Adaptation Framework Thematic Brief: Pasture Restoration

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Climate Change and Pasture Restoration

Pasture restoration refers to the rehabilitation of degraded grasslands used to feed domestic livestock such as cattle, goats, and camel. Depending on geographic location, grasslands are also referred to as rangeland, prairie, pampa, steppe, savannah, and veldt. Grasslands can be found on all continents but Antarctica and are mostly characterized by (seasonal) water scarcity. These ecosystems can support large numbers of domestic and wild grazing animals and their predators. Grasslands are generally resilient ecosystems that depend on a cycle of plant death and renewal; however, they are vulnerable to anthropogenic and climate change. Given its resilience to environmental stressors, grassland degradation is often a result of combined human induced pressures and climate change impacts.

Unsustainable grazing practices and cutting of tree and shrub vegetation interact with drought and flooding, resulting in degradation, erosion and, depending on location in desertification. Grassland degradation directly threatens the livelihoods of pastoralists, who rely on the resource for livestock grazing. While unused grasslands tend to be very resilient, droughts coupled with overgrazing decrease resilience and can permanently alter the quantity and quality of vegetation. Degradation levels vary locally, but are generally highest around water sources, infrastructure and settlements, due to their use by pastoralists. With higher temperatures and more frequent and intensive droughts projected for many grassland regions of the world, grassland degradation due to human interreference is expected to be amplified. Flooding can cause further degradation of damaged grasslands, when bare soil is washed out, while invasive weeds can intensify the degradation of grasslands. Secondary impacts from climate change impacts on pastures include; permanent degradation and desertification, increased pressure on remaining pastures, conflict between pastoralist groups and with farmers due to competition over remaining pastures, loss of pastoralists'

source of livelihood and traditional way of live, decrease in regional livestock trade and availability of meat and dairy products.

Pastoralists will be most affected by the impacts of climate change on grasslands, with poor households, women, children and youth being especially vulnerable. Patriarchal structures often limit women in taking part in communal decision-making processes and inheritance of animals, negatively affecting their ability to adapt. As a group, pastoralists suffer marginalisation, including lower access to services such as health and education. Their needs are addressed less on a policy level, competing with economically more productive crop system agriculture and other development of grasslands. As a result, pastoralists' adaptive capacity to climate change impacts on pastures is limited. Apart from climate change impacts on pastures, challenges placed on pastoralists in some regions that affect their ability to rear livestock include, land tenure insecurity, transformation of pasture into cropland, political and demographic changes blocking migration routes to pastures, and competition over pastures and water resulting in conflict between pastoralist groups. Unsustainable cutting of native trees and shrubs for fuelwood and charcoal production[1] causes erosion due to the loss of soil organic matter, leading to a loss of soil moisture and stability. It also diminishes an additional feed source for grazing animals.

On a global scale, the role of grasslands for climate change mitigation is not fully understood but localized scientific evidence shows that grasslands have large carbon storage and sequestration capacities. Grasslands store carbon mainly underground in roots and organic matter of the soil. Sequestration occurs over decades to centuries, with varying ability to store carbon depending on soil type and moisture as well as management practices. Carbon is mainly released from the soil through increasing soil temperature[2], decrease in soil moisture, degradation, and conversion to agricultural land (ploughing and tilling). These changes can also affect the soil's ability to store carbon, turning a carbon sink into a source.

In summary, climate change impacts on grasslands interact with other pressures, leading to (further) degradation of pastures for livestock grazing. It directly threatens the livelihood and food security of pastoralist. Pasture degradation has a negative effect on the soil's ability to sequester and store carbon.

Adaptation and typical options available

Adaptation options primarily focus on increasing the resilience of pastures to climate change impacts, and reducing other stressors. Due to globally widespread grassland degradation, these measures often include grazing management and land restoration. Grasslands store vast quantities of carbon; thus, typical adaptation measures have mitigation co-benefits. Healthy grasslands can better cope with drought and flood and hold and sequester larger amounts of carbon.

