Food and Agriculture Organization of the United Nations

NDC

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Key findings

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BY

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Abbreviations

AFOLU	agriculture, forestry and other land use
CBD	United Nations Convention on Biological Diversity
CCA	climate change adaptation
COP	Conference of the Parties (to the UNFCCC)
CPI	Climate Policy Initiative
DRR	disaster risk reduction
FAO	Food and Agriculture Organization of the United Nations
GGA	global goal on adaptation
GHG	greenhouse gas
HICs	high-income countries
IFAD	International Fund for Agricultural Development
IPPC	Intergovernmental Panel on Climate Change
IPPU	industrial processes and product use
LDCs	least developed countries
LICs	low-income countries
LLDCs	Land Locked Developing Countries
LUC	land-use change
LULUCF	land use, land-use change, and forestry
NAPs	national adaptation plans
NDCs	nationally determined contributions
SDGs	Sustainable Development Goals
SIDS	Small Island Developing States
UNCCD	United Nations Convention to Combat Desertification

UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNICEF	United Nations Children's Fund
WFP	World Food Programme
WHO	World Health Organization

Chemical formulae

CH_4	methane
CO_2	carbon dioxide
CO_2eq	carbon dioxide equivalent
$GtCO_2eq$	gigatonnes of carbon dioxide equivalent
N_2O	nitrous oxide

Introduction

BACKGROUND

Climate change impacts are negatively affecting crops, livestock, forestry, fisheries and aquaculture and will increasingly add significant pressure on all components of agrifood systems. Observed impacts are severe across all agricultural subsectors, and the rise in weather and climate extremes have already exposed millions of people to acute and severe food insecurity. The impacts of climate change are rippling through agrifood systems, in the form of yield losses, a rise in pests and diseases, supply chain disruptions, food insecurity and undernutrition, and risks will escalate with higher levels of global warming. By mid-century, 10 percent of currently suitable area for agriculture is projected to be climatically unsuitable under high emission scenarios. Women, children, low-income households, small-scale producers, Indigenous Peoples and minority groups are often the most vulnerable populations to climate change and are disproportionately affected – due to structural inequalities in combination with the climate-sensitivity of their livelihoods. Climate risks can also interact with other drivers of migration and displacement and trigger social tipping points. Irreversible losses in terrestrial, freshwater and coastal and open ocean marine ecosystems that provide essential services to agrifood systems have already occurred in every region, and the risk of biodiversity loss will continue to rise exponentially with every degree of warming.[1] There is evidence that, even with effective adaptation, losses and damages will continue to affect the poorest vulnerable populations,[1] posing a particularly significant risk to those living in rural areas and dependent on subsistence agriculture where the greatest concentration of the extreme poor resides.[2]

To address the global climate crisis, 196 Parties from developed and developing nations adopted the landmark Paris Agreement in 2015. The Agreement sets three overarching goals to: collectively pursue efforts to limit the increase in global temperature to 1.5 °C compared to pre-industrial levels; enhance adaptive capacity and resilience to climate change; and make financial flows consistent with low-emissions, climate-resilient development pathways. Article 4 of the agreement requires all Parties to set forth their best efforts to address climate change through nationally determined contributions (NDCs), which are national climate plans that each Party communicates to the United Nations Framework Convention on Climate Change (UNFCCC) every five years.[3]

The latest climate science, however, paints a dire picture demonstrating that the world has already warmed by 1.1 °C, and the pervasive impacts will continue to push natural and human systems pushed beyond their ability to adapt.[4] The Intergovernmental Panel on Climate Change (IPCC) finds that current on-farm adaptations are insufficient to meet Sustainable Development Goal (SDG) 2, and that soft limits to adaptation are already being hit among smallholder farmers with their adaptation capacity constrained by a combination of high exposure to climate hazards and underlying structural inequalities. The adaptation options in agrifood systems that are feasible and effective today will become constrained and less

effective in the future.[1] While global efforts in adaptation planning continue to make incremental progress,[5] they fail to keep pace with increasing climate risks.[6]

