IFAD
Investing in rural people

INVESTING IN LIVESTOCK FOR IMPROVED AND RESILIENT LIVELIHOODS, NUTRITION AND CLIMATE ACTION

POSITION PAPER

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ACRONYMS

AfDB	African Development Bank
AFOLU	agriculture, forestry and other land use
CCAC	Climate and Clean Air Coalition
ECG	Environment, Climate, Gender and Social Inclusion Division
FAO	Food and Agriculture Organization of the United Nations
GCF	Green Climate Fund
GEF	Global Environment Facility
GHG	greenhouse gas
GLEAM-i	Global Livestock Environmental Assessment Model – interactive
IPCC	Intergovernmental Panel on Climate Change
LIC	low-income country
LMIC	lower-middle-income country
M&E	monitoring and evaluation
MRV	monitoring, reporting and verification system
NDC	Nationally Determined Contribution
PMD	Programme Management Department
PMI	sustainable production, markets and institutions
ROLL	Restoration of Landscape and Livelihoods Project
SDG	Sustainable Development Goal
SECAP	Social, Environmental and Climate Assessment Procedures
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change

EXECUTIVE SUMMARY

Livestock are a game changer for the rural poor. They provide food and income to the majority of the 700 million people who live in extreme poverty, playing a critical role in incomes, food security and nutrition. Worldwide, about 750 million people suffer from hunger and the diets of an estimated two billion people are deficient in micronutrients, especially in iron, calcium, zinc, vitamin A, B12 and folate (FAO, IFAD, UNICEF, WFP and WHO, 2023).

Animal products are essential for closing the nutritional gap of the rural poor, because they provide higher-quality protein than other foods and are denser in several micronutrients, in more bioavailable forms. Livestock also provide fuel and fibre as well as a form of savings. They are a common asset that can be used for direct cash needs and can serve as insurance for times of crisis, for example during a drought, a flood or a crop failure. Livestock increase crop productivity through manure that is used as fertilizer and through traction for working land and transporting people and goods. Livestock are essential parts of agroecosystems and they also serve non-marketable roles in the livelihoods of the rural poor, including important cultural value.

About 60 per cent of rural households keep livestock in a wide variety of production systems, with a range of 40 to 93 per cent of households in sub-Saharan Africa (Kaur et al., 2017). Smallholder livestock keepers and pastoralists, however, are among the most vulnerable to climate change. **Climate change affects livestock** directly, for example through heat stress or lack of water, and indirectly, for example through reduced fodder quality and quantity. **Livestock are also globally identified as significant contributors to greenhouse gas emissions**, including methane through enteric fermentation and indirectly through deforestation in certain regions. The potential for reducing greenhouse gas emissions from livestock through improved practices is high.

IFAD invests in small-scale livestock production and pastoralism and is committed to leaving no one behind. Livestock development is a growing part of IFAD's portfolio. Twenty-two per cent of all IFAD projects since 2010 focus on livestock and another 39 per cent include livestock activities to different extents. Livestock investment is distributed across all regions.

Lessons learned from IFAD's portfolio on livestock show that investing in livestock supports countries achieving the Paris Agreement (2015) and limits the rise in mean global temperature. In particular, poor rural people, a large share of whom depend on livestock for their livelihoods, are disproportionately affected by the effect of climate change. IFAD gives a specific focus to their vulnerability and adaptive capacity. IFAD supports countries in realizing their Nationally Determined Contributions (NDCs) by enhancing the role of livestock in climate action, for adaptation and mitigation. About a third of countries include livestock in their Nationally Determined Contributions, but fewer than 18 per cent include specific measures.

IFAD's investments help with developing resilient and efficient livestock production. Lessons learned show that animal health, animal genetic resources, and herd, feed, manure and grazing management are the main technical entry points to improve efficiency and resilience in livestock production and reduce greenhouse gas emissions. On the farm, most improvements leading to adaptation and mitigation are complementary and go hand in hand.

IFAD's investments also support the development of livestock value chains and lead to better access to nutritious and low-emission animal-source foods. Market access is often an important challenge faced by smallholders and pastoralists, either because of their low level of production or their distance to existing markets, such as urban and peri-urban areas. IFAD works at increasing their market access by investing in aggregation and access to a range of services, such as food loss reduction and waste reduction, while supporting low-emission technologies along the value chains, such as renewable energies.

Knowledge and capacity development are essential for low emissions and resilient livestock investments. This includes the use of advanced tools for assessing climate risks and greenhouse gas emissions (GHG) from livestock, the development of capacity to use those tools, and the publication of technical reports, policy briefs and guidance for assessing the impact of livestock investments on climate change adaptation and mitigation.

IFAD develops access to services such as climate insurance and supports the development of policies with evidence-based recommendations that promote participatory, integrated and coherent solutions to climate change and other global challenges, while at the same time improving the livelihoods of small-scale producers.

This position paper formulates five recommendations for livestock investments to deliver better climate outcomes while continuing to support livelihoods and nutrition:

1. Mainstream climate-smart livestock interventions across IFAD's portfolio.
2. Promote simple indicators and tools to measure climate outcomes from livestock investments.
3. Improve access to finance to develop low-emission livestock value chains, with a particular focus on methane.
4. Support capacity development on low-emission and resilient livestock interventions and manage knowledge.
5. Inform and support public policies as part of livestock projects and ensure a balanced approach to livestock development and climate action.

WHY A POSITION PAPER **LIVESTOCK** AND CLIMATE CHANGE?

GOAL AND AUDIENCE

The aim of this paper is to articulate IFAD's approach to investing in and promoting livestock development and to illustrate how such interventions serve the Fund's objectives of inclusive and sustainable rural development as well as its cross-cutting corporate priorities, notably its climate commitments. It builds on IFAD's experience, including lessons learned from IFAD's and other partners' work, and aims to provide guidance and recommendations to inform the future design and implementation of livestock investments.

In this paper, livestock include cattle, buffaloes, goats, sheep, camelids, poultry, rabbits and pigs. While this paper does not aim to address fisheries and aquaculture in detail, examples are provided to illustrate how IFAD is also working on climate action in these sectors.

On the one hand, a generalized narrative that frequently prevails is that livestock are a major contributor to greenhouse gas (GHG) emissions. On the other hand, the role livestock play in income generation, building resilience, reducing GHG emissions and increasing carbon sequestration is not equally acknowledged and documented. Decision makers in financing institutions may, therefore, be under the impression that a better climate strategy would be to reduce or stop investments in livestock. This paper illustrates that that is likely to be detrimental to the livelihoods, food security and nutrition of hundreds of millions of smallholders and pastoralists, and may also result in higher emissions in the medium term if the sector's development is left without public interventions to promote better climate co-benefits.

This paper aims to be accessible to all IFAD stakeholders, but its main targeted audience and users include:

- ☐ IFAD management and staff, all of whom have a role in including more climate outcomes in the Fund's livestock programmes and operations, notably during the design, supervision and implementation of support missions and impact assessment and evaluation, or as part of policy engagement and other non-lending activities;
- ☐ IFAD partners in countries, including representatives of governments, producers and value chain actors, who are the ultimate owners and change agents and drivers of livestock development and climate actions in the context of national development objectives;
- ☐ IFAD Executive Board members, Rome-based agencies and other United Nations organizations, multilateral financial institutions, global funds, development agencies and donors, including philanthropic organizations;
- ☐ Implementation partners, including research and academia, civil society organizations and private sector collaborators.

WHY SHOULD WE CARE ABOUT LIVESTOCK?

Livestock for inclusive livelihoods and nutrition

Livestock provide food and income to the majority of the 719 million people who live in extreme poverty, on less than US$2.15 a day. About 60 per cent of rural households keep livestock in a wide variety of production systems, with a range of 40 to 93 per cent of households in sub-Saharan Africa, with livestock thus playing a critical role in incomes, food security and nutrition (Kaur et al., 2017). The livestock sector, including primary production and value chains, represents between 20 and 40 per cent of the agricultural GDP at the country level. Livestock are particularly important to rural populations in fragile countries, with an average of 32 per cent of agricultural GDP in conflict countries and 30 per cent in countries with institutional and social fragility. Livestock are also an asset that can be used for direct cash needs and serve as savings and insurance for times of crisis, for example during a drought, a flood or a crop failure. They also serve non-marketable roles in the livelihoods of the rural poor, including important cultural value. Livestock as a social or cultural gift increase social capital and livelihood resilience through community cohesion and reciprocity (Alders et al., 2021; Leneman et al., 2021).

Livestock also provide nutritionally dense food. Animal-source foods are essential for closing the nutritional gap of the rural poor. About 750 million people worldwide suffer from hunger, and the diets of an estimated 2 billion people are deficient in micronutrients, especially in iron, calcium, zinc, vitamin A, vitamin B12 and folate (Beal et al, 2023; FAO, 2023b). This so-called "hidden hunger" affects the most vulnerable, especially young children, adolescent women and women of reproductive age in lower-middle-income countries (LMICs). Animal products are a valuable source of these micronutrients, as well as essential amino acids (high-quality protein). Apart from food, livestock provide fuel and fibre as well as direct income.

Rural women represent two thirds of the world's poor livestock keepers and carry out most of the day-to-day farm animal management, processing, marketing and selling of animal products. But women have substantially less control than men over the income generated. They also have less access than men to resources such as land, credit and training. Youth are also often involved in livestock production and value chains, for example with herding and with collection at the farm gate and transport to processing or retail (in the case of milk, for instance).

Livestock are essential parts of agroecosystems

Livestock provide fertilization with manure, provide traction for working the land, increase crop productivity, and transport people and goods. Livestock are essential part of agroecosystems, complete the nutrient cycle and can contribute to conserving water quality and biodiversity under adequate management. With over 8,000 different breeds of farm animals, livestock are part of biodiversity and are adapted to almost all types of environments.

Livestock are particularly essential to achieve SDG 1, "no poverty", and SDG 2, "zero hunger", but they contribute directly or indirectly to all 17 SDGs, including SDG 13, "climate action", and SDG 15, "life on land" (FAO, 2018). They provide all four kinds of ecosystem services, as illustrated in table 1.

Livestock vulnerability to climate change

Smallholder livestock keepers and pastoralists are among the most vulnerable to climate change, which is already affecting their incomes and food security (FAO, 2018; IPCC, 2022).

Climate change affects livestock through increases in temperature (with impacts on animal health, reproduction, productivity, forage, water and diseases), variations in precipitation (with impacts on forage and diseases) and increases in carbon dioxide (CO_2) (with an impact on forage) (figure 1).

Impact can be direct, for example through animal heat stress or lack of water, and indirect, for example through reduced fodder quality and quantity. Table 2 summarizes the main impacts on grazing and non-grazing systems.

Climate-change-related disasters, such as droughts, cyclones and floods, can cause loss of human lives and livelihoods, including livestock. High animal morbidity and mortality are not uncommon as a secondary crisis (Klein et al., 2019). These crises can be particularly serious in pastoralist systems, where rangelands and mobility are key to livelihoods with no alternative sources of food or income. The Horn of Africa has been experiencing its worst drought in 40 years, with three consecutive years of subnormal precipitation since 2020, resulting in at least 18 million people facing extreme hunger. Rivers and wells have dried up and pastures have turned to dust, causing the death of more than 1.5 million head of livestock in Kenya alone (Africanews, 2022).

TABLE 1

SUMMARY OF LIVESTOCK ROLES IN AGROECOSYSTEMS AND LIVELIHOOD PURPOSES FOR KEEPING LIVESTOCK

LIVESTOCK ROLE	LIVELIHOOD PURPOSES	ADVANTAGES FOR RURAL DEVELOPMENT AND AGROECOSYSTEMS
Provisioning services: **Food (meat, milk, eggs, offal)** **Bones, hides, wool, feathers** **Manure and biogas** **Draft power** **Asset building and insurance**	Home consumption for food security and nutrition Income and value addition Value chain development and job creation Clothing, income Value chain development and job creation, Soil fertility, structure and water retention, energy Tillage and land work, transport Buffer for livelihood shocks Income from products and offspring, cash flow and investments	Increase safe rural household consumption by local market production of animal-source foods School feeding Value addition and industry development (glue, feed/blood meal) Input for horticulture/agriculture Energy for small and medium-sized enterprises (milk processing) Livelihoods and stimulus for rural development Demand for farm inputs Supply consumer demand
Regulating and supporting services: **Grazing management, integrated crop-livestock, silvopastoralism**	Regeneration of system Increase of crop yields Livelihood continuation and resilience	Water retention and quality, biodiversity conservation, carbon sequestration in pastures, transfer of nutrients and water through dung and urine Cohabitation for nature conservation
Cultural services: **Tourism**	Income, strengthening of rural community	Tourist spending, boosting and supporting local economic development

The 2022 unprecedented floods in Pakistan affected one third of the country and led to the death of 1.8 million livestock.

Such crises can be mitigated through appropriate disaster risk preparedness and management, including early warning systems, insurance and social safety nets, as well as animal disease surveillance and prevention. However, initiatives to mainstream livestock into disaster risk reduction management and disaster relief and emergency management are still in their early stages (LEGS, 2023; Mizutori and Taalas, 2022; CERF, 2023).