Adaptation of pastures is closely linked to adaptation of livestock rearing and pastoralism. To make use of synergies and to avoid redundancy and maladaptation, activities in these two agricultural sub-sectors need to be coordinated. For example, changing grazing patterns will require making alternative fodder sources for livestock available to pastoralists.

Integrating a gender perspective in adaptation is critical, and it is clear that empowering women has positive outcomes in terms of capacity to adapt to climate change. Given the inequitable impacts of climate change, interventions need to be designed which specifically address the challenges faced by women, indigenous and marginalised groups, and poor people. Without this specific focus, there is a

[1] Destructive charcoal production is especially prevalent in Somalia.

[2] Increasing temperatures can accelerate microbial break down of soil organic matter, a process which releases carbon into the air.

risk that adaptation can perpetuate and enhance existing inequalities. Adaptation measures for pasture restoration can be broadly grouped into the following categories[3]:

Nature-based Adaptation and Ecosystem-based Adaptation (EbA)

These approaches emphasise synergies between enhancing natural resource productivity and environmental protection and restoration. Examples include agroforestry techniques, natural run-off and erosion control, and water retention of the soil. Pasture sowing and native shrub and tree planting can improve pastures' productivity. Managing overgrazing through adapted grazing patterns, making use of underutilized pastures, and using non-climate sensitive sources of fodder can greatly reduce the stress on grasslands, increasing their resilience to climate change impacts. Applying a landscape scale approach in pasture restoration addresses cost-effectiveness, landscape connectivity and can enhance ecosystem services.

Policy/Institutional measures

In order for adaptation measures to be effective and move beyond site-specific interventions there is a need for climate change to be integrated into national and regional policy processes and plans. As pasture degradation is almost always a result of external stressors combined with drought and/or flooding, holistic policy solutions are needed. This includes for example, raising awareness of climate impacts and other stressors on grasslands among staff of regional institutions and pastoralist groups, and designing appropriate sector policy. Changing approaches to pasture management, such as expanding pastures into less vulnerable locations and making use of nutrient providing pasture flooding in plains, can provide relief for climate-stressed and overgrazed pastures. However, such management changes require inclusion of pastoralist groups to ensure that interventions are socially accepted and do not impede pastoralists' livelihoods.

Experience from the ASAP I programme

The Adaptation for Smallholder Agriculture Programme I (ASAP I) programme was launched in 2012, providing co-financing resources to scale up and integrate climate change adaptation into IFAD's investments. The programme reached eight million vulnerable smallholders in 43 countries, increasing their capacity to cope with climate change impacts and ability to build more resilient livelihoods.

Projects within ASAP have focused on rangeland rehabilitation, reducing grazing intensity, and capacity building among communities to manage pastures more sustainably. Such components have been included in Sudan, Morocco, Lesotho, Nigeria, Yemen, and Kyrgyzstan. In Sudan, rehabilitation of rangeland and related infrastructure as well as the eradication of invasive species is expected to benefit farmers and pastoralists alike. In Lesotho, one aspect of the rehabilitation of grasslands is the slaughtering and auctioning of unproductive (wool-producing) animals, thus reducing pressure from grazing. In Kyrgyzstan, pasture users' unions and pasture committees are supported to develop and implement community-based pasture management plans that integrate climate change and disaster risk management concerns, including animal health issues. The projects highlight the interconnectedness of pasture restoration and the livestock sector. Pasture restoration is often just one component of a larger project aiming to increase climate resilience.

[3] For a comprehensive list of adaptation options for pasture restoration please see the Adaptation Options database.

NDC Priorities

Pasture restoration is included in the (Intended) Nationally Determined Contributions (INDC/NDC[4]) of 36 IFAD partner countries, and is found in particular as an adaptation priority in the NDCs of those with extensive grasslands and regions inhabited by pastoralist communities. However, at the national level, NDCs vary significantly in their depth and scope.

The most common adaptation priorities seek to restore, regenerate, and rehabilitate degraded grasslands. One approach to this is improved grazing management and adapted pasture management, such as sowing of pastures. Preventing damage from fire, invasive species and counteracting further degradation of pastures is included in some NDCs. Only two countries, Honduras and Sudan, seek to gain a better understanding of climate change impacts on grasslands and measures to increase the resilience of pastures through research. NDCs of countries in Africa and the Near East often include more elaborate and diverse adaptation priorities for pasture restoration.

