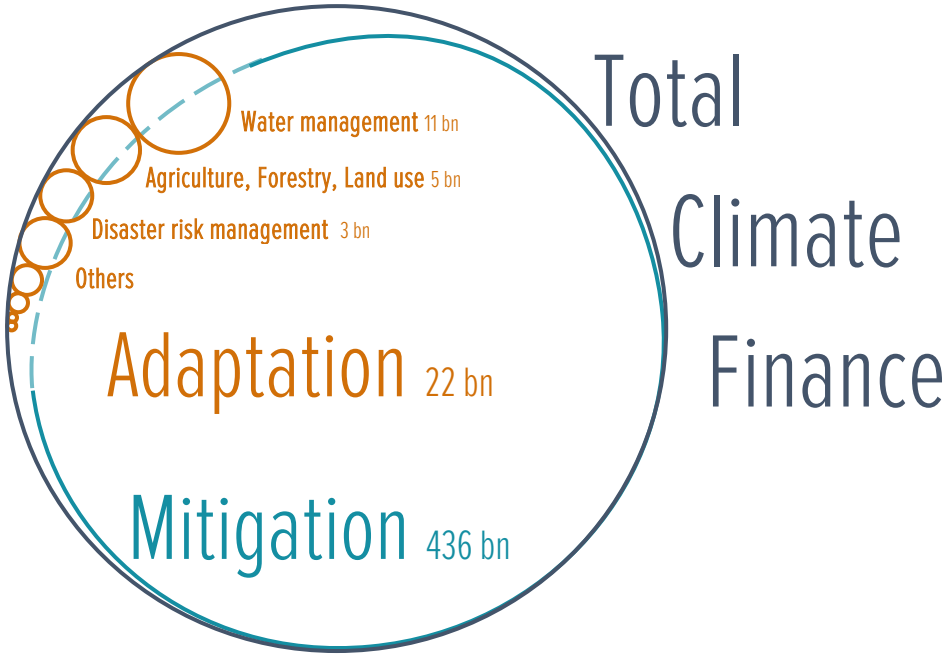


Figure 7. Adaptation in Agriculture, Forestry and Land-use represents a small proportion (USD 5 billion) of the total climate finance in 2015/2016 (USD 463 billion). Other orange circles: other crosscutting adaptation, infrastructure & energy, policy & capacity building, coastal protection. Data: Climate Policy Initiative (2018).

[8] Goldstein et al. 2018 (Nature Climate Change): The private sector's climate change risk and adaptation blind spots.

6 Designing Nature-based Transformative Adaptation

Multiple guidelines have been developed on how to design adaptation projects, including those that are nature-based, but these guidelines do not specifically consider transformative adaptation. Examples of methodologies to design nature-based adaptation projects include guidelines[9], tools[10], and standards[11] (see footnotes). However, the design of transformative adaptation projects requires additional considerations due to their demanding characteristics.

In the following sections, we briefly introduce three methods to help design transformative adaptation projects. They were chosen because they encourage integrated system thinking that not only can help develop more appropriate adaptation but also more transformative ones. These methods are the cause-effects diagrams, back casting, and adaptation pathways.

6.1 Cause-effect system diagrams with leverage points

In order to design adaptation strategies, especially transformative ones, it is important to understand how a given social-ecological system works and changes under different conditions. Assessing systems' dynamics help identify key processes that can affect entire system. Cause-effects diagrams show the interconnections between key variables in a system of interest and how they are linked to each other (Fig. 8). Sometimes these variables are connected through circular relationships (i.e. feedback loop) that can balance or reinforce changes in the system. These diagrams not only help navigate the complexity of a system, but also help detect leverage points for adaptation. Developing projects that target leverage points is crucial for transformative adaptation because desired changes need to be amplified to result in systemic changes. Transformative adaptation should be designed in a way that facilitates the functioning of a system towards increased adaptation, while also addressing other factors that drive vulnerability. Such changes are usually easier to promote within the system rather than imposing upon the system. For this reason, cause-effect diagrams should be developed in consultation with multiple stakeholders and take into account the diversity of interests and power.