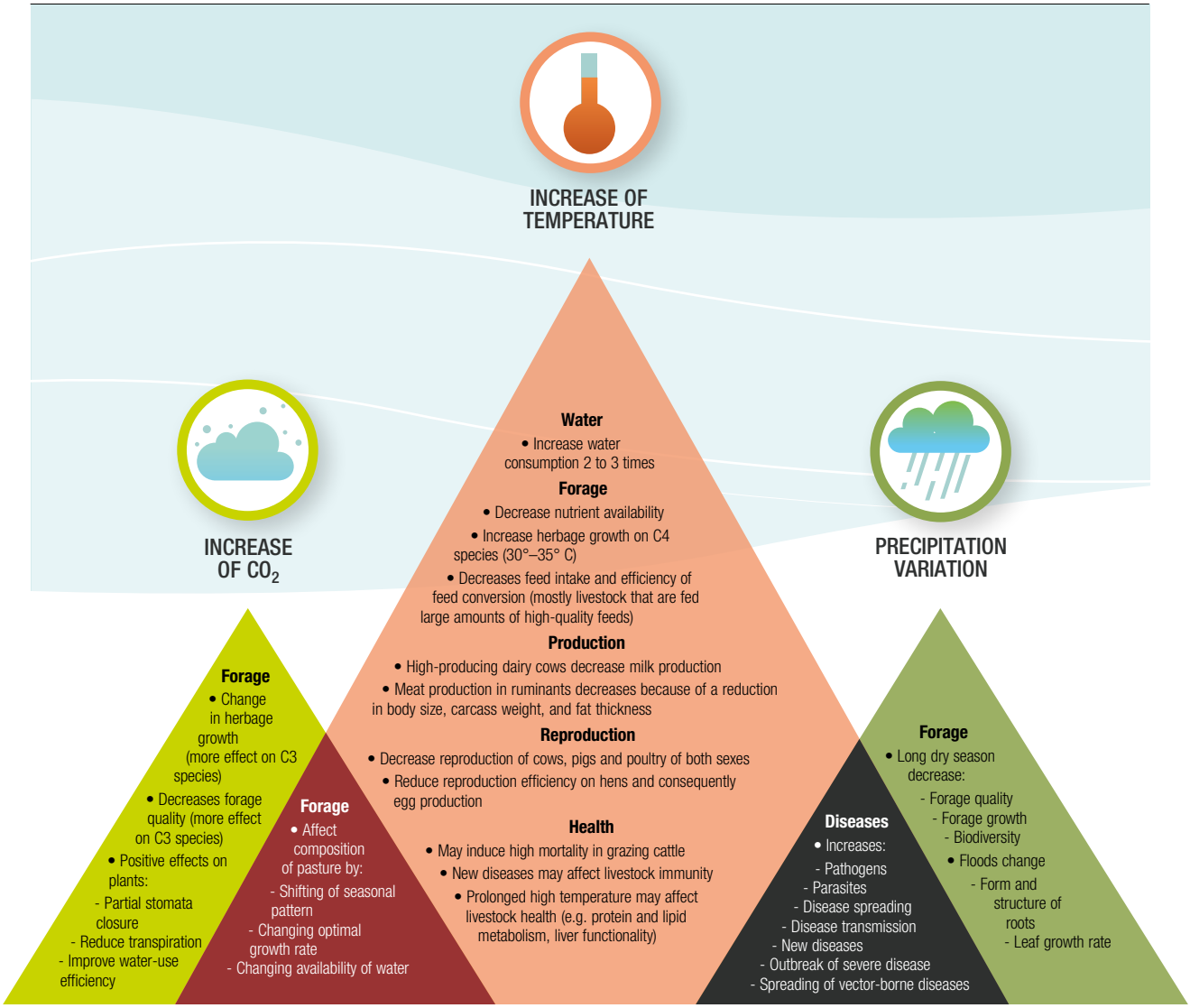
Adaptation options for livestock keepers include a large range of on-farm practices relevant to the individual animal or the herd, such as diversification of production; water management (e.g. water harvesting and storage, boreholes); breeding (e.g. resistance to drought, heat and harsh environments); shifts in species, breeds and/or production system (e.g. from cattle to small ruminants); disease control and animal health; cooling (indoor systems); or provision of shade (e.g. trees).

Adaptation options for feed and fodder include feed crops and pasture irrigation, which are particularly relevant for mixed crop-livestock systems, purchase of feed and supplementation,

breeding feed crops and forages for water use efficiency and for resistance to drought and salinity, changes in grazing management (e.g. rotational grazing), changes in cropping calendar, agroforestry and increase mobility of herds for resources (e.g. pastoralism).

Finally, adaptation options also include off-farm diversification (external income), insurance and a large range of institutional changes (e.g. trade, conflict resolution, income stabilization programmes).

FIGURE 1
IMPACTS OF CLIMATE CHANGE ON LIVESTOCK



Source: Reprinted from Rojas-Downing et al., 2017.

TABLE 2

DIRECT AND INDIRECT IMPACTS OF CLIMATE CHANGE ON LIVESTOCK PRODUCTION SYSTEMS

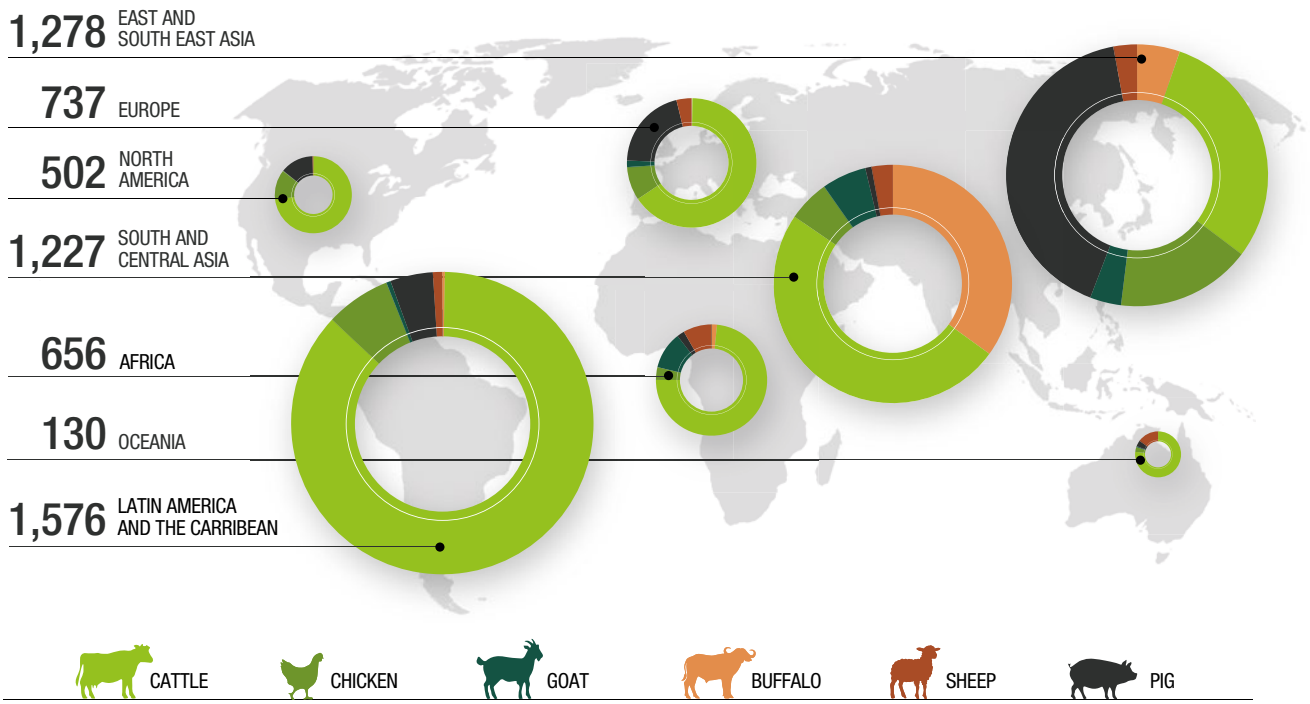
	GRAZING SYSTEMS	NON-GRAZING SYSTEMS
Direct impacts of climate change	• Increased frequency and magnitude of droughts and floods and resulting changes in migration and herd morbidity and mortality • Productivity losses resulting from physiological stress due to higher temperatures (heat stress decreases reproductive and feed efficiency) • Change in water availability (increase or decrease depending on the region)	• Increased frequency of extreme weather events, with impact being less acute than for extensive systems • Change in water availability (increase or decrease depending on the region)
Indirect impacts of climate change	Agroecological changes and ecosystem shifts leading to: • Alteration in fodder quality and quantity • Change in host–pathogen interactions resulting in increased incidences of (re)emerging diseases • Increased risk of infectious disease epidemics • Shifts in production systems	• Increased resource prices (e.g. feed, water and energy) • Increased cost of animal housing (e.g. cooling systems, warding off infectious disease risks) • Increased risk of infectious disease epidemics • Shifts in production systems

Source: Adapted from FAO, 2017.

FIGURE 2

BREAKDOWN OF LIVESTOCK SECTOR EMISSIONS BY REGIONS AND SPECIES

MILLION TONNES CO_2 -EQ



Source: FAO, 2022.

Livestock value chains as contributors to greenhouse gas emissions and their reduction

Livestock are significant contributors to GHG emissions. Globally, livestock are responsible for about 30 per cent of anthropogenic methane (CH_4) emissions, while livestock value chain activities are estimated to account for about 11 per cent of total anthropogenic GHG emissions (UNEP and CCAC, 2021; FAO, 2023a). Primary production accounts for the majority of emissions, including for feed and fodder production, which can include deforestation, while processing, transport and retail are estimated to contribute about only 2 per cent of the total. The livestock sector thus plays an important role in climate change. A breakdown per animal species shows that:

- Cattle and buffalo for milk and meat production jointly set free some 70 per cent of the sector's emissions;
- Pig meat and poultry meat and eggs contribute 14 per cent and 9 per cent respectively to the sector's emissions;
- Goat and sheep production contributes the remaining 7 per cent.

Countries and regions contribute to the sector's emissions to very different extents. For example, sub-Saharan Africa accounts for about 6 per cent of the total. Low-income countries all together represent about 6 per cent of the sector's emissions while high-income countries account for 21 per cent. Figure 2 shows the breakdown of livestock sector emissions by regions and species.

The four major sources of livestock GHG emissions, in order of magnitude, are:

1. Enteric fermentation (CH_4) – about 40 per cent;
2. Feed and fodder production: application of manure, fertilizers, machinery, transport (nitrous oxide (N_2O) and CO_2) – about 37 per cent;
3. Manure (both CH_4 and N_2O) – about 10 per cent;
4. Pasture and feed crops expansion into natural areas such as forests (CO_2) – about 9 per cent.

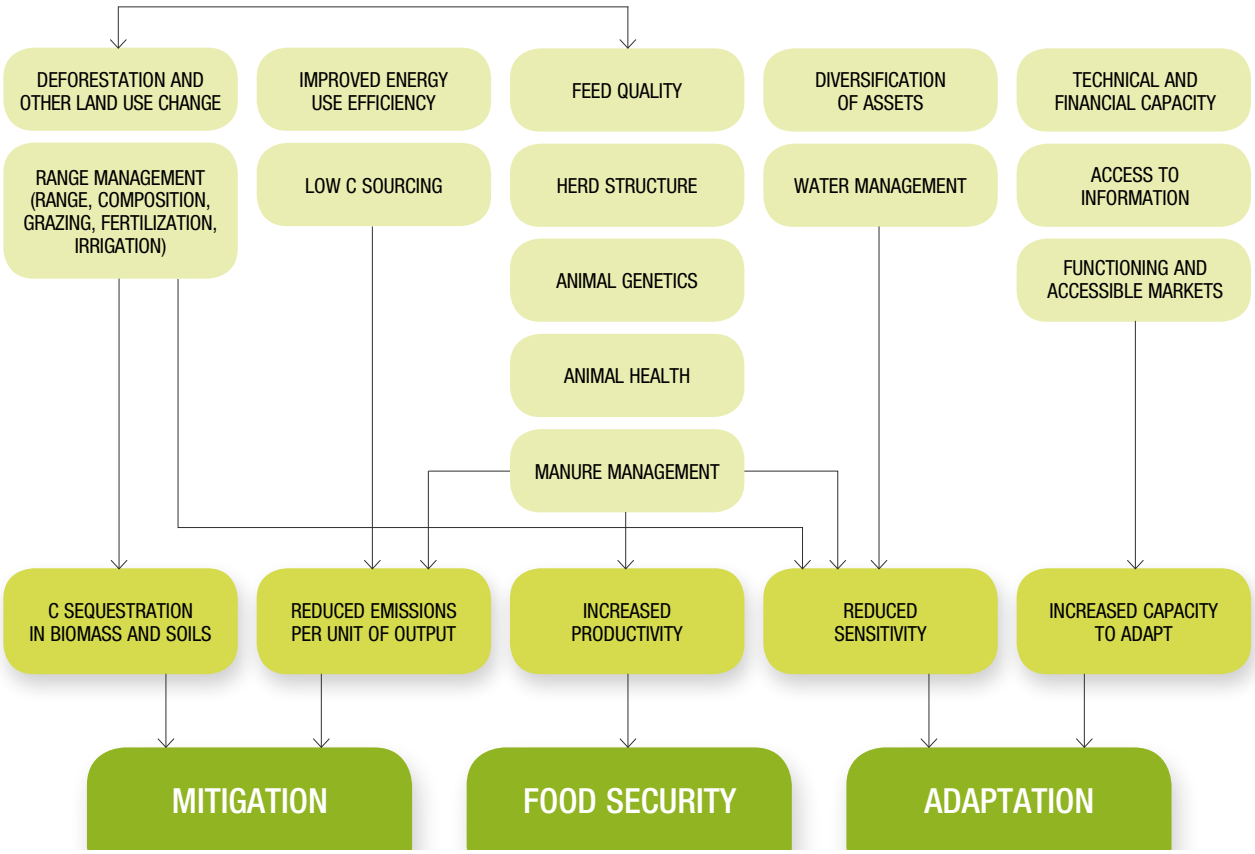
When looking at CH_4 emissions only, we find that livestock are responsible for about 30 per cent of the global total (UNEP and CCAC, 2021). CH_4 is a short-lived climate pollutant, with a global warming potential currently estimated to be 27 times higher than that of CO_2. Reducing CH_4 emissions, even modestly, can have a very positive impact on temperatures in the short and long terms. This is what motivated the launch of the Global Methane Pledge at the United Nations Framework Convention on Climate Change (UNFCCC) COP26 in Glasgow in 2021, which aims to reduce global anthropogenic CH_4 emissions by 30 per cent in 2030 compared with 2020 levels – making CH_4 emission reduction a priority in climate action.