Table 1 provides an overview of INDC/NDC priorities for adaptation of pastures by IFAD region of operation. A full list of adaptation priorities by IFAD partner country can be found in the NDC adaptation priorities database.

Table 1: NDC priorities for adaptation of pastures

NDC priority	Asia and the Pacific	Latin America and the Caribbean	Near East, North Africa and Europe	East and Southern Africa	West and Central Africa	Total
Number of countries	4	4	7	10	11	**36**
Restoration, regeneration and rehabilitation of grasslands	3	2	4	3	5	**17**
Protect and prevent further grassland degeneration	2	0	2	1	1	**6**
Grazing management and adapted pasture management (e.g. sowing)	0	0	3	7	5	**15**
Management of fire and invasive species	1	2	0	2	3	**8**
Research on resilient pastures and impacts of CC on grasslands	0	1	1	0	0	**2**

[4] In the following, NDCs is used to refer to both, NDCs and INDCs.

Accessing the Green Climate Fund (GCF)

The GCF invests in adaptation and mitigation projects and programmes in developing countries, with the objective of limiting or reducing greenhouse gas emissions and supporting vulnerable people to adapt to climate change. Key to GCF access is ensuring that projects have a strong climate rationale – the justification for how the project addresses specific climate impacts and vulnerabilities. While there are lots of other GCF assessment criteria, in this brief we summarise how to craft a strong climate rationale. A strong climate rationale must first set out the need for adaptation, and then clearly describe the rationale for planned adaptation interventions and why they have been selected.

Step 1: Adaptation Evidence

The project team must describe the project context, namely expected climate change impacts, risks and vulnerabilities. Expected climate impacts should be based on scientific evidence, and thus the project team needs to demonstrate clear use of climate data in the assessment of impacts and vulnerabilities. Demonstrating clear risks from climate change, including, where possible estimates of economic damage and number of people affected, is key if a project is to qualify for GCF funding.

Assessment Criteria – project should answer:

- What are the climate risks, vulnerabilities, and impacts related to climate variability and change relevant to the project context?
- What aspects of climate vulnerability will be targeted?
- Which climate-related risks might prevent project objectives being achieved?
- What is likely business-as-usual development and what are climate change related vulnerabilities?

Step 2: Prioritization of Interventions

The second step is to identify and describe adaptation measures for the project that are clearly linked to the previously identified climate risks and vulnerabilities. Adaptation measures should be consistent with national priorities for adaptation and sustainable development. The Adaptation Options System provides a foundation for identifying and prioritising appropriate adaptation options for the project. Transparency of decision-making around project interventions, including assumptions and uncertainty behind the choice of options strengthens a climate rationale. A theory of change should describe how the adaptation interventions are expected to contribute to the project objective.

Assessment Criteria:

- What options are available to address identified climate related vulnerabilities and are the proposed adaptation options realistic?
- Are the options robust and within an appropriate envelope of uncertainty?
- What type of adaptation is being pursued: reducing adaptation deficit, incremental, or transformational adaptation?
- With the investment, what are the specific adaptation activities to be implemented to increase the climate change resilience of the business-as-usual activity or baseline?
- Project states intent to address outlined vulnerabilities and risks through the proposed interventions. (Could take out?)
- Does this project respond to national adaptation and sustainable development priorities?

Tools available to support project design

Various tools are available to help integrate adaptation into project design. In this note three main tools are highlighted, with a selection of additional data sources and tools provided under the resources section. Together, these tools provide support to IFAD staff to identify the relevant climate risks during project design, and integrate appropriate adaptation measures. They also provide the evidence base needed for the climate finance contribution from adaptation projects to be reported.