[9] Voluntary guidelines for the design and effective implementation of ecosystem-based approaches to climate change adaptation and disaster risk reduction. CBD/SBSTTA/22/INF/1 (July 2018)

[10] Ecosystem-based Adaptation Tools Navigator IIED/IUCN/UNEP-WCMC/GIZ (January 2019)

[11] A Framework for Defining Qualification Criteria and Quality Standards FEBA (July 2018)

6.2 Visioning with Climate Scenarios

Visioning exercises are another key step in designing transformative adaptation strategies that build on system diagrams. In this exercise, a shared possible future vision is developed in which the well-being of both people and nature are maintained or enhanced despite changing climate conditions. Scenarios of possible futures combine different ongoing and expected climate change projections, which can be complemented by people's perceptions about ongoing changes. The results of the exercise help define the "big picture" and provide a long-term shared goal of what needs to be achieved to reduce the impact of climate change in a given place.

Discussing the possible future climate and related vulnerabilities with multiple stakeholders helps develop a common understanding of "where we are today and where we want to be". The gap between the current and future situations represents the transformations needed to get there. Because both climate change and adaptation modify systems' dynamics, it is important to account for trade-offs and the long-term side effects of a selected vision. This participatory process develops more sustainable and inclusive adaptation strategies.

Figure 9. Example of a participatory visioning exercise with 4 possible scenarios for a protected area (Palomo et al. 2011).

6.3 Backcasting with Adaptation Pathways

Once a common vision for an adapted future has been defined , the next step is working backwards in time to identify actions towards achieving this vision (i.e. backcasting). Reflecting on the multiple steps necessary to achieve the vision helps outline adaptation pathways. Adaptation pathways represent sequences of adaptation decisions that change the trajectories of a system. They also identify actions and actors that can drive such changes. The assumption is that the current development pathway is less likely to lead to the desired vision under climate change. The adaptation pathways can be linked to the "Theory of Change" approach for climate change adaptation.

Developing a Theory of Change help design interventions that contribute to a long-term goal. In the case of adaptation, the goal is an outcome that maintains or improves well-being in the face of climate change. The Theory of Change is used to explicitly explain the rationale behind an intervention and emphasize the assumptions that link activities to outcomes. In addition, it can be useful for developing indicators to track progress. Theories of Change are considered one of the most robust approaches to programme design, monitoring, and evaluation.

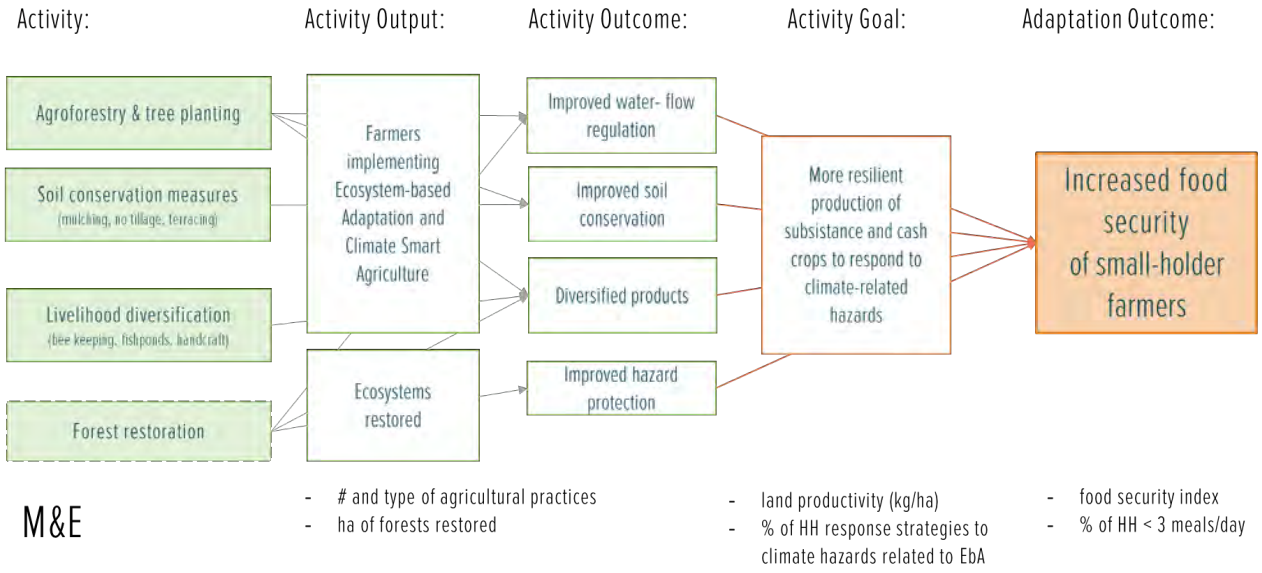


Figure 10. Example of Theory of Change for the adaptation of small-holder famers (improved food security) through ecosystem-based adaptation activities (agroforestry, soil conservation, livelihood diversification, reforestation). For more information see Conservation International 2012[12].