The review of collective progress towards meeting the Paris Agreement confirm that the greenhouse gas emission (GHG) scenarios embodied in current NDCs are highly insufficient and imply that warming will likely exceed 1.5 °C during the twenty-first century and make it harder to limit warming below 2 °C.[4] Policies currently in place with no additional action are projected to result in global warming of 3.1 °C over the twenty-first century, while implementation of unconditional and conditional NDCs would reduce warming to 2.8 °C and 2.6° C, respectively.[7] To get back on track and close this emissions gap, countries would have to collectively reduce global GHG emissions by 28 and 42 percent, compared to 2019 levels, respectively to limit global warming to below 2.0 °C and, preferably, 1.5 °C.[7]

Deep transformation and upscaling of a wide portfolio of mitigation and adaptation options across agrifood systems – as well as an immediate redirection of global capital towards climate finance is now essential to achieving the goals of the Paris Agreement.
Agrifood systems are uniquely placed to deliver on both mitigation and adaptation goals in tandem.[8] Smallholder farmers producing one-third of the world's food depend on climate-sensitive activities and therefore must be at the centre of climate change efforts globally.[1, 9] Reducing the emission intensity of agricultural production, enhancing carbon sequestration in biomass and soils, and reducing emissions along the pre- and postproduction value chain processes can significantly contribute to mitigating the 30 percent share of GHG emissions generated by the global agrifood system each year.[10] Greater conservation, restoration and management of the world's forests, wetlands, grasslands and agricultural lands is regarded as one of the most cost-effective natural solutions to climate change – with an emission reduction potential equivalent to one-third of global GHG emissions – and a centerpiece to building the resilience of ecosystems and communities.[11] When climate action is integrated into broader transformative policies on agriculture, food security and rural development, and inclusive planning approaches are adopted, they are more likely to be effective and sustainable in the long run.[1, 8]

FAO recognizes that its goals to eliminate hunger, food insecurity and malnutrition, reduce rural poverty, and make agriculture, forestry and fisheries more productive and sustainable cannot be fulfilled without decisive action on climate change. Building on its long-standing leadership as a provider of technical expertise and data on sustainable food and agriculture, FAO committed to scaling up its support to member countries on climate change mitigation and adaptation, as reflected in FAO Strategy on Climate Change 2022-2031 and Action Plan. The strategy is built upon three main pillars focusing on: i) strengthening global and regional climate policy and governance; ii) developing countries' capacities for climate action; and iii) scaling up climate action on the ground. The NDCs present a natural framework for orienting FAO's work on climate change, as they already define, at the highest political level, targets and strategies for climate action in agrifood systems.

PURPOSE

The purpose of this analysis is to present an overview of the status of agrifood systems in NDCs, as well as provide insights into the extent to which current NDCs are contributing to the climate-resilient and low-emissions agrifood system transformation needed to achieve the Paris Agreement. It provides an overview of the major climate-related risks and GHG hot spots in agrifood systems, and it synthesizes the main climate change adaptation and mitigation strategies being set forth in the NDCs to address them. It also takes stock of the underpinning governance, knowledge and capacity and finance needs articulated to enable climate action in agrifood systems. Lastly, ahead of the global call for third-round NDCs expected to be submitted by all countries in 2025, this report presents an analysis of the mitigation, adaptation and climate finance ambition gaps in agrifood systems to inform enhanced ambition, action and support.

It is designed primarily for national planners and policymakers involved in climate change and agrifood system planning as a key reference document for conceptualizing the role and potential of agrifood system climate solutions within the context of NDC enhancement and implementation. The report is organized around the core components of the NDC and presents entry points for integrating agrifood systems, including a portfolio of climate solutions across all components and subsectors of agrifood systems that can be adapted to national contexts and priorities. By adopting a broad definition of agrifood systems, which encompasses not only agriculture, forestry and fisheries production and value-adding activities but also interlinkages with critical ecosystems, biodiversity and dependent livelihoods, it supports a multidimensional approach to NDC planning and action in agrifood systems. As such, it can serve as a "checklist" for designing more ambitious, inclusive and implementable NDC submissions in 2025 and beyond.