Adaptation Options Prioritisation System

A database of adaptation options, and system for the assessment and prioritisation of adaptation options have been developed as part of IFAD's Adaptation Framework. The prioritisation comprises two main elements. First, the adaptation options in the database are filtered based on project sector, and the climate risks identified during the climate screening process. A multi-criteria analysis is then carried out on the shortlist of adaptation options to assist IFAD staff in choosing measures to integrate into the project using the following criteria:

- Technical feasibility
- Cost-benefit ratio
- How well the option addresses risks in the project context
- Complementarity to other IFAD themes
- Flexibility (i.e avoids lock-in)
- Mitigation co-benefits
- Transformative potential
- Accessibility for small-holder farmers

The Adaptation Options System uses a simple scoring system based on the eight criteria above. The first four criteria require a minimum score of 2; options which score lower than 2 on any of these criteria do not meet the minimum requirements and are not deemed to be suitable. Adaptation options which are scored the highest are most suitable for a project. The guidance below sets out how users of the system should score assign scores to the adaptation options for each of the criteria in the multi-criteria assessment.

Technical feasibility

The technical feasibility criterion is important in assessing which adaptation options are practical, given the skills, experience and capacity of the organisations tasked with implementing the project. If there is no prior experience with an adaptation option then the barrier to implementation may be too high, and there is an increased risk that it fails to meet its objectives.

1: Executing Agency has no experience implementing this type of adaptation option and there are no project partners with this experience.

2: Executing Agency does not have direct experience with this adaptation option, but partners are available who can provide technical expertise and experience with this type of option.

3: Executing Agency has previously implemented this type of adaptation option, and there is technical expertise within the organisation itself.

Economic case

The economic case includes a cost-benefit analysis and other instruments to establish the business case for public investment. The benefits must exceed the costs: the ratio of benefits to costs is greater than 1 in a cost-benefit analysis. Comparing the costs and benefits of different options allows for a comparison of the efficiency of different options, but requires costs and benefits to be calculated over the lifetime of the option and therefore requires a discount rate to be applied. The choice of discount rate for the analysis has an important bearing on the overall ratio of benefits to costs. Cost-benefit analysis for adaptation should also make some allowance for benefits that are hard to value in a traditional assessment, such as the benefits arising from improved environmental goods and services.

1: The benefits are less than the costs (BCR < 1) over the lifetime of the option, even with indirect benefits included

2: The benefit-cost ratio is in the range of 1-2. Benefits of implementing the option are higher than the estimated costs over the lifetime of the option although the benefits are not large and may be distributed unevenly among beneficiaries.

3: The benefit-cost ratio is greater than 2. Benefits of implementing the option are significantly higher than the estimated costs over the lifetime of the option and should be readily achieved.

Addresses climate risks

The extent to which an adaptation option increases resilience to the climate risks facing the project is a key consideration in prioritising options. All other things being equal, an option which increases resilience to several of the identified risks (e.g. livelihood diversification) should be prioritised over options that only address a single risk (e.g. increased flood protection). In the final consideration of which options to include in the project, care should be taken to select a package of options which address the different risks identified in the climate screening process.

1: Adaptation option is not relevant or may not be effective for the risks identified for the project.

2: Adaptation option effectively addresses at least one of the identified risks.

3: Adaptation option is relevant for all of the major climate risks identified for the project.

Accessibility for project beneficiaries

Adaptation options for IFAD projects should be appropriate for the project beneficiaries. This means ensuring that the adaptation option is affordable for target groups such as rural smallholders, youth or indigenous populations, or will not exacerbate existing gender inequalities (for example an insurance product that is only accessible to heads of the household, who may be predominately men).

1: Adaptation option is inaccessible for the main project beneficiaries (e.g. unaffordable, requiring regular complex maintenance), or exacerbates existing inequalities.

2: Adaptation option is accessible for the majority of the project's target beneficiaries.

3: Adaptation option is accessible to project beneficiaries and specifically benefits women or other marginalised groups.

Flexibility

Flexible and agile strategies for dealing with the uncertainty inherent in predictions of climate change ensure that adaptation options and strategies are developed in response to pressing needs and opportunities. This includes allowing for changes in approach as new information becomes available, or certain impacts start to pose a major risk. Flexibility in adaptation options is a function of the timeframe being considered, the design of the option, and the approach to managing change in the options being considered.