[12] Conservation International (2013). Constructing theories of change models for Ecosystem-based Adaptation projects: a guidance document. CI, USA

7 Learning about Nature-based Transformative Adaptation

Redirecting current development towards a more resilient (and low carbon) future is an urgent challenge that requires fundamental changes in how we think about and interact with nature. As any other global social and environmental issue, climate change is complex and overwhelming, which makes it hard to know where to begin to address it. The scientific and practitioners' knowledge synthetized in this booklet provides some early examples of what it takes to adapt to climate change in a transformative way.

Successful stories of nature-based transformative adaptation can inspire new transformative adaptation that is required to address challenges driven by climate change. Initial lessons learnt from these stories can support decisions makers to shape policies, projects, or plans that leverage the potential of nature to address climate-related vulnerability. In the following sections, we summarize initial key lessons emerging when implementing transformative adaptation projects.

Table 5. Key lessons learnt for moving towards nature-based transformative adaptation

Re-structuring land management
from seeing "people above nature" to "people in nature".

Re-directing unsustainable practices
from changing individual perceptions to changing societal behaviors.

Re-connecting multiple land uses
from siloed sectoral plans to integrated landscape and seascapes approaches.

Re-scaling landscape interventions
from isolated projects to programmatic and jurisdictional initiatives.

Re-thinking nature's role
from nature protection as a burden to an investment.

Re-timing climate actions with nature
from short-term technical fixes to multiyear mixed nature-based solutions with long-term impact.

7.1 Key messages for public policy-makers and finance

- Governments can strengthen and step up climate change adaptation by considering transformative adaptation using the overlooked potential of nature. The design of such transformative adaptation could be informed by the key messages presented about a paradigm shift in how we think about and use nature to adapt (see Chapter 7).

- Bilateral and multilateral agencies as well as funds that support climate actions in the land-use sector should better define transformative adaptation based on the proposed 6 characteristics and their qualitative assessment criteria (see Chapter 2 and Annex 1).

- Governments could improve the inclusion of transformative adaptation based on nature, in addition to coping strategies or incremental adaptation, in national adaptation plans and communications such as National Adaptation Plans, Nationally Determined Contributions (see examples for different geographies, ecosystems, and adaptation outcomes in the case studies in Chapter 4).

- Governments can establish tracking systems for climate change impacts, adaptation outcomes, and the needs for transformative adaptation that can be used for national communications to the UNFCCC, such as Nationally Determined Contributions (NDCs), adaptation communications, losses and damages (see adaptation outcomes, maps, and indicators in Chapter 4).

7.2 Key messages for NGOs practitioners

- NGOs could re-consider their adaptation activities using the perspective of transformative adaptation. They could start identifying needs for this type of adaptation and design projects accordingly. Considering these characteristics in the project design phase can increase the chances to achieve transformative adaptation (see Chapter 2).

- NGOs can broaden traditional collaborations with other organizations and sectors to jointly drive transformative adaptation at scale while improving ownership and sustainability. For example, environmental organizations could expand collaborations with humanitarian and development organizations as well as involving multiple levels of governance and local private sector (as per examples in Chapter 3).

- NGOs can ensure that adaptation projects reach the most climate vulnerable people and ecosystems and their needs are met in case of transformative adaptation. Supporting enabling conditions and capacities for these beneficiaries will provide opportunities to start shifting development pathways and ensuring just transformative adaptation (see Chapter 3).

- NGOs and project managers can embed in adaptation activities regular opportunities for learning, sharing, and adaptive management, for example by establishing flexible M&E systems. This is particularly relevant for transformative adaptation because of the high uncertainties, non-linear changes and innovation associated with such projects.

7.3 Key messages for researchers

- Research organizations can help develop interdisciplinary methods to assess transformative adaptation that include quantitative and qualitative biophysical, ecological, social, cultural, and institutional aspects (e.g. Chapter 6). These methods can also support the development of M&E systems that are tailored to track and evaluate the benefits provided by transformative adaptation actions.

- Researchers can help identify where transformative adaptation might be needed or prioritized compared to other adaptation strategies through vulnerability assessments and social and ecological models (current and projected). See Chapter 2 for rationale.

- Researchers can provide data informing the design adaptation projects by assessing local vulnerability contexts and dynamics, such as ecological states, political relations and institutional arrangements. Such understanding is key to identify leverage points for transformative adaptation and possible resulting outcomes that might not be compatible with future climate change (i.e. causing maladaptation).