While CH_4 emissions are less important in low-income countries (LICs) and LMICs than in high-income countries and upper-middle-income countries in absolute terms, they represent a higher share of total life-cycle emissions for livestock (72 per cent and 56 per cent respectively in LICs and LMICs versus 38 per cent in high-income and upper-middle-income countries). This indicates that livestock GHG emissions in LICs and LMICs are caused less by producing and transporting feeds, inputs and post-farm emissions (processing, transport and retail). The focus for mitigation in LICs and LMICs should, therefore, be on primary production on farm, to reduce direct emissions in absolute terms and per kg of products.

Wider adoption of existing best practices in feeding, health and husbandry, and in manure management – as well as greater use of existing technologies and practices such as biogas generators and energy-saving devices – could help the global livestock sector **cut its GHG emissions by as much as 30 per cent** without affecting overall production (Gerber et al., 2013; Mottet et al., 2016). However, improvements in livestock production that also aim at achieving climate outcomes (known as "climate-smart livestock production") need to be tailored to each system and value chain and each country context. It should not be detrimental to food security and nutrition. This is clearly also what is recognized by the Koronivia Joint Work on Agriculture from UNFCCC COP23. Figure 3 summarizes the main mitigation and adaptation options available for livestock value chains and their links to productivity and food security.

FIGURE 3

SUMMARY OF MAIN MITIGATION AND ADAPTATION OPTIONS AVAILABLE FOR LIVESTOCK VALUE CHAINS AND THEIR LINKS TO PRODUCTIVITY AND FOOD SECURITY



Source: FAO, 2017.

IFAD'S APPROACH TO **LIVESTOCK** AND CLIMATE CHANGE

IFAD INVESTS IN SMALL-SCALE LIVESTOCK PRODUCTION AND PASTORALISM

Livestock are instrumental for poverty alleviation and food security. IFAD's goal is that rural women and men in low- and middle-income Member States achieve incomes that are higher and resilient to climate and other shocks, as well as improved food security and nutrition outcomes.

The number of people whose livelihoods are based on pastoral practices is estimated at between 100 million and 500 million worldwide, depending on the definitions used. Pastoral populations often rank among the poorest and most destitute agricultural and rural peoples in the world and are the most excluded from basic socioeconomic services and infrastructure (Rota, 2018). Understanding and strengthening the livelihood system in which poor small-scale farmers and pastoralists operate, as well as their circumstantial opportunities and risks, is key for developing their adaptive capacity and supporting measures aiming at production efficiency and GHG emission reductions.

IFAD has invested in approximately 102 livestock development projects since 2010 for a total of US$6.4 billion (table 3), or 17 per cent in value of the total IFAD portfolio. In addition, another 179 IFAD projects have included livestock development activities. This portfolio spans across all regions, with higher budgets and number of projects in the Near East, North Africa and Europe, while West and Central Africa, East and Southern Africa and Asia and the Pacific are not far behind. In Latin America and the Caribbean, IFAD investments in livestock are less specific and are found as activities included in projects focusing on value chain development, natural resources management or rural finance.

IFAD considers livestock as one of the key pillars of rural development. As a consequence, globally, livestock activities can be found in 25 per cent of IFAD's value chain development projects and in 42 per cent of IFAD's natural resource management projects.

TABLE 3

IFAD PROJECTS WITH LIVESTOCK-RELATED ACTIVITIES BY REGION SINCE 2010 *

	NUMBER OF PROJECTS			INVESTMENT VALUE (MILLION US$)		
IFAD regional divisions	**Total IFAD portfolio**	**Projects focusing on livestock**	**Projects including livestock activities***	**Total IFAD portfolio**	**Projects focusing on livestock**	**Projects including livestock activities**
Asia and the Pacific	107	25	51	13 838	2 048	5 595
East and Southern Africa	85	21	38	8 419	1 898	3 524
Latin America and the Caribbean	65	4	33	3 332	126	1 492
Near East, North Africa and Europe	66	28	57	3 830	1 161	2 130
West and Central Africa	92	24	40	7 009	1 201	3 622
Total portfolio	**415**	**102**	**193**	**36 428**	**6 433**	**16 363**

* These projects can be focusing on value chain development, natural resources management or rural finance.

* See annex 1 for IFAD regions.

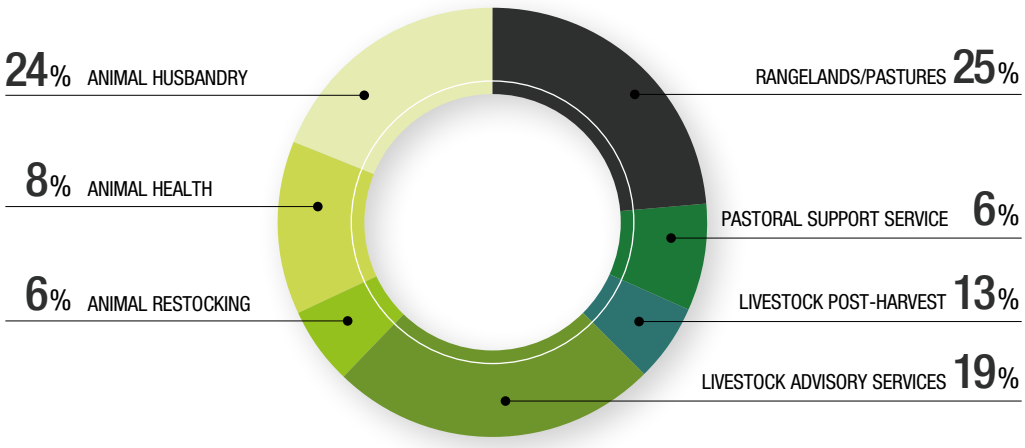
Note: Data accessed on 22 December 2023.

IFAD has an elaborate targeting policy that is the basis for each project's targeting strategy (IFAD, 2022b). The strategy ensures that the beneficiaries are carefully selected and the investment made yields the desired impact. The prioritization of IFAD's target groups is based on government priorities, reflecting criteria such as poverty characteristics of the project area and vulnerability to climate change. IFAD specializes in targeting people living in poverty in rural areas as well as vulnerable populations at risk of falling into poverty, with a continuing priority on the poorest and most excluded, including those who are food insecure. The Fund's comparative advantage lies in its three-dimensional approach, reconciling livelihoods, climate and social inclusion/nutrition outcomes. IFAD investments are also context-based. For example, under extensive livestock production systems in remote and harsh conditions (e.g. in Mongolia), 20 cattle may not be sufficient to build a sustainable livelihood, whereas, for intensive zero-grazing dairy in mixed crop-livestock systems (e.g. in Rwanda), one dairy cow can be a starting point in building a sustainable livelihood. In dire circumstances, even a single animal can make a difference (e.g. poor households in India that depend on a few goats for their livelihood), and single carriage and draught animals can also generate a household income. Therefore, IFAD's targeting strategy accounts for the local context.

Most of the projects supporting livestock development target improved productivity of livestock and natural resources as well as the provision of essential services to support market systems. Animal husbandry (including breeding and feed) and rangelands/pasture management (including reducing land degradation) are the two most important areas of investment in IFAD's livestock portfolio, followed by livestock advisory services (figure 4). Animal-restocking projects are mainly targeted towards the provision of productive assets to vulnerable households. Animal health investments focus on the delivery of the "last mile" services to improve the access of smallholders and pastoralists to such services.

FIGURE 4

INVESTMENTS IN THE IFAD PORTFOLIO SINCE 2010 PER AREA OF LIVESTOCK DEVELOPMENT



Source: Data accessed from IFAD thematic dashboard on 12 June 2024.

IFAD investments are also designed and implemented to promote social inclusion by supporting rural women, youth and Indigenous Peoples engaged in crop, livestock and fisheries production. There is now an increased focus on methodologies that can lead to women's empowerment and promote equitable development for men and women in all age categories. The projects are also designed to support sustainable futures for Indigenous Peoples. While women are heavily involved in livestock production, with feeding, milking and daily care, they still lack decision-making power on resources, including animals, land and cash. Projects focusing on small stock, such as poultry and small ruminants, can be especially suitable for empowering women.

At the household level, special attention is also given to home consumption of animal products to ensure that the gains in productivity are not entirely absorbed by the increased market access but also benefit women and children, who are the most in need of animal-source foods for improved nutrition. The Gender Action Learning Systems approach is used in livestock development projects to foster this gender transformation.

Most livestock projects in IFAD are classified as nutrition-sensitive. Nutrition is one of the corporate priorities of IFAD, and livestock development makes a large contribution to improving nutrition (FAO, 2023b). Meat, milk and eggs are nutrient-dense, especially the nutrients most lacking at global level, such as iron, calcium, zinc, folate, vitamin B12 and vitamin A (Beal et al., 2023). IFAD projects not only lead to better productivity in animal production but also contribute to raising awareness and providing training on nutrition and improving the nutrition of children, for example through school milk programmes.

IFAD'S INVESTMENTS HELP COUNTRIES ACHIEVE THEIR CLIMATE COMMITMENTS

IFAD, by targeting poor smallholders and pastoralists, is committed to supporting its Member States in achieving the Paris Agreement (2015) and limiting the rise in the mean global temperature. In line with the Koronivia Joint Work on Agriculture (2017), IFAD recognizes the unique potential of agriculture in tackling climate change and the need for specific approaches to achieve food security while taking climate action. In particular, poor rural people, a large share of whom depend on livestock for their livelihoods, are disproportionately affected by the impact of climate change. IFAD gives a specific focus to their vulnerability and adaptive capacity, in line with the principle of common but differentiated responsibilities from the Rio de Janeiro Summit (1992), establishing that all states are responsible for addressing global environmental destruction yet not equally responsible.

IFAD supports countries in achieving their Nationally Determined Contributions (NDCs). NDCs are self-defined national climate pledges detailing what countries will do to meet the objectives of the Paris Agreement in terms of mitigation and adaptation, and finance to support these efforts. About a third of countries include livestock in their NDCs, but only 18 per cent and 16 per cent included specific measures such as manure and feed management respectively as mitigation options (figure 5). This shows that more awareness-raising and support are needed for NDCs to better reflect the role of livestock in the climate (Özkan et al., 2022; Mottet et al., 2024).

IFAD targets poor small livestock keepers and pastoralists, who are among the most vulnerable to climate change. Adaptation is therefore a priority for IFAD's investments, as described in the section on Livestock vulnerability to climate change.