The report may also be relevant for designing needs-based programmes, projects and investments within international development organizations, non-governmental organizations and financial institutions with a mandate to support sustainable, inclusive and climate-resilient agrifood system transformation. The key findings also provide insights for informing ongoing UNFCCC programmes and contribute to raising the profile and flow of technical, capacity-building and financial support towards agrifood systems within the context of the global climate change agenda. Lastly, the analysis represents a vital information resource for guiding the implementation of the FAO Strategy on Climate Change 2022-2031 and Action Plan.

The executive summary is supplemented by the full technical report and methodological annex.

METHODS AND DATA SOURCE

A rigorous analytical approach was adopted to screen 167 NDCs, representing 194 Parties to the Paris Agreement and 193 countries, as of 1 January 2024 for agrifood system-related components. A methodological framework and protocol were developed to guide the data extraction and analysis of agrifood systems in the NDCs (refer to the methodological annex). Each NDC was screened manually against the data extraction protocol, and each observation was recorded and coded accordingly in a Microsoft Excel-based database. Data quality control was performed by three individual reviewers and inconsistencies were addressed. The data was analysed using semi-automatic methods in Microsoft Excel, and the results of the country-level analysis were aggregated to the global and FAO regional level. In some instances, the results are also

presented by World Bank country income classification and UN special country grouping, including least developed countries (LDCs), Land Locked Developing Countries (LLDCs) and Small Island Developing States (SIDS), to illustrate notable trends. Refer to the methodological annex for the list of countries (based on UN Stat) and various classification clusters. It should be noted that the European Union's NDC was treated as a single NDC, representing all 27 Member States, while the NDCs of individual countries in the European Union and the NDC of the Holy See were excluded from the analysis. In some instances, the report provides a comparison between "first round" and "second round" NDCs, which represent the NDCs coded as "active" on the UNFCCC NDC Registry[12] when accessed on 29 July 2016 ("first round") and those NDC submitted since with a cutoff date of 1 January 2024 ("second round"). The "first" and "second" round NDCs correspond to the five-year submission cycles defined in the Paris Agreement, starting in 2015/2016 and 2020/2021. In 2025, new or updated ("third round") NDCs will be submitted. For the sake of readability, when reporting trends observed in the NDCs, this report refers to "countries" instead of "Parties." However, since one of the NDCs reviewed represents the European Union submission (which represents 28 Member States), the results should be interpreted by the reader with this nuance in mind.

The report adopts the FAO, International Fund for Agricultural Development (IFAD), United Nations Children's Fund (UNICEF), World Food Programme (WFP) and World Health Organization (WHO) conceptual framework for defining agrifood systems, which are characterized as: (i) encompassing both agricultural and food systems and focusing on both food and non-food agricultural products, with clear overlaps; (ii) encompassing the entire range of actors and their interlinked value-adding activities involved in the production, aggregation, processing, distribution, consumption, and disposal of food products including those of non-agricultural origin; and (iii) comprising all food products that originate from crop and livestock production, forestry, fisheries, and aquaculture, and from other sources meant for human consumption, as well as (iv) the broader economic, societal, and natural environments in which these diverse production systems are embedded.[13,14] In the FAO Constitution, the term "agriculture" and its derivatives include fisheries, marine products, forestry, and primary forestry products. An agrifood systems framework captures the complexity of the interrelationships of drivers of change at a broader scale with the functioning of agrifood systems.[15] To account for the interactions between climate change and agrifood system outcomes and impacts, the report draws upon the FAO concept of "resilient agrifood systems," which are defined by their "robust capacity to prevent, anticipate, absorb, adapt and transform in the face of any disruption, with the functional goal of ensuring food security and nutrition for all and decent livelihoods and incomes for agrifood systems' actors."[13]