1: The adaptation option has a long life-time (>10 years) and its design does not allow for any adjustment. For example, a flood defence designed to cope with an additional 1m of flooding, and which would have be completely replaced if greater protection was required.

2: The adaptation option being considered has a short lifetime (<10 years) meaning that considerations of flexibility are not as relevant.

3: The adaptation option is low or no regrets or is part of an adaptive management approach. Low regrets mean the option has benefits across a wide range of conditions. Thresholds and trigger points identified in adaptation strategies support adjustments in response to new information, risks or opportunities.

Mitigation co-benefits

Where possible we should prioritise those options which also have emissions reductions potential. For example, the reforestation to stabilise slopes prone to landslides has clear mitigation benefits, while a reduction in the use of fertilizer resulting from the implementation of low or no-till agricultural practices would decrease the emissions used in food production.

1: No mitigation co-benefits or adaptation significantly increases greenhouse gas emissions.

2: Adaptation option leads to emissions reductions, either at present or in the future.

3: Adaptation option involves reforestation, restoration of carbon sinks, or the substitution of fossil fuels for renewable energy sources.

Transformative potential

An adaptation option may enable fundamental change in the target system so that it becomes more resilient to climate change. Key attributes of transformative adaptation are that it addresses underlying barriers to change, and that it operates at scale; for example enabling access to insurance products amongst smallholders may create knock-on effects in risk-taking and ability to invest in productive assets and thus create transformative change in livelihoods and significantly increase resilience to climate change at a large scale.

1: Adaptation option is limited to small increases in the resilience of target group, but does not involve changes in wider systems.

2: Adaptation option operates at scale or enables wider implementation of the option, for instance with a declining marginal cost.

3: Adaptation option enables change in the system in question which significantly increases opportunities for target beneficiaries to adapt to climate change.

Complementarity to IFAD themes

Where possible the adaptation options selected should complement the other IFAD cross-cutting themes (Gender, Youth and Nutrition). For example, a drought-resistant crop variety may be introduced which is nutritionally superior to existing varieties.

1: No complementarity

2: Complements at least one other cross-cutting theme that is directly relevant to adaptation outcomes.

3: Complements more than one other cross-cutting theme to support systemic resilience.

Resources

IFAD Guidance

- How to do: Engaging with pastoralists – a holistic development approach
- The Dryland Advantage. Protecting the environment, empowering people
- Enabling Land Management, Resilient Pastoral Livelihoods and Poverty Reduction in Africa
- How to do: Measuring Climate Resilience
- IFAD Climate Finance Tracking guidelines
- Scaling up note: Climate-resilient agricultural development
- Gender in Climate-Smart Agriculture
- Climate change mitigation potential of agricultural practices supported by IFAD investments
- Climate Adaptation in Rural Development (CARD) User Manual

Adaptation Framework:

- Adaptation Options prioritisation system
- Access climate finance from the Green Climate Fund
- NDC Priorities database

Useful reports

- IPCC (2019) Special Report on Climate Change and Land
- ILO (2019) Indigenous Peoples and Climate Change: Emerging Research on Traditional Knowledge and Livelihoods
- FAO (2018) Farmer field schools for small-scale livestock producers – A guide for decision makers on improving livelihoods. FAO Animal Production and Health Guidelines No. 20
- UNDP & FAO (2018) Promoting gender-responsive adaptation in the agriculture sectors: Entry points within National Adaptation Plans. Briefing Note
- Rojas-Downing, M. *et al.* (2017) Climate change and livestock: Impacts, adaptation, and mitigation. *Climate Risk Management* 16: 145-163
- Asian Development Bank (2014) Making grasslands sustainable in Mongolia: Herders' Livelihoods and Climate Change
- FAO (2012) *Incorporating climate change into agricultural investment programmes: a guidance document.*

Data & Tools

Climate data portals:

World Bank Climate Portal
KNMI Climate Explorer
Climate Information Portal
COPERNICUS Climate Change Service
CCAFS Downscaled Climate Data Portal

Climate hazards data

ThinkHazard
Global Flood Risk Analyzer