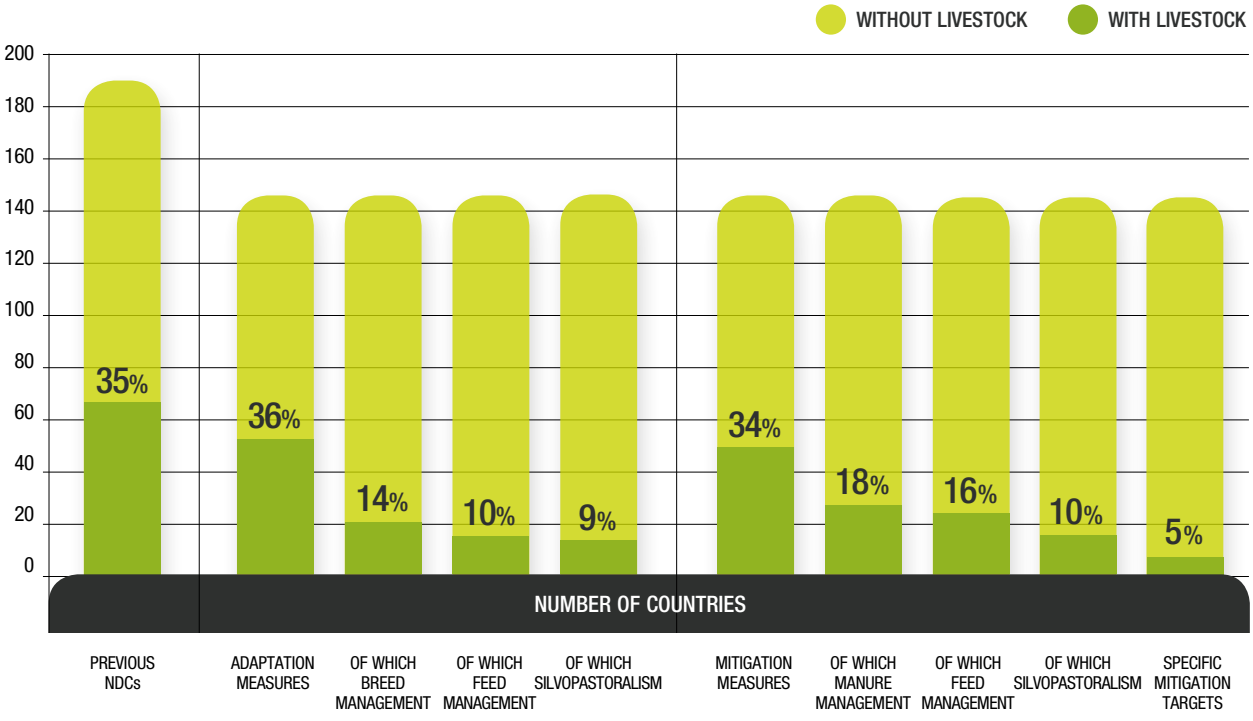
While over 150 countries have signed the Global Methane Pledge since 2020 and agreed to take voluntary action to collectively reduce global CH_4 emissions by at least 30 per cent by 2030, many countries require support to develop the right strategies and processes to achieve their goals in CH_4 reduction. With the new initiative called Reducing Agricultural Methane Program, and funded by the Global Methane Hub and the United States Department of State, IFAD has committed to providing this support to 15 countries, and livestock is one of the main pillars targeted to achieve this goal.

All IFAD's investments in livestock are aligned with the Fund's Strategy and Action Plan on Environment and Climate Change 2019–2025. In addition, the recent IFAD Biodiversity Strategy 2022–2025 is also considered in the new designs. IFAD recognizes that the targeted project beneficiaries play an important role as guardians of biodiversity, while facing numerous challenges related to the environment they depend on. Livestock projects are therefore uniquely designed to support small-scale producers, pastoralists and other stakeholders in protecting and enhancing biodiversity in rural systems while ensuring improved livelihoods, resilience and empowerment.

The Social, Environmental and Climate Assessment Procedures (SECAP) of IFAD were updated in 2020. They outline how to manage risks and impacts and integrate priorities into IFAD investments to achieve better development outcomes. Where GHG emissions may be significant, SECAP 2020 recommend establishing a baseline for reducing them, provided such estimation is technically and financially feasible. The borrower/recipient/partner should support and adopt GHG-accounting methodologies for programming activities according to good international practice.

FIGURE 5

LIVESTOCK IN REVISED NATIONALLY DETERMINED CONTRIBUTIONS (2021)



Source: Data from Rose et al., 2021.

MEASURING THE CLIMATE EFFECTS OF LIVESTOCK PROJECTS REQUIRES SIMPLE INDICATORS AND TOOLS

The selection of activities that IFAD projects support covers improvements in livelihoods as well as best practices for the project's impact on farmers' resilience and on GHG emissions.

However, IFAD does not include systematic tracking of GHG emissions with specific guidelines for calculations. For example, the World Bank requires detailed ex ante GHG emission accounting, comparing the situation within the project to the business-as-usual scenario, over the entire implementation and capitalization period of the project, with reporting of cumulative avoided emissions over this period.

IFAD, however, has recently started to include more systematic ex ante climate risks and GHG assessments as part of the SECAP, although this is desired simply to justify a climate risk classification of "moderate". In the absence of such assessment, a livestock project is more likely to be classified as "significant", triggering additional studies to be conducted.

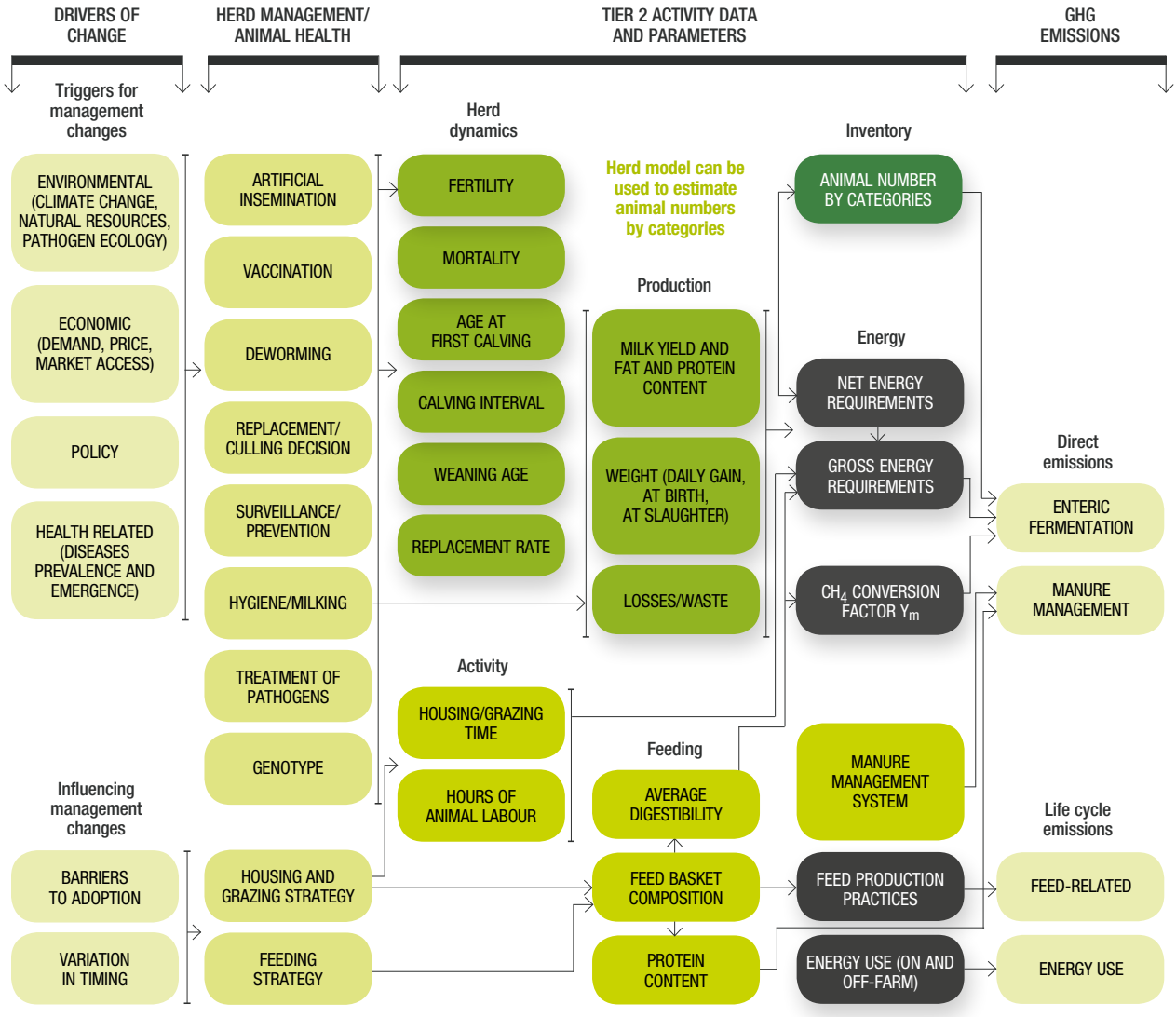
IFAD's approach also aligns with other development finance institutions in developing the use of Intergovernmental Panel on Climate Change (IPCC) Tier 2 GHG emission calculations, instead of entry-level Tier 1.

Tier 2 activity data are specific to animal categories (adults, young, replacement) and local production systems. They include animal numbers per category, production data (live body weight at different life stages and milk yields), feed basket composition and digestibility, protein content of feed material, and type of manure management system (Özkan et al., 2022, figure 6). Animal numbers per category, feed baskets and types of manure management systems in particular are usually not available, and the use of Tier 2 models and tools, such as the FAO Global Livestock Environmental Assessment Model – interactive (GLEAM-i) online tool and the free GHG calculator recommended by the EX-ACT tool, can help fill this gap. This requires adequate capacities, which also need to be developed in the target countries (Özkan et al., 2022).

Currently, only 63 countries out of the 198 parties to the UNFCCC use Tier 2, including 42 developed countries and 21 developing countries (Wilkes and van Dijk, 2015). Consequently, improvements in livestock production, whether from national policies or development projects, are rarely captured in the GHG inventories reported by countries, even though they are already happening.

FIGURE 6

OVERVIEW OF DATA NEEDED FOR TIER 2 CALCULATION OF THE IMPACT OF ANIMAL INTERVENTIONS



Source: Özkan et al., 2022.

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LESSONS LEARNED FOR LOW EMISSIONS AND RESILIENT LIVESTOCK FROM IFAD'S INVESTMENTS

AT PRODUCTION STAGE, IFAD PROJECTS DEVELOP RESILIENT AND EFFICIENT LIVESTOCK

Animal health, animal genetic resources, and herd, feed, manure and grazing management are the main technical entry points to improve efficiency and resilience in livestock production and reduce GHG emissions. On a farm, most improvements leading to better adaptation to climate change and reduced emissions (or mitigation) are complementary and go hand in hand.

The following sections present the lessons learned from IFAD's investments and provide many examples that can be mainstreamed in new project designs for low emissions and resilient livestock. They are summarized in table 4.

ANIMAL HEALTH IN A ONE HEALTH APPROACH

Under a One Health approach, the health of animals, humans and the environment are considered equally important and interlinked. Healthy animals that are well adapted to local conditions produce more and better-quality milk, meat, eggs and wool. With higher yields per animal, smallholder farmers can keep smaller herds and flocks, reducing their overall environmental impact. This can be achieved by better animal health management and access to good-quality preventive and therapeutic veterinary care (e.g. access to veterinary services and drugs, vaccination). In Kyrgyzstan, for example, IFAD supports capacity-building of private and public veterinary service providers and helps them provide veterinary services with motorcycles to access remote rural locations at reduced cost.

BOX 1

LOW-CARBON AND RESILIENT LIVESTOCK DEVELOPMENT IN KYRGYZSTAN

The Regional Resilient Pastoral Communities Project aims to reduce rural poverty and food insecurity in Kyrgyzstan by increasing resilience, income and economic growth in farming communities through strengthening sustainable pasture and herd management. In addition, FAO and IFAD are assisting the Government of Kyrgyzstan in refining its commitments for limiting future emissions, as spelled out in its NDCs. With the support of FAO, IFAD uses the tool called GLEAM-i to calculate the project's current livestock emissions, along with the potential reductions. Models prepared show that more milk and meat can be produced (+4 per cent) with fewer emissions (-17 per cent) and without increasing the number of livestock (FAO and IFAD, 2021).

In addition to diseases causing direct production losses, transboundary diseases can result in trade loss and risks for human health too. Although they take place on farm (in and between herds for pastoralists), their impact on societies argues for a disease intelligence system, from disease agent detecting in animals to (inter)national early warning data systems and preparedness and response plans. In such systems, the weakest link in LMICs is the "last mile" (regular sampling of animals and confirmation by laboratory test diagnosis) given the remoteness and lack of capacity of farmers and herders. IFAD specifically focuses on last-mile services for farmers and pastoralists. For example, IFAD has financed mobile veterinary laboratories for dairy projects in East Africa, as subclinical mastitis can only be diagnosed through lab testing and is the major cause of milk yield and income loss. Reducing mastitis has a positive impact on farmers' income, and reduces their vulnerability as well as GHG emissions. Zoonotic diseases, such as brucellosis and tuberculosis in dairy, primarily affect the households and represent an economic cost and unproductive emissions from sick animals. However, if not accompanied by interventions to improve productivity and limit herd growth, improved animal health can lead to higher emissions.

Some vector-borne diseases can be transmitted from wildlife to livestock to humans, such as Rift Valley Fever. IFAD projects also can be affected, as seen in a Rift Valley Fever case in Burundi. IFAD projects include contingency plans to redirect resources to deal with such outbreaks.