7.4 Key messages for private companies

- The private sector can actively invest in transformative adaptation projects that provide social and environmental benefits alongside financial returns. For example, adaptation projects that re-shape value chains, e.g. coffee, cattle, agriculture, wildlife eco-tourism (as showcased in Chapter 3). This sector can also invest in transformative adaptation projects that protect their assets and the ecosystem services that they depend on.

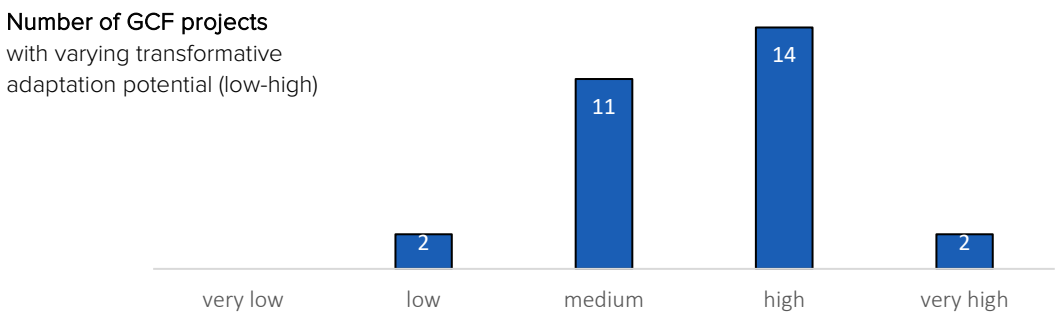
- The private sector can invest in scaling-up projects that offer market opportunities and the potential to achieve transformative outcomes. Ideally, such projects should be aligned with national processes and priorities.

- Private capital, in combination with public funds, can incentivize innovation, develop market opportunities, and support riskier projects and earlier investments that lead to transformative adaptation.

Annexes

Annex Table 1. Typologies for the qualitative assessment of the six characteristics of transformative adaptation based on the review of 28 projects related to Ecosystem-based Adaptation in the Green Climate Fund portfolio (accessed in April 2019).

Potential to achieve TA characteristic	**Very low (0-20%)**	**Low (20-40%)**	**Medium (40-60%)**	**High (60-80%)**	**Very high (80-100%)**
Re-structuring	Maintaining the same current interactions between people and nature	Re-structuring social-ecological system flows (e.g. information, materials)	Re-structuring social-ecological system processes (e.g. land management, plans, natural resources use, collaborations)	Re-structuring social-ecological system organization (e.g. land-related livelihoods, morphology, institutions, businesses)	Re-structuring social-ecological system goals (e.g. power dynamics, governance, land cover, business models, value systems)
Path-shifting	Maintaining similar business-as-usual development	Shifting towards resilient land management (e.g. practices, uses)	Shifting towards resilient land-use strategies (e.g. livelihoods, coordination, plans)	Shifting towards resilient land-use approaches (e.g. anticipatory, integrated, multipurpose, empowering)	Shifting towards sustainably resilient social-ecological systems (e.g. governance reforms, new financial mechanisms)
Multiscale	Involving partially one single scale (sector, governance, spatial, or business)	Involving one single scale (sector, governance, spatial, or business)	Involving two levels within a scale or across two scales (sector, governance, spatial, or business)	Involving three levels within a scale or across three scales (sector, governance, spatial, or business)	Involving four levels within a scale or across fours scales (sector, governance, spatial, or business)
Systemwide	Covering few villages or communities	Covering several parts of a landscape or seascape	Covering entire landscapes, seascapes, protected areas, watersheds	Covering entire provinces, districts or geographies (multiple landscapes, entire coasts, deltas, mountains)	Covering entire regions, states, or most of a country or multiple countries
Innovative	Using existing solutions or practices	Introducing new knowledge or practices	Introducing new technologies or management	Introducing new social behaviors or production systems with integrated and holistic approaches	Introducing new mixes of all previous solutions
Persistent	Collaborating with existing institutions, but actions mostly driven by project staff	Strengthening resilience of existing institutions or signing agreements	Mainstreaming or institutionalizing climate resilience in updated government plans or policies	Partnering with government or private sector for implementation of resilient institutions, management bodies, services	Same as previous + embedding in government or market sustainable financial mechanisms



Annex Figure 1. Most of GCF projects related to Ecosystem-based Adaptation have medium and high transformative adaptation potential based on the assessment of how each of the 6 characteristics of transformative adaptation are met.

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