The framing of the NDC information components is based on UNFCCC guidance on the information necessary for clarity, transparency and understanding of NDCs.[16,17] The sectoral scope of the mitigation component in the report follows the definition of mitigation in the Agriculture, Forestry and Other Land Use (AFOLU) Sector as described by the IPCC Guidelines for National GHG Inventories[18] and mitigation in agrifood systems (which includes emissions from within the farm gate, land-use change and pre- and postproduction processes) as defined by FAO (2022).[19] The sectoral scope of the adaptation component in the report follows the framing of adaptation in natural and human systems as defined IPCC (2022)[1] and FAO (2021) definition of agrifood systems.[20] The adaptation and mitigation action categories are based on literature review, primarily from IPCC and FAO sources (refer to the methodological annex for detailed references and definitions). Given the large degree of heterogeneity across the NDCs in terms of scope, content, structure and level of detail, this report aims to apply standardized taxonomies and methods of analysis for the sake of aggregation and comparison.

Key findings

Key finding #1

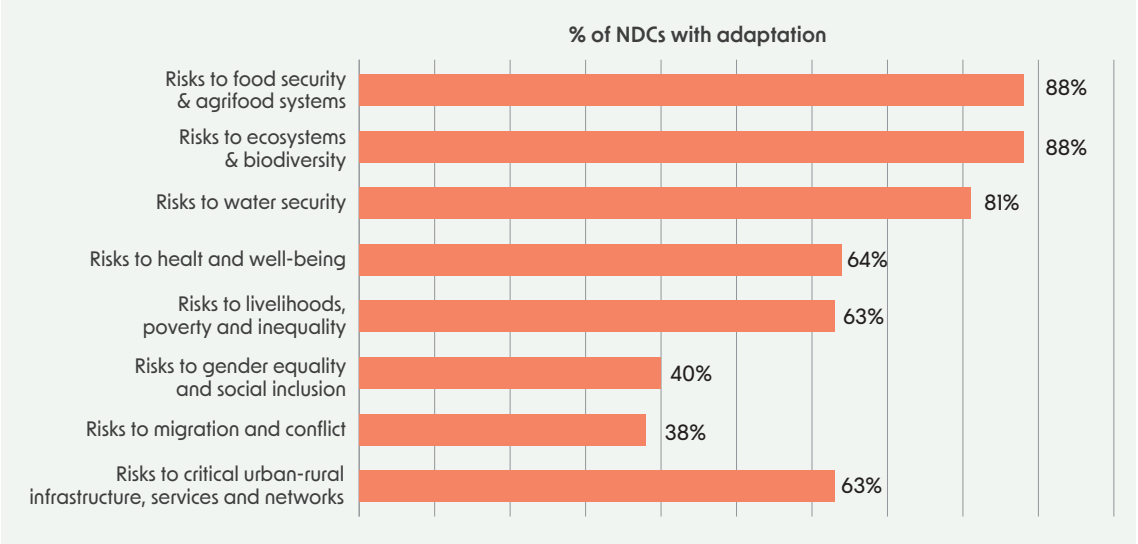
Food insecurity and loss of ecosystems and biodiversity are the most frequently reported climate-related risks in the NDCs, and they threaten to undermine hard-earned sustainable development gains.

Agrifood systems are particularly exposed and vulnerable to climate change due to their intrinsic dependence on natural resources and deep ties with livelihoods. Increasing weather and climate extreme events have already affected the productivity of all agriculture sectors and the pervasive impacts of climate change on food security and livelihoods will worsen with every increment of global warming. Climate and weather-related hazards have already exposed millions to severe and acute food security, particularly in low-latitude regions, in small islands and among small-sale food producers. By mid-century, 10 percent of agricultural areas are projected to be climatically unsuitable under high-emission scenarios.[1] An additional 80 million people will be at risk of hunger by 2050,[1] and an estimated 122 million people may fall into poverty largely due to climate change.[21]

Adaptation responses in the NDCs are being driven by a number of climate-related hazards, predominantly droughts, floods and changes in rainfall that influence the functioning of agrifood systems. Other slow-onset and extreme events are more prominent in certain areas and informing adaptation responses, such as sea level rise in SIDS and extreme heat in LLDCs. The frequency and intensify of climate extremes and variability is growing and expected to pose a high cost to agrifood systems.[22] Between 2007 and 2022, the agriculture sector alone absorbed one-fourth of the impact of disasters across all sectors, and over 65 percent of losses caused by droughts were experienced in the agriculture sector.[23]

Risks to food security and agrifood systems are the most frequently reported climate-related risk in the NDCs (Figure 1) **globally and in nearly every region,** particularly in sub-Saharan Africa. As climate-related hazards, including slow-onset and extreme events, interact with the underlying vulnerability, exposure and adaptive capacity of ecological and socioeconomic systems underpinning agrifood systems, climate-related impacts and risks are generated that can trigger a rise in hunger, malnutrition and poverty.