Natural resource use and climate change response also influence global and farm-level health and zoonotic risks, for example through encroachment of habitats, animal migrations, stress and crowding of humans and livestock during natural disasters. Nearly 75 per cent of human infections have spilled over from livestock and wildlife (WOAH, undated).

With livestock increasing in numbers and biomass in parts of the world, more diseases are likely to emerge. However, through improvements in farming systems, better ecosystem health can be achieved. IFAD has a long-standing holistic approach to reducing the impact of projects on the environment, and mainstreams assessments in each part of the project cycle, including climate change, biodiversity and One Health for livestock projects.

MANAGEMENT OF ANIMAL GENETIC RESOURCES AND REPRODUCTION

Through better breeding, farmers can keep productive animals that remain adapted to their local environment. Introducing traits such as increased milk productivity, live weight and growth rates can be achieved by cross-breeding local animals with exotic ones, while retaining their adaptive traits, such as resistance to endemic diseases or local climate. In Bolivia, IFAD supports farmers with the Pro-Camélidos project to breed more productive llamas, crossing native breeds with improved ones and helping farmers produce more meat and wool and increase their incomes, while retaining the resilience of local breeds to local conditions, including limited precipitation and changing temperatures. Distribution of live animals should happen only in tandem with prevention of animal diseases to avoid outbreaks (e.g. vaccination of small ruminants against peste des petits ruminants or foot-and-mouth disease). In Uzbekistan, the Dairy Value Chains Development Programme promoted the use of higher-yield cows and improved rearing practices, and resulted in improvements in incomes, milk sales and food security, while reducing vulnerability to climate-related challenges. Another example, in Lesotho, is provided in box 2.

Some livestock species can be particularly important to building resilience, as they are adapted to dry and arid conditions or to low-quality fodder from high mountain areas. For example, IFAD has invested in the development of camelids (camels and llamas) in five countries (Argentina, the Plurinational State of Bolivia, Chad, Ethiopia, Mauritania and Tunisia).

A key strategy to reduce GHG emissions is also to reduce the number of unproductive animals in the herd. Better reproductive management can increase productivity at the herd level, not just at the individual animal level. For example, improving the fertility rate of adult females can be achieved through training producers in better detection of fertile periods, better care and better nutrition. Age at first parturition is often quite late in low-productivity systems. Even a small reduction in age at first parturition means that fewer young females need to be kept in the herd to maintain the adult female cohort, thus reducing costs for farmers and GHG emissions at the same time. The use of artificial insemination can make it easier for farmers and herders to manage reproduction and have better control over breeding for desired genetic traits. Finally, the use of sexed semen reduces the number of unproductive males, especially in dairy herds, and therefore reduces the amount of unproductive emissions.

BOX 2

CULLING AND EXCHANGE PROGRAMME IN LESOTHO

The Wool and Mohair Promotion Project worked with farmers to improve the quality and quantity of wool and mohair fibre produced. Farmers were encouraged to exchange four low-yielding animals (sheep or goats) for one Merino ram or Angora buck. The project increased livestock productivity, while also contributing to rangeland improvement by reducing the number of animals on communal resources.

MANAGEMENT OF FEED AND FODDER RESOURCES

Improving feed quality, particularly digestibility, results in increased production and reduced GHG emissions from enteric fermentation. Enteric CH_4 emissions depend primarily on the quantity and quality of feed consumed by ruminants. Sourcing local feed can also help reduce their environmental impact. For example, high-quality and resilient maize produced locally in Lesotho through the IFAD Restoration of Landscape and Livelihoods (ROLL) Project means that pastoralists are less dependent on imported soy. This and other interventions are estimated to reduce emissions by 7 per cent while increasing protein production. Another example, from Rwanda, is provided in box 3.

Feeding livestock with crop residues and by-products, such as rice stalks or bran, reduces waste and keeps agricultural land producing food for people rather than animals. Livestock are essential for a circular bioeconomy (Milios, 2018), which involves recycling resources at every possible step in agrifood systems. A new IFAD project in dairy and beef production in Uganda will provide farmers with chopper machines to recycle crop residues in animal feed, reducing waste and increasing their digestibility, for lower CH_4 emissions.

From a global perspective, stopping the cutting down of forests for fodder and pasture production is an urgent priority and remains one of the most effective ways for pastoral and agricultural systems to contribute to climate change mitigation (FAO, 2020). Investments should not support the development of systems relying on imported feed from deforested areas (e.g. oil palm, soybeans).

BOX 3

CLIMATE-SMART DAIRY PRODUCTION IN RWANDA

The Rwanda Dairy Development Project contributed to making the dairy value chain more climate-smart. Livestock farmer field schools have contributed significantly to the adoption of climate-smart technologies: 86 per cent of livestock farmer field school beneficiaries now cultivate improved fodder, compost adoption improved from 42.3 per cent to 54.8 per cent, water-harvesting tank ownership improved from 16.3 per cent to 25.1 per cent, and crop and legume integration practices improved from 15.7 per cent to 43.2 per cent. On top of this, 75 per cent of approved projects under the matching grants included a climate-smart component (water, solar panels, forage storage and manure management).

Fodder trees and alternative adapted fodder resources such as moringa, calliandra, thornless cactus and azolla can be part of agroforestry and silvopastoralism and can be an effective way to increase access to fodder, especially during the dry season. These trees can also offset emissions by sequestering carbon as they grow. Fodder trees are easy to grow, require little land, labour or capital, have numerous co-products and often provide fodder within a year of planting. In addition, trees provide shade, improve soil drainage and prevent soil erosion. IFAD provides seed and capacity development to grow such fodder trees. In the highlands of Eastern Africa, over 200,000 smallholders have adopted them, mainly to feed dairy cows (Franzel et al., 2014). In this context, the introduction of invasive species should be avoided, relying on lessons learned from research and development projects to choose the appropriate species.

Feed supplementation can also be used to reduce the activity of methanogens in the rumen. Feed with high concentrations of tannins for example, can have this effect, although potential antinutritive effects should also be considered. Various natural and synthetic feed supplements have shown to be promising for reducing enteric CH_4 emissions. More trials in tropical small-scale and pastoralist systems should be carried out before they can be included in large-scale investments.

MANURE MANAGEMENT

Improved manure management is also part of a circular bioeconomy and can improve the resilience of farmers and herders to climate change and fluctuations in fertilizer prices. Animal manure returns nutrients and water to the soil, reducing reliance on synthetic fertilizers and reducing the cost of production. Manure stored in uncovered pits in liquid form has higher GHG emissions than manure deposited on pastures during grazing or stored in solid forms and applied regularly on land. In Burkina Faso and Niger, farmers supported by IFAD use indigenous techniques, such as *zai*, which are small pits filled with organic matter such as manure to collect rainwater, attract insects that condition the soil and increase soil fertility. Manure can also be used to produce biogas, which can be used for energy and is much less polluting than burning wood or charcoal. With IFAD support, farmers in Kenya and Rwanda use innovative flexi-biogas digesters. Careful assessment of the efficiency of such systems in the local context should be carried out before investments, as they depend on many factors, including temperature and humidity, but also farmers' skills.

PASTURE/RANGELAND MANAGEMENT AND ANIMAL MOBILITY

In the current IFAD livestock portfolio, rangeland management is one of the largest areas of investments (figure 4). An essential technical entry point for boosting productivity, improving resilience and reducing emissions in extensive and pastoral systems is grazing management. In many rangeland ecosystems, animals disperse seeds, deposit manure and trim grasses and bush so that diverse plants and insects can grow. To protect rangelands from overgrazing, IFAD helps herders restore pastures, protect water resources and prevent erosion. This includes pasture resting, building roads to reach remote grazing land, accessing new water points and managing herd sizes. In Tajikistan, the IFAD Livestock and Pasture Development Programme promotes rotational grazing, which gives plants a chance to grow deep roots and sequester more carbon. Rehabilitation of degraded grasslands can help producers better cope with drought and flood as well as help plants hold and sequester larger amounts of carbon. Changing grazing patterns can also require making alternative fodder sources available for livestock.

Livestock mobility is a key component of pastoral systems' productivity and resilience. Transhumance, the practice of moving herds from one grazing ground to another, is often the only way for herders to adapt to variability in available fodder resources in space and/or in time. It can also reduce emissions through prevention of bush fire and carbon sequestration in pastures. This climate adaptive practice requires secure access to land. Animal mobility in pastoral systems has been reduced by urbanization and crop land expansion but also by measures to contain animal diseases, by conflicts and by settlement policies and interventions. IFAD supports alternative measures for prevention and control of transboundary diseases and preservation of animal mobility in West and East Africa, Central Asia and the Caucasus.

TABLE 4

NON-EXHAUSTIVE LIST OF INVESTMENTS TO BOOST PRODUCTIVITY, IMPROVE RESILIENCE AND REDUCE GHG EMISSIONS AT ANIMAL AND HERD LEVELS

ENTRY POINT	IMPACT ON PRODUCTIVITY	IMPACT ON ADAPTATION/ RESILIENCE	IMPACT ON EMISSIONS AND SEQUESTERING CARBON
Animal health	Higher milk yields, fertility rates, growth rates Lower losses of products	Lower vulnerability to heat stress, droughts, diseases and other stressors	Healthier animals, which emit less GHG to produce more output
Animal genetic resources and management of reproduction	Selection of animals based on production traits such as higher yields and weights Improved fertility rates	Keeping traits such as resistance to diseases or heat, adaptation to lower feed quality, etc., through conservation of local breeds	Fewer animals needed for the same output More resilient animals, requiring less inputs Expression of genetic potential for higher productivity, resulting in needing fewer animals for the same output
Feeding and feed quality, including fodder	Higher digestibility Higher fertility Mitigation of seasonal availability of feed and fodder	Use of varieties selected for resistance to heat, drought or flood Use of fodder trees for shade, water conservation and seasonal availability	Higher digestibility resulting in lower enteric CH_4 emissions and possibly changes in excretion and emissions from manure (higher or lower) Avoided emissions through local feed sourcing Sequestration in fodder and trees
Manure management	Increased soil fertility and food/feed crops' productivity	Lower reliance on synthetic fertilizers Improved soil heath, including water retention and organic matter content	Lower CH_4 and N_2O emissions from manure storage and application Lower emissions from producing and transporting synthetic fertilizers
Pasture/rangeland management and animal mobility	Improved grazing management resulting in higher biomass productivity in pastures and rangelands, and better animal nutrition with positive impact on health and fertility	Restored rangelands with higher carrying capacity and less vulnerability to climate shocks	Well-managed pastures and rangelands better able to store carbon High-quality fodder, more digestible and resulting in less enteric CH_4

LIVESTOCK-AQUACULTURE INTEGRATION

Integrating livestock and aquaculture is a strategy for climate change adaptation, food diversification and increasing farm productivity and profitability (IFAD, 2014). It also contributes to reducing GHG emissions from livestock manure and fish feed production. It relies on using livestock waste and manure-based nutrients as organic fertilizers in fishponds to stimulate primary productivity and natural food webs for fish production (Ogello et al., 2013). Consequently, nutrient-rich wastewater and silt from fishponds are released to irrigate backyard fodder crop for livestock and/or vegetable garden for household consumption. The productive recycling and reuse of livestock and pond waste within the farm ensures less reliance on expensive feed and fertilizers, and minimizes costs, pollution effects and disease risks. Furthermore, it promotes diversified food production within the farm, ensuring income and reduced investment risks.

A simple integrated livestock-aquaculture system typically involves livestock (pigs, ducks, chicken, goats, sheep, cows, etc.), a fishpond (with, for example, tilapia, carp and/or catfish) and a fodder crop/vegetable garden (including Napier grass, pulses, leafy vegetables, cereals, etc.) (Ogello et al., 2023). More advanced models may include biogas generated from animal and crop wastes to provide for household energy needs (Mulokozi, 2021). The number and type of livestock to meet aquaculture manure needs depends on the area of the fishpond, species of fish, water and air circulation, and production density (table 5).

Some fish species can be raised completely in a green pond without additional supplementary feed, which saves significant costs, as feed constitutes 60–70 per cent of production budgets and 80 per cent of GHG emissions. However, fish farmers often add supplementary feed to achieve faster growth rates and larger sizes to meet market demand. Water availability in sufficient quantity and quality and good air circulation are vital for an integrated livestock-aquaculture system.

Aquaculture based on good management practices generally contributes lower GHG emissions per kg of product than most terrestrial primary sources of animal protein, especially ruminant meat (cattle, sheep and goats), and is comparable to the main monogastric meats (pig and broiler meat) (Tiseo, 2023; MacLeod et al., 2020). This is because aquaculture does not produce enteric CH_4, and has much higher fertility rates and much lower feed conversion ratios (and, consequently, low feed-related emissions). Fish require less energy for locomotion (helped by their buoyant and streamlined shape), they are cold-blooded and they excrete ammonia directly, not in the form of the GHG N_2O. At global level, aquaculture produces 13.6 kg of CO_2 per kg of food for human consumption, compared with beef herds (99.5 kg), dairy herds (33.3 kg), lamb/mutton (39.7 kg), pig meat (12.3 kg) and poultry (9.9 kg) (Tiseo, 2023). Expanding aquaculture into livestock landscapes could therefore lower aggregate GHG emissions of protein production systems overall.

