

## Adaptation Framework Thematic Brief: Livestock



Credit: Ashley Cooper

### Climate Change and Livestock

The impacts of climate change on livestock will vary according to type of animal, location and sources of fodder and water. Overall, climate change will impact animal health, wellbeing, and productivity, with resulting effects especially on pastoralists and small-scale livestock keepers. Animal husbandry occurs in different production systems and at different scales, including transhumance pastoralism, agro-pastoralism, silvo-pastoralism, dairying, poultry farming, and beekeeping.

Heat stress on animals and individuals attending to their care, such as shepherds, herders, and farmers already pose challenges in regions such as the Horn of Africa. If temperatures exceeding 40°C for example, milk production in cattle decreases, breeding is interrupted, animals become less mobile and will not feed as normal. Pasture and water availability will be negatively impacted by drought and flooding, intensified by unsustainable use of these resources. Loss of livestock and higher livestock mortality commonly occurs during drought. It may result in the need to adjust herd size and composition, favouring smaller animals that require less feed and water, such as sheep and goat, or migrating to more favourable conditions. Smallholder farmers may face difficulty providing fodder and water to their livestock during drought and flood.

Changes in climate can lead to new animal pests and diseases, or the return of previously eradicated diseases, to which animals in poor health will be more susceptible. Some pathogens and parasites may develop that live longer outside of their hosts. When herds gather near water sources, the risk of contraction is especially high.

The secondary impacts of climate change on livestock may include; lower mature weight of livestock or longer time to reach mature weight, lower milk and egg productivity, loss of genetic resources, increased pressure on remaining productive pastures and water sources, and increased fodder prices during high demand periods, ultimately resulting in a loss of food sources, income, and livestock assets.

The impacts of climate change will not be felt evenly, with women, marginalised indigenous groups and the poorest members of communities likely to be at greater risk. Poverty, lack of political power and marginalisation from decision-making processes interact to reduce the ability of these groups to adapt to a changing climate. Pastoralists will be strongly impacted, with poor households, women, children and youth being especially vulnerable. Patriarchal structures often limit women in taking part in communal decision-making processes and the 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 less often addressed 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 livestock is limited. Smallholder farmers are also consistently found to be more vulnerable to the impacts of climate change than commercial livestock farmers with greater access to supplementary fodder, water, and veterinary services.

In summary, the impacts of climate change on the livestock sector will affect both fodder and water availability as well as animal health and well-being. Impacts will be especially hard felt in areas that are already struggling with these issues, such as the Horn of Africa. For pastoralist communities in particular, climate change will pose a major challenge for food security and their traditional way of live.

### Adaptation and typical options available

Adaptation provides an important opportunity to reduce many of the negative effects described above, and in some cases avoid them entirely. Through the transformation of agricultural systems, it also provides the opportunity to improve on current conditions and improve food security among poor and marginalised groups. Adaptation for livestock systems is influenced by the type of animals, as well as the nature of local climatic, environmental and social systems. Adapting to climate change will require a combination of technological, environmental and policy responses.

Adaptation of livestock systems is closely linked to adaptation of pastures. To make use of synergies and to avoid redundancy and maladaptation, activities in these two agricultural sub-sectors need to be coordinated. For example, changes in herd composition and watering points directly affect pasture conditions.

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 risk that adaptation can perpetuate and enhance existing inequalities.

Many interventions which increase the resilience of livestock systems to climate change also have mitigation co-benefits. The global livestock sector accounts for more greenhouse gas emissions than many other food sources. Including mitigation measures into adaptation whenever possible has a good potential to contribute to reduced emissions and enhanced climate resilience of the sector.

Better quality of feed and good animal health, for example, increase productivity of livestock<sup>1</sup> and make them more resilient to climatic stress. Improved pasture management increases feed availability, as well as the amount of carbon sequestered in the soil of grasslands.

Adaptation measures for livestock can be broadly grouped into the following categories<sup>2</sup>:

### **Agricultural Technology**

Improved agricultural technologies can play an important role in adapting to climate change. Securing water access for livestock, especially during dry and drought conditions, is fundamental for the survival of livestock. Measures include watering points, water harvesting in the form of dams and improving the efficiency of water infrastructure. More resilient animals, from targeted breeding and reintroduction of native species are also a viable option, however needs to be weighed against factors such as market demand, nutritional value and ecosystem impact. Monitoring and controlling animal health, through improved practices and veterinary services, can further benefit livestock resilience and productivity.

### **Climate Information and risk management**

The provision of climate information, in the form of seasonal forecasts, or early-warning systems, can, if well-tailored, significantly increase the resilience of pastoralists to climate change. Effective seasonal forecasts can allow pastoralists to adjust migratory routes, adjust herd size and composition, and farm practices in integrated livestock systems (e.g. agro-pastoralism). Flood or drought early-warning systems can reduce losses from extreme events. The integration of indigenous and local knowledge into climate information products is increasingly seen as important in increasing accuracy and uptake. Expanding both traditional, and index-based insurance schemes can be an effective risk transfer mechanism. Contingency plans for flood and drought events can allow pastoralists to better respond to and recover from climate impacts.

### **Nature-based Adaptation**

These approaches emphasise increasing the quality of pastures, while enhancing local biodiversity and ecosystem services, and strengthening and empowering local communities. Diversification of food and livelihood systems provides increased resilience against extreme events, while the maintenance and enhancement of local environmental services can provide a buffer against climate shocks. Examples include integrated crop-livestock systems and silvo-pastoralism aimed at maintaining soil fertility and improving water retention with co-benefits for livestock. In many cases there are existing good examples of these approaches with potential to be scaled up. Rehabilitating pastures for grazing and improved grazing management increase the availability of feed and make feed sources more resilient to climate impacts.