TABLE 5

LIVESTOCK PER 100 M² OF FISHPOND AT LOW PRODUCTION DENSITY

LIVESTOCK	NUMBER OF ANIMALS	COMMENT
Pig	0.2–0.3	A pig weighing about 60 kg can produce 2–2.5 kg of fresh dung daily. Moisture content of fresh dung is about 70 per cent; average nitrogen and phosphate contents are about 1.4 and 0.4 per cent respectively of dry matter.
Duck	3–5	Ducks feed on various organisms (frogs, larvae, insects, aquatic weeds, earthworms, etc.); thereby they reduce fish predators, keep aquatic plants in check and loosen the pond bottom, releasing trapped nutrients. Ducks may need less supplementary feed, as they can source this naturally from the pond.
Chicken	5–15	Chickens are often raised in large numbers; they can therefore easily produce adequate manure for fishpond and excess chicken manure can be sold to neighbouring farms. Broiler production, in particular, gives faster cash flow to the farmer while waiting for the fish to grow to market size.
Sheep/ goat	2–4	Goats are versatile animals and produce a good amount of manure. Goats can be kept in a fairly inexpensive shelter near the fishpond. Solid goat waste is quite rich in nitrogen and phosphoric acid content, and goat urine is equally rich in both nitrogen and potash.
Cow	0.1–0.4	A cow weighing 450 kg produces 12 000–13 000 kg of faeces and 8 500–90 00 kg of urine annually. The nutritive content of cow dung, however, is a little less than that of pig excreta.

Source: FAO, undated.

BOX 4

INTEGRATED LIVESTOCK-FISH FARMING IN KENYA

In Kenya, under the Aquaculture and Business Development programme, farmers have set up integrated livestock-aquaculture initiatives, with training and extension support from IFAD's local partners, including the Ministry of Livestock and Fisheries and the Kenya Marine and Fisheries Research Institute. The main preference is chicken-fish farming, although there are also farmers combining pigs or cows with aquaculture. Fertilizing fishponds with cow dung is a widespread practice in Kenya, with nutrient-rich wastewater from the fishponds, in turn, used to irrigate Napier grass for cows and vegetable gardens for household consumption. A study of integrated cow-fish systems in Kenya reported that a 200 m² tilapia fishpond manured with cow dung produced about 200 kg/ha of fish a year and resulted in an additional fish supply of 3.4 kg per capita in the targeted households, which averaged seven people. Another study of poultry-fish farming intervention, in western Kenya, reported fish yields of 3–5 kg/m² per cycle in well-managed systems. Egg-laying chickens typically yield 150–200 eggs per hen per cycle, while broiler chickens can reach market weight within 8 weeks. Vegetables such as spinach and kale are harvested every 4–6 weeks, with longer cycles for tomatoes.

Jane is a female fish farmer in Siaya County, western Kenya, aged 52 years, and a member of the Aquaculture Field School under IFAD's Aquaculture Business Development Programme. She has three fishponds raising 3,000 tilapia fish integrated with poultry farming and crops (maize, bananas, vegetables and hibiscus). Starting in 2018 with a small pond, she has gradually expanded her farming activities with support from the project, especially to access inputs.

Jane uses chicken manure to fertilize the pond, and the nutrient-rich pond water as natural fertilizer to irrigate her farm. Some of the maize and vegetables produced are fed to the chickens. Jane harvests fish four times a year, earning KES 212,000 (US$1,600). With this amount she is able to educate her four children, of whom three are in college and one is in secondary school.

Small-scale integrated chicken-fish system

BOX 5

SOLAR-POWERED FRIDGES AND FREEZERS IN THE ARTISANAL FISHERIES SECTOR

SunDanzer Refrigeration, through the IFAD Green Technologies grant, has been working to facilitate the development of value chains for perishable animal products by focusing on solar-powered cooling solutions for dairy farmers and artisanal fishers in east and central Africa. The informal artisanal fisheries sector lies on the fringe of or outside the established formal value chain of the commercial fish industry. To understand how benefits can be brought to this sector, pilot programmes consisting of 50 units of small-scale, solar-powered refrigerators or freezers (160 litres in volume) were initiated in Rwanda and the United Republic of Tanzania.

The project successfully identified multiple productive use cases in which market-based solar cooling solutions enabled beneficiaries to increase their income and contribute to an upward cycle by targeting artisanal fishers and fish traders who typically did not cool their catch. Instead, they kept their catch in the boat, sometimes for many hours, and sold it to fish traders on shore later in the day. The project was therefore able to reduce significant post-harvest losses. In terms of food safety, this first link in a cold chain was more or less missing. Given the short amount of time before the fish spoiled and became a post-harvest loss, they were often at the mercy of fish traders, who had the power to dictate how much they bought and at what price. However, because of this pilot programme, both fishers and fish traders reaped similar benefits, which included preventing losses, being able to sell more fish at a higher price and the ability to use the fridge or freezer for other business (e.g. making and selling ice) or for domestic purposes.

IFAD PROJECTS IMPROVE ACCESS TO NUTRITIOUS AND LOW-EMISSION ANIMAL-SOURCE FOODS

Market access is often an important challenge faced by smallholders and pastoralists, either because of their low level of production and lack of organization for aggregation or because of their distance from existing markets, such as those in urban and peri-urban areas.
IFAD has increased its investments in value chains, aggregation and access to a range of services. A good example is the establishment of milk collection centres and their equipment for the preservation of milk quality throughout the value chain, including transport and storage (e.g. cooling tanks). Organized as groups or cooperatives, producers can expect a better price for their products and more diversified markets, and they can invest in reducing post-harvest losses, due for example to contamination of products or disruption in the cold chain, avoiding food waste and loss and lowering GHG emissions. For example, in Georgia, Rwanda, the United Republic of Tanzania, Uganda and Uzbekistan, IFAD is investing in milk collection centres/clusters and supporting capacity development in milk hygiene, conservation and processing to reduce milk losses. Another example, in the artisanal fisheries sector, is provided in box 5.

While post-farm energy-related emissions are usually low compared with on-farm emissions, especially enteric CH_4, most LMICs include energy as one of their priorities for climate change mitigation in their NDCs. It is therefore strategic for the livestock sector to invest in such practices and technologies, in addition to on-farm climate action, in anticipation of value chain development and expansion.

Fossil fuel energy consumption for transport, processing and storage of animal products can be reduced through investments in efficient energy sources and the use of solar panels and biogas, together resulting in lower post-farm GHG emissions.

The post-farm part of livestock value chains is an important area of investment in the current IFAD portfolio, with over 13 per cent of the total investment in the sector (figure 4). Recent experience in IFAD projects include solar panels on poultry sheds, LED bulbs for lighting and improving airflow, and small-scale, solar-powered and portable refrigeration solutions in dairy and fishery value chains.

CLIMATE SOLUTIONS NEED INVESTMENTS IN KNOWLEDGE, SERVICES AND POLICIES

Lessons learned from IFAD's investments show that to be more efficient and better linked to markets, farmers/pastoralists often need to learn new practices, which can be obtained through capacity development like training, demonstrations visits or livestock farmer field schools.

Several knowledge products providing examples of low emissions and resilient livestock in IFAD investments are already available, including the guidance note *Analysis of livestock and pasture subsectors for the NDC revision in Kyrgyzstan*, the report *Estimating the environmental impact of the Regeneration of Landscapes and Livelihoods (ROLL) project in Lesotho* and *Estimation of greenhouse gas emissions from goat and sheep herds in the Caatinga biome, Brazilian Semiarid, in IFAD action scenarios*.
These products benefited from collaboration with governments and with various partners.

Through its experience in LMICs, IFAD contributes to establishing monitoring, reporting and verification systems (MRVs) to better keep track of the impact of livestock investments. Examples of such MRVs were proposed in the publication *The role of animal health in national climate commitments* (figure 7), to which IFAD contributed.

In addition to services for veterinary medicine, veterinary extension and farm inputs, IFAD also develops access to insurance that can play an important role in improving risk management for smallholders and pastoralists. For example, the Insurance Toolkit is implemented as part of the INSURED programme through the Platform for Agricultural Risk Management.

IFAD is well placed to contribute to creating an enabling policy environment for rural systems that contribute to eradicating poverty and hunger while tackling climate change.
This requires support for the livestock sector's policies (e.g. minimum sector investment related to sector contribution to GDP, food safety and health requirements, breeding programmes, feed strategies) but also non-livestock specific policies (e.g. land tenure, NDCs).

Through its policy support, IFAD can provide evidence-based recommendations to promote participatory, integrated and coherent solutions for climate change and other global challenges while at the same time improving the livelihoods of small-scale producers. One example of such support can be found in the *Analysis of livestock and pasture subsectors for the NDC revision in Kyrgyzstan*.

FIGURE 7
MRV FOR THE ASSESSMENT OF ANIMAL HEALTH INTERVENTIONS IN KYRGYZSTAN

KYRGYZSTAN CASE STUDY

Status of integration of MRV results into GHG inventory/NDC

- Results published (IFAD & FAO, 2021) and included in the analysis of livestock and pasture sub sectors by the Kyrgyz Ministry of Economy (Abdurasulova et al., 2021)
- Results presented and discussed with government and all agencies involved in NDC revision, in series of meetings including a side event at COP26

Results not included in 2021 NDC revision, which focused on reducing herd size and biogas production. Further recommendations were formulated for future revision:

- Development of technical capacity in lead agency and government on Tier 2 and how livestock interventions can be quantified and included in NDC
- Better inclusion of relevant livestock actors in NDC process, including for collection and maintenance of quality activity data
- Better alignment of funding sources (Green Climate Fund, Adaptation Fund, NAMA facility) with NDC
- MRV system should include i) policies, plans and measures, ii) measurement; and iii) review to meet obligations under the Enhanced Transparency Framework

Enabling environment: Who provides what

- United Nations Development Program led the NDC update
- FAO + partners (UNIQUE and GIZ) provided results to include in the NDC update and to support Kyrgyzstan in mobilizing external climate finance for conditional targets

- Public and private sector investment to improve animal productivity, develop farmers' capacity and increase pasture productivity
- Inter-agency coordination

1. Establish the required baseline of emissions using IPCC Tier 2 (or 3) methodology

Activity data needed:

- Number of beneficiary animals (by species)
- Herd parameters to estimate the number of animals in each cohort
- Animal feed rations (composition and quality)
- Manure management system

- IFAD project management unit provided data based on economic and financial analysis
- Multistakeholder workshops to verify or revise default data

2. Expected impact of vaccination on activity data

- Reduced mortality, increased cattle fertility, increased weights and milk yield
- Improved feed ration for cattle (increased share of sugar beet and crop residues from maize, silage from maize, decreased share of crop residues from wheat and other grains, grazing)

- Literature review, consultations with national experts/stakeholders

3. Calculate the change in emissions and monitor regularly

- Tools: GHG emissions calculator (GLEAM-i), political, economic (and financial), social, technological, legal (and Institutional), and environmental multicriteria framework for adaptation

- FAO carried out GHG emissions assessment
- UNIQUE consolidate results between project and government interventions

Source: Özkan et al., 2022.

RECOMMENDATIONS FOR LIVESTOCK INVESTMENTS TO DELIVER BETTER CLIMATE OUTCOMES

MAINSTREAM CLIMATE-SMART LIVESTOCK INTERVENTIONS ACROSS IFAD'S PORTFOLIO

While all investments in livestock have the potential to contribute to climate action, the climate outcomes of livestock interventions can be strengthened by enhancing the integration of climate-smart practices and the consideration of the climate at every step of the project cycle for projects that include livestock activities, with particular attention to targeting, design of activities, and monitoring and evaluation.

At the targeting stage, priority should be given to livestock producers who are particularly vulnerable to climate change, not only taking generic climate risks into account but paying attention to the impact of climate change on animals and on their feed and fodder basis (see figure 1). For example, small livestock keepers with low adaptive capacity because they have limited alternative feed resources or pastoralists regularly affected by droughts and floods should be prioritized. Targeting should also prioritize the livestock systems where the potential to reduce emissions or store carbon is the highest, for example low-productivity systems with high mortality and low feed-quality, and rangeland or pasture-based systems. This can be better achieved by explicit criteria, vulnerability assessments and GHG emission abatement studies when possible. While such assessments may come at a cost, they are basic requirements for access to climate finance, which is more and more mobilized by IFAD as supplementary funds to its loans and grants.

During design, the five main technical entry points identified in table 4 should be systematically considered for primary production. These entry points can be further developed to provide specific practices and technologies for each type of livestock production systems. The tool Investing in Sustainable Livestock developed by the World Bank can also be used (see World Bank Group, 2020). Value chain development should systematically complement investments in primary production, and priority should be given to improving access to market for smallholders and pastoralists while promoting low-emission renewable energy use and reduction of food loss and waste (see pages 30-31).

For monitoring and evaluation, indicators of emission intensities and absolute emissions should be included in the logframe, a baseline should be established and targets should be carefully assessed during design based on expected impact of project activities. More information is provided in the following section.

Project design and implementation teams need to be supported at each of these stages. This could be done through the development of specific practical guidelines to support this mainstreaming and the inclusion of climate-smart practices and livestock-specific climate indicators in monitoring and evaluation (M&E) systems. It also requires the development of capacities in project delivery teams and project management units through training and technical backstopping on livestock-specific tools (see the section on supporting capacity development on page 36). While GHG ex ante assessments also come at a cost when provided by an external service provider, mainstreaming user-friendly tools and investing in developing in-house capacity to use them can limit such costs.

PROMOTE SIMPLE INDICATORS AND TOOLS TO MEASURE CLIMATE OUTCOMES FROM LIVESTOCK INVESTMENTS

IFAD's SECAP are being strengthened to measure the success of climate-smart livestock development through initial detailed baseline studies and ex ante assessments and subsequent effective monitoring of progress and evaluation of results and impact. IFAD applies core indicators at the project level (IFAD, 2017), which include the following that relate to climate and livestock development:

- ☐ Number of groups supported to sustainably manage natural resources and climate-related risks (SDG 13.1);
- ☐ Number of persons accessing technologies that sequester carbon or reduce greenhouse gas emissions (SDG 13.2);

- Number of persons/households reporting adoption of environmentally sustainable and climate-resilient technologies and practices;
- Number of hectares of land brought under climate resilient management (SDG 13.1); and
- Number of tons of greenhouse gas emissions (CO_2) avoided and/or sequestered.

For mitigation, these SECAP indicators could be strengthened with additional specific indicators for livestock, looking at absolute emissions and emission intensities (i.e. per unit of product such as litre of milk and kg of meat). They aim to reduce emissions compared with a situation without the project and not with the level of emissions at the beginning of the project.

Quantifying changes in GHG emissions from livestock interventions in reproduction, feed manure, etc. requires a minimum of IPCC Tier 2 methodology. Several tools have been developed. Those most often used are GLEAM-i and EX-ACT, coupled together (FAO, 2021; FAO, undated).

There is scope for IFAD to support further development and mainstreaming of M&E tools to track the progress and impact of livestock development that focuses on both climate change adaptation and mitigation. At the same time, more work is needed to establish the returns on investment and impact. Ideally this focuses on financial and economic returns, as well as social and non-calculable impacts.

IMPROVE ACCESS TO FINANCE TO DEVELOP LOW-EMISSION LIVESTOCK VALUE CHAINS

Financial institutions often perceive small-scale agriculture or pastoralism as too risky and are reluctant to lend money to farmers and agribusinesses. Climate change increases the risks and investment reluctance. Farmers themselves are reluctant to borrow for agricultural production, because of their difficulty in managing risks such as climate-related shocks and livestock disease.

Individual small-scale producers have small, highly diverse and highly geographically dispersed operations, and assessing their individual risks is costly. For livestock, the absence of a movable asset registry can also be a limitation on the use of animals as collateral. Funding needs to be channelled through aggregators such as project developers and financial institutions, which can increase the funding costs. In addition, loans for certain climate investments, such as planting trees for agroforestry activities, would require longer-term maturities (several years) for the farmer to achieve the revenue needed to repay the loan, and most financial institutions do not offer such long-term maturities to small producers.

Traditionally, farmers and pastoralists have insured their livelihoods through social capital and animal asset building. These surplus animals also emit GHGs. Many IFAD projects increase access to financial services and loans, so that small-scale livestock producers can invest in their businesses and increase their productivity. However, in pastoralist systems, adoption remains very low. Trustworthy insurance, secure saving facilities (including through information and communications technology) and investment options for pastoralists can shift asset capital from livestock to other (monetary) assets, and therefore contribute to reducing GHG emissions. For microcredit, trust can be built through farmer-controlled saving schemes, trusted banks or innovative solutions (e.g. index-based livestock insurance schemes, early warning systems) (IFAD, 2023).

The current climate finance target for IFAD12 (2022–2024) is that at least 40 per cent of the projects and activities funded through IFAD's Programme of Loans and Grants are to be climate-focused (with a stronger focus on adaptation). In its Strategy and Action Plan on Environment and Climate Change (2019–2025), IFAD committed to mobilizing an extra US$500 million in supplementary climate and environment finance by 2025. This includes the enhanced Adaptation for Smallholder Agriculture Programme (ASAP+), launched by IFAD in 2020, as well as the Adaptation Fund, the Green Climate Fund (GCF) and the Global Environmental Facility (GEF). As of June 2024, the climate finance percentage of IFAD's Programme of Loans and Grants stands at 39.3 per cent against the target of 40 per cent with 6 months left in IFAD12 programming cycle, amounting to US$670 million, of which US$622 million is adaptation finance and US$48 million is mitigation finance.

An overview of climate finance sources is provided in box 6.

Attracting private sector funding and blended finance is crucial to fill the climate financing deficit. IFAD can leverage its roles as an accredited entity of GCF and an agency of GEF, to raise no-cost or low-cost monies from climate funds for blended finance structures. While this is a new area of work for IFAD, two examples are available: the ARCAFIM project, which provides de-risking to attract public and private investors that would otherwise not invest, and the DaIMA project in East Africa, which will provide financing options for dairy farmers and value chain actors to reduce emissions, including CH_4.

IFAD can further reduce barriers to climate financing of livestock development in smallholder and pastoralist systems.

For example, IFAD can convene local and global private and public stakeholders to accelerate the development of policies, frameworks and common metrics needed to attract investment to small-scale producers. For example, supporting the development of localized climate-risk data, information services, standardized methodology for identifying climate adaptation and mitigation activities, and cost-effective methods for tracking adaptation and mitigation outcomes (MRVs, see page 31). In addition, by aggregating funds for ecosystem health, IFAD could strengthen its role in the One Health global agenda, for example with an accreditation to the Pandemic Fund.

SUPPORT CAPACITY DEVELOPMENT ON LOW EMISSIONS AND RESILIENT LIVESTOCK INTERVENTION, AND MANAGE KNOWLEDGE

IFAD can support the development of capacities of decision makers in countries, including project delivery teams and of project management units in countries, for the identification and assessment of climate-smart livestock interventions. In particular, guidelines and user-friendly tools such as GLEAM-i can be used not only as systematic corporate tools for project design and for M&E but also as support for capacity development, including identification of best practices and collection of required data. This support can be provided through the mobilization of supplementary funds for grants and through partnerships with other United Nations agencies (e.g. FAO, UNEP) and with research and academia to transfer this capacity.

Several knowledge products are already available from IFAD's investments in a few countries, showing the climate co-benefits from livestock projects (see box 1).

IFAD can strengthen its role in knowledge management related to livestock and climate change by carrying out more analysis throughout the whole livestock portfolio and consolidated in a global report. Comprehensive assessments can also be conducted considering more dimensions of sustainability in addition to climate change, using approaches such as agroecology that also include women's empowerment, youth employment, nutrition and biodiversity. One example is already available from the report on the use of the Tool for Agroecology Performance Evaluation in Lesotho in the context of the ROLL Project.

INFORM AND SUPPORT PUBLIC POLICIES AND ENSURE A BALANCED APPROACH TO LIVESTOCK DEVELOPMENT AND CLIMATE ACTION

A range of public policy interventions are needed to support climate-smart livestock development, focusing on both adaptation and mitigation. IFAD investments already include support to public policies, and this can be strengthened by a systematic consideration of a list of enabling public policies for better climate outcomes. For example, FAO (2019) distinguishes four types of policy measures that should be considered for better climate outcomes:

i. Regulatory policies, for example, on land use and zero deforestation, or on feed sourcing and feed supply chains;

ii. Incentivization, for example, subsidies for livestock keepers investing in regenerative forms of grazing or use of manure for biogas, and introducing financing mechanisms such as targeted subsidies in debt finance or insurance schemes;

iii. Pricing/trade, for example, pricing adjustments reflecting taxes on carbon, or market and import regulations regarding livestock products;

iv. Research and infrastructure, for example, research into technological innovations for climate-smart livestock development, and, a related industry, strengthening animal health and extension services.

IFAD can pilot solutions and, through the inclusion of components/activities on knowledge management in its investments, can provide evidence and information to governments to support the review and revisions of public policy frameworks (see box 1). Through the capacity provided, IFAD also contributes to facilitating the design and implementation of more enabling public policies for climate actions.

By integrating climate action more systematically in its livestock operations, IFAD will be able to effectively communicate and advocate for the recognition of the role of rural populations, particularly small livestock keepers and pastoralists, in combating climate change. IFAD can increase its visibility and disseminate lessons learned from its work on livestock and climate change in both national and global policy dialogue (e.g. Koronivia Joint Work on Agriculture, UNFCCC COPs) and multi stakeholder platforms. IFAD can support raising awareness on the sustainability of investments in livestock in a global context where international financial institutions are challenged for their impact on the environment.

BOX 6

CLIMATE FINANCE: AN OVERVIEW OF SOURCES

Public sources, which represent 51 per cent of total climate financing, include multilateral institutions; multilateral development banks; bilateral donors; multilateral climate funds such as GEF, GCF and the Adaptation Fund; and domestic government budgets. Some 40 per cent of multilateral climate funds financing went to agriculture, forestry and other land use (AFOLU) projects, compared with 2.2 per cent from all sources.

- The **Global Environment Facility** is the largest funder of biodiversity protection, nature restoration, pollution reduction and climate change response in developing countries. In June 2022, donor governments pledged US$5.3 billion for GEF's next operating period, GEF-8. GEF primarily provides grants and will expand its non-grant instrument window in GEF-8. In GEF-8, the Food Systems Integrated Programme will focus on "sustainable, regenerative, nature positive production systems and 'support efficient value/supply chains covering food crops, commercial commodities, livestock, and aquaculture'", including "reducing livestock's impact on the environment and contribution to zoonotic spillover and supporting production of alternative protein sources".
- The **Green Climate Fund**, which mobilized US$10 billion during its first replenishment (2020–2023), is the world's largest multilateral climate fund. GCF's mandate is to support developing countries to raise and realize their NDCs. GCF invests 50 per cent of its resources in mitigation and 50 per cent in adaptation. GCF offers grants, concessional debt, guarantees and equity instruments. Four of GCF's strategic results areas include agriculture: forest and land use; health, food and water security; livelihoods of people and communities; and ecosystems and ecosystems services.
- The **Adaptation Fund** finances climate adaptation projects that address the risks of climate change and its impacts on vulnerable communities in developing countries. It has committed US$923.5 million in funding since 2010, financing projects in food and water security, coastal management, agriculture, disaster risk reduction, rural development and forests. Adaptation Fund funding comes from a 2 per cent share of certified emission reduction proceeds issued under the Clean Development Mechanism and from private and public donors.
- **Multilateral development banks** lend to sustainable agriculture activities from their balance sheets, and several have also created dedicated climate funds, including the Inter-American Development Bank's Climate-Smart Agriculture Fund for Latin America and the Caribbean; the Forest Carbon Partnership Facility and the Congo Basin Forest Fund, both set up by the World Bank and the African Development Bank (AfDB); AfDB's Adaptation Benefits Mechanism; and the International Finance Corporation's Carbon Opportunities Fund. The World Bank and the regional multilateral development banks also created climate investment funds to provide concessional financing for climate advisory and investment activities.
- **National government budgets** also represent a source of public climate finance. Some countries have created climate finance institutions, such as national climate funds, to help establish a strong governance framework for managing the country's climate change planning and expenditures.

Private sources contributed US$310 billion of climate finance in 2019/2020. Funders include domestic financial institutions such as banks and microfinance institutions, as well as international investors such as impact investors who seek social and/or environmental outcomes in addition to a financial return. Value chain actors are also significant sources of financing for upstream suppliers as well as downstream distribution channels and consumers.