### **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. Identifying the barriers to scaling up different adaptation measures, many of which may not be specifically related to climate change, but revolve around issues such as land tenure and grazing rights, for example, and working to overcome these barriers can create better enabling conditions for adaptation.

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<sup>1</sup> Increased livestock productivity lowers emissions per unit of input, e.g. water, fodder, fertilizer.

<sup>2</sup> For a comprehensive list of adaptation options for livestock please see the Adaptation Options database.

Strengthening local institutions so that they are better able to deal with climate risks, for example by integrating climate risk management frameworks into organisational strategies, or training staff to use and act on climate information is also key in any adaptation strategy.

### 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 targeted mainly climate-resilient value-chains, improved access to markets and product processing, animal health through veterinary services, increased availability of water and quality and quantity of fodder. Managing grazing patterns, rehabilitating rangelands and diversifying livelihoods are commonly included in ASAP projects. Overall, projects are characterized by their design with various entry points to livestock adaptation. Often, adaptation measures for the livestock sector are components of larger projects aiming to increase the climate resilience of smallholder farmers.

ASAP projects with a livestock component have been or are currently being implemented in Mozambique, Tanzania, Sudan, Burundi, Morocco, Lesotho, Nigeria, Ghana, and Kyrgyzstan<sup>1</sup>. For example, in Sudan, livestock business development aims to promote access to finance for livestock owners, and market development of the national livestock industry. In Lesotho, wool and mohair production is improved from the field to the processing of the products, with co-benefits for rangeland rehabilitation. In Kyrgyzstan, access to veterinary services will be improved and vulnerable groups will receive training for value-addition of animal products.

### NDC Priorities

The livestock sector is included in the (Intended) Nationally Determined Contributions (INDC/NDC<sup>3</sup>) of 64 IFAD partner countries. There is clearly recognition of the need for adaptation in the sector, especially in regions that are inhabited by pastoralist communities. However, at the national level, NDCs vary significantly in their depth and scope.

The most common adaptation priority is the improvement of livestock production systems, for example, improved feed and fodder quality, as well as value-chains. The inclusion of indigenous and local knowledge is sometimes stated. Another priority is pastoralists' social protection, through livestock insurance and diversification of livelihoods. Sustainable livestock management and the adoption of more resilient breeds are also mentioned in some NDCs. Integrated production systems, such as agro-pastoralism and increased water availability for livestock are included in NDCs from most regions. Less common priorities are measures relating to animal health, disaster risk reduction/management for livestock and research on climate change impacts on the sector.

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<sup>3</sup> In the following, NDCs is used to refer to both, NDCs and INDCs.

Table 1 provides an overview of INDC/NDC priorities for adaptation in the livestock sector 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 in the livestock sector**

<b>NDC priority</b>	<b>Asia and the Pacific</b>	<b>Latin America and the Caribbean</b>	<b>Near East, North Africa and Europe</b>	<b>East and Southern Africa</b>	<b>West and Central Africa</b>	<b>Total</b>
Number of countries	10	12	9	16	17	<b>64</b>
<b>Sustainable livestock management (e.g. livestock management, soil and water conservation, conflict management)</b>	2	1	2	3	9	<b>17</b>
<b>Silvo-pastoralism, Agro-pastoralism and integrated agro-forest-livestock systems</b>	1	5	2	1	5	<b>14</b>
<b>Increase water availability for livestock</b>	1	0	3	3	5	<b>12</b>
<b>Social protection (insurance, livelihood diversification, access to finance)</b>	2	2	4	4	5	<b>17</b>
<b>Adopt more resilient breeds; change herd composition; and conserve genetic resources</b>	0	2	4	6	3	<b>15</b>
<b>Improve breeding techniques, feed, production, management &amp; value-chains; based on indigenous/local and new knowledge</b>	7	5	6	12	9	<b>39</b>
<b>Animal health, including disease monitoring, veterinary services</b>	2	1	2	4	2	<b>11</b>
<b>DRR for livestock production systems, incl. Forecasts and climate information</b>	1	0	3	2	1	<b>7</b>
<b>Research into CC impacts on livestock and resilient livestock production</b>	2	0	0	2	2	<b>6</b>

## 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 to 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: Climate Change Risk Assessments in Value Chain Projects
- How to do: Measuring Climate Resilience
- IFAD Climate Finance Tracking guidelines
- Climate change mitigation potential of agricultural practices supported by IFAD investments
- How to do: Engaging with pastoralists – a holistic development approach
- How to do: Mainstreaming portable biogas systems into IFAD-supported projects
- Women and pastoralism
- Scaling up note: Smallholder livestock development
- Lessons learned: Pastoralism land rights and tenure

### 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
- FAO (2019) Good practices for integrating gender equality and women's empowerment in climate-smart agriculture programmes.
- ILO (2019) Indigenous Peoples and Climate Change: Emerging Research on Traditional Knowledge and Livelihoods
- FAO (2019) Africa Sustainable Livestock 2050 - Livestock sector development in Asia and sub-Saharan Africa - A comparison of environmental impacts
- UNDP & FAO (2018) Promoting gender-responsive adaptation in the agriculture sectors: Entry points within National Adaptation Plans. Briefing Note
- FAO (2018) Climate change and the global dairy cattle sector – The role of the dairy sector in a low-carbon future
- FAO (2017) Livestock solutions for climate change
- FAO (2016) Climate Change and Food Security: Risks and Responses
- 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