- **Impact investors** have different investment criteria including purpose (e.g. mitigation/adaptation, livelihoods), size of investment, type of instrument, geography, expected financial return and target beneficiary. Most impact investment in developing countries is focused on financial inclusion, whereby loans are provided to local financial institutions for onlending to underserved segments, such as farmers and small and medium-sized enterprises. A percentage of these borrowers may have livestock activities. Investment funds investing in financial inclusion with a climate lens is a new phenomenon. Funds investing in landscape finance projects implementing, for example, nature-based solutions, forest restoration, agroforestry and conservation activities have also emerged in recent years. Some of these investors prioritize climate and conservation outcomes and not necessarily outcomes for smallholders, while other investors seek to balance conservation and smallholder livelihood outcomes.
- **Financial institutions** such as commercial banks and microfinance institutions are a source of financing for livestock farmers but their penetration is limited because of the transaction costs and real and perceived risks of lending to small-scale agriculture, as well as institutions' limited capacity to offer climate financing. Smaller, local lending institutions such as village savings and loan associations and savings and credit cooperatives are also sources of financing for farmers, but they are often liquidity constrained and similarly lack climate-financing capacity.
- **Corporations** take part in livestock industry initiatives such as Pathways to Dairy Net Zero, the Global Dairy Platform's initiative to reduce the industry's GHG emissions and FAIRR Initiative, an investor network focused on environmental, social and governance risks and opportunities in livestock production. These reflect growing attention to sustainability in the livestock value chain. Marfig, Walmart and McDonalds have financed projects to prevent deforestation in their beef supply chains in Brazil, demonstrating value chain financing of upstream mitigation activities.
- Several **foundations** have recently made significant pledges to invest in climate programmes that could reach small-scale livestock producers, such as IKEA Foundation's EUR 1 billion pledge to climate programmes that reduce GHG emissions, and Rockefeller Foundation's US$500 million Ending Energy Poverty Initiative, which includes investments at the agriculture and renewable energy nexus, for example solar-powered cold chain. The Bill & Melinda Gates Foundation, for which livestock is a key focus area in its agriculture strategy, recently partnered with the Qatar Fund for Development on a US$200 million initiative to fund smallholder climate adaptation, including a partnership with the World Poultry Foundation to provide women farmers with improved breeds of chicken. The Bezos Earth Fund also funds climate initiatives targeting low-income and vulnerable communities.
- **Carbon markets** offer pricing and trading of carbon credits (or offsets), whereby one carbon credit is equivalent to 1 ton of CO_2 emissions removed from the atmosphere. The compliance carbon market is roughly US$850 billion. The Clean Development Mechanism has a track record of financing activities for CH_4 capture for aerobic digestion of animal waste and use for energy. Manure management activities, which have relatively low up-front costs, were the primary livestock activity funded by carbon credits. The voluntary carbon market, on which entities can trade carbon credits outside the compliance market, is much smaller, with a market value of US$2 billion, but is expected to increase to US$30 billion and US$50 billion by 2030. There has been strong demand for high-quality emission AFOLU credits in the voluntary market. Forestry represents two thirds of AFOLU credits, followed by livestock.

CONCLUSIONS

Livestock are a game changer for the rural poor and key assets for closing their nutritional gap, because they provide income, goods and services as well as higher-quality protein than other foods and are denser in several micronutrients, in more bioavailable forms.

IFAD invests in small-scale livestock production and pastoralism and is committed to supporting its members to achieve the Paris Agreement (2015) and limit the rise in mean global temperature. IFAD puts a specific focus on the vulnerability and adaptive capacity of poor rural people, a large share of whom depend on livestock for their livelihoods and are disproportionately affected by the effect of climate change. IFAD supports countries to realize their NDC by enhancing the role of livestock in climate action, for adaptation and mitigation.

Lessons learned from IFAD's investments show that the development of resilient and efficient livestock production can also contribute to lower GHG emissions. Animal health, animal genetic resources, and herd, feed, manure and grazing management are the main technical entry points to improve efficiency and resilience in livestock production. Market access is often an important challenge faced by smallholders and pastoralists, and IFAD supports the development of low-emission livestock value chains.

Knowledge and capacity development are part of IFAD's investments in livestock. Lessons learned also show that the use of advanced tools for assessing climate risks and GHG emissions from livestock and the development of capacity to use them are necessary to monitor the impact of livestock investments on GHG emissions.

Strengthening access to services, such as climate insurance, and supporting the development of policies are also priorities for IFAD's livestock portfolio, with evidence-based recommendations that promote participatory, integrated and coherent solutions to climate change and other global challenges while at the same time improving the livelihoods of small-scale producers.

Five recommendations are made for livestock investments to deliver better climate outcomes while continuing to support livelihoods and nutrition:

1. Mainstream climate-smart livestock interventions across IFAD's portfolio.
2. Promote simple indicators and tools to measure climate outcomes from livestock investments.
3. Improve access to finance to develop low-emission livestock value chains, with a particular focus on methane.
4. Support capacity development on low-emission and resilient livestock interventions, and manage knowledge.
5. Inform and support public policies as part of livestock projects and ensure a balanced approach to livestock development and climate action.

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https://www.ifad.org/en/-/biodiversity-strategy

IFAD's Framework for Implementing Transformational Approaches to Mainstreaming Themes: Environment and climate, gender, nutrition and youth
https://www.ifad.org/en/-/framework-for-implementing-transformational-approaches-to-mainstreaming-themes-environment-and-climate-gender-nutrition-and-youth

Strategy and Action Plan on Environment and Climate Change 2019–2025
https://webapps.ifad.org/members/eb/125/docs/EB-2018-125-R-12.pdf

Taking IFAD's Results and Impact Management System (RIMS) to the Next Level
https://webapps.ifad.org/members/eb/120/docs/EB-2017-120-R-7-Rev-1.pdf

Transforming Food Systems for Rural Prosperity: Rural development report 2021
https://www.ifad.org/en/rural-development-report/

LIVESTOCK

Adaptation Framework Tool
https://www.ifad.org/en/web/knowledge/-/publication/adaptation-framework-tool

How to Do Note: Engaging with pastoralists – A holistic development approach
https://www.ifad.org/en/web/knowledge/-/publication/how-to-do-engaging-with-pastoralists-a-holistic-development-approach

IFAD's Livestock Position Paper: Livestock planning, challenges and strategies for livestock development in IFAD
https://www.ifad.org/en/web/knowledge/-/publication/ifad-s-livestock-position-paper

The Small Livestock Advantage: A sustainable entry point for addressing SDGs in rural areas
https://www.ifad.org/documents/38714170/42264619/livestock_advantage.pdf/6e4114ab-5fb7-55c9-f79b-eb779c7214de?t=1619018180658

CLIMATE AND ENVIRONMENT

Adaptation Framework Thematic Brief: Livestock
https://www.ifad.org/documents/38714170/42258938/Adaptation+Framework+-+Thematic+Brief+-+Livestock.pdf/07ebe276-8a40-86a3-8865-038ccf423bc8

Adaptation Framework Thematic Brief: Pasture restoration
https://www.ifad.org/documents/38714170/42258938/Adaptation+Framework+-+Thematic+Brief+-+Pasture+Restoration.pdf/1e35f9ef-0e93-e911-a53f-72d8b893b86b

Climate Action Report
https://www.ifad.org/en/web/knowledge/-/climate-action-report-2022

Climate Change Mitigation Potential of Agricultural Practices Supported by IFAD Investments
https://www.ifad.org/documents/38714170/41066943/35_research.pdf

Engaging Smallholder Farmer Communities to Develop Index-based Insurance
https://www.ifad.org/en/web/knowledge/-/insurance-toolkit-knowledge-brief-engaging-smallholder-farmer-communities-to-develop-index-based-insurance

Financing climate adaptation and Resilient Agricultural Livelihoods
https://www.rfilc.org/wp-content/uploads/2022/06/Financing-climate-adaptation-and-resilient-agricultural-livelihoods.pdf

Farmed Animal Production in Tropical Circular Food Systems
https://www.ifad.org/en/web/knowledge/-/research-series-84-farmed-animal-production-in-tropical-circular-food-systems

Gender in Climate-smart Agriculture
https://documents.worldbank.org/en/publication/documents-reports/documentdetail/654451468190785156/gender-in-climate-smart-agriculture-module-18-for-gender-in-agriculture-sourcebook

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https://www.ifad.org/en/web/knowledge/-/formulating-a-climate-resilience-community-village-plan

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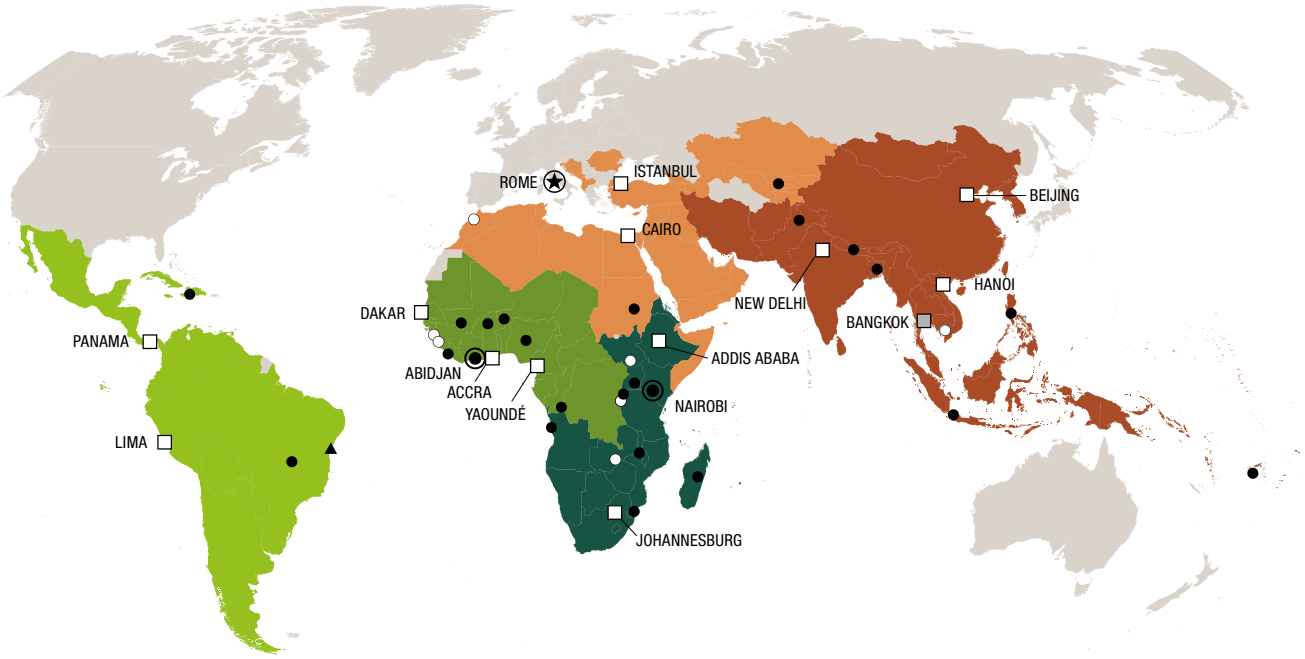
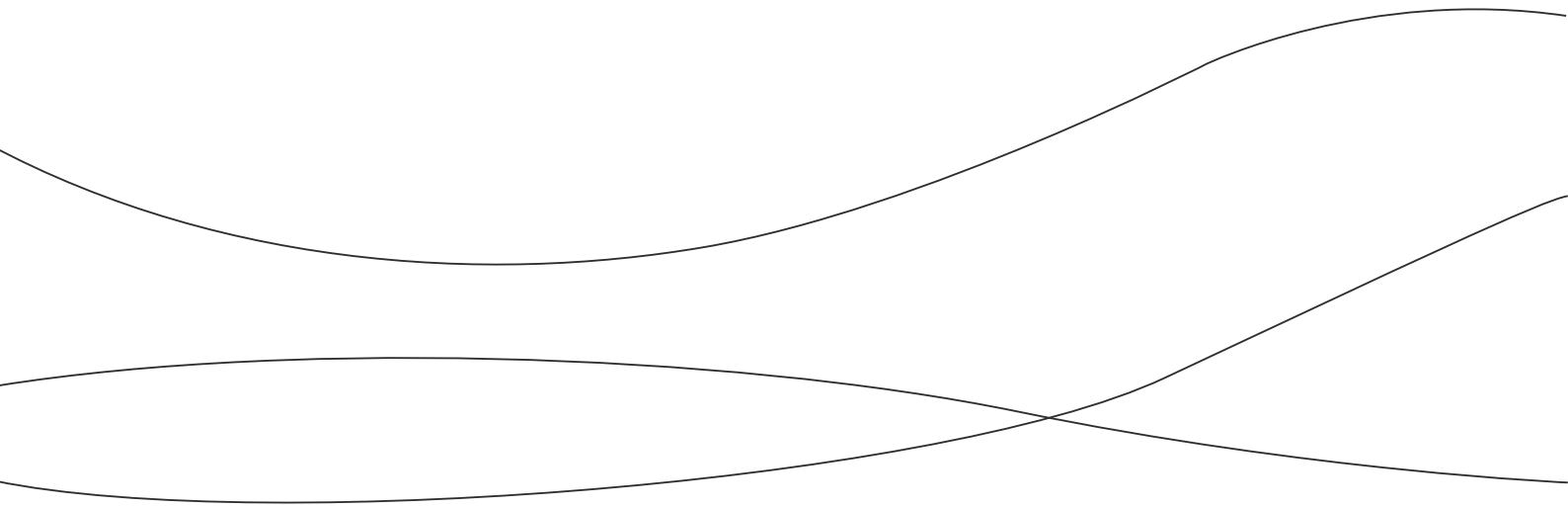
Social, Environmental and Climate Assessment Procedures (SECAP)
https://www.ifad.org/en/secap

ANNEX 1: IFAD REGIONS AND OFFICES



- LATIN AMERICA AND THE CARIBBEAN (LAC)
- WEST AND CENTRAL AFRICA (WCA)
- EAST AND SOUTHERN AFRICA (ESA)
- NEAR EAST, NORTH AFRICA AND EUROPE (NEN)
- ASIA AND THE PACIFIC (APR)

- IFAD headquarters
- Regional office
- Multi-country office
- To be decided
- Country programme officer-led office
- Country director-led office
- Satellite office



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