FIGURE 1. Representative climate-related key risks (observed and/or projected) relevant to agrifood systems, by type (% of NDCs with adaptation component)



Source: Authors' own elaboration based on FAO analysis of latest NDCs submitted as of 1 January 2024.

Around two-thirds of all countries report climate-related impacts and risks for crop-based systems in their NDCs, while around one-half do for livestock, forest, and ocean and coastal-based fisheries and aquaculture systems. Observed and/or projected impacts in agrifood systems reported range from changes in crop yields and productivity; incidence of pests, diseases and weeds; altered crop phenology; changes in soil formation and water moisture; changes in animal productivity and livestock distribution; animal heat stress and mortality; tree mortality; changes in fish species abundance and distribution; harmful algal blooms; coastal erosion; and salinization, among others.

LDCs and low-income countries (LICs) report climate-related risks – across every risk category – at a higher rate than the global average, especially risks to **agrifood systems and food security** (95 percent and 93 percent of NDCs in LDCs and LICs, respectively); **livelihoods, poverty and inequality** (85 percent and 84 percent, respectively); and **water security** (89 percent in NDCs of both LDCs and LICs). Other key representative risks overlap with agrifood systems and are informing global adaptation responses, including risks to ecosystems and biodiversity (88 percent of NDCs, globally), risks to human health and well-being (64 percent); and risks associated with critical urban-rural infrastructure, services and networks (63 percent). Around one-third of countries also report risks related to gender equality and social inclusion and risks related migration and conflict due to climate change in their NDCs.

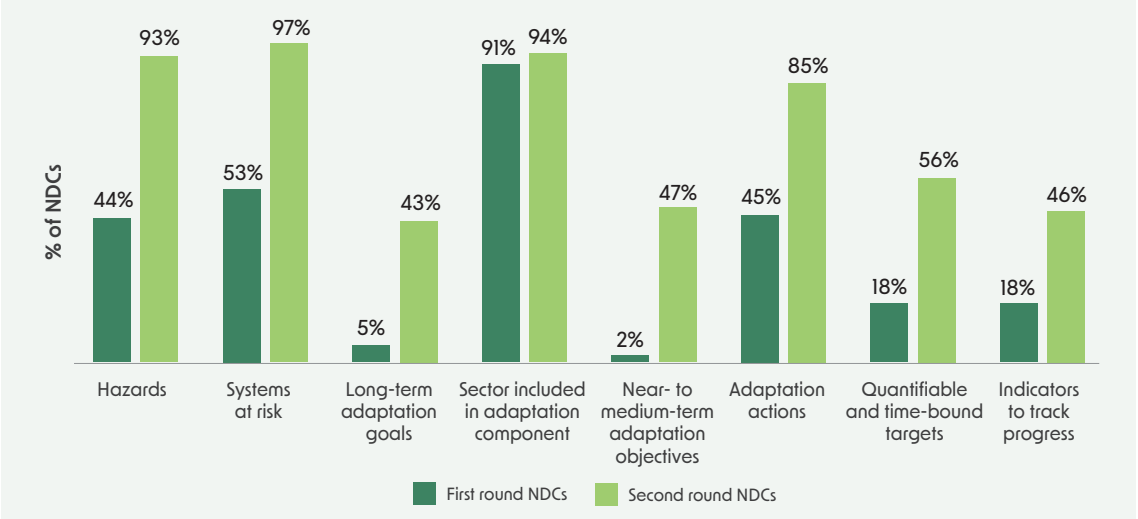
Key finding #2

Agrifood systems feature more prominently in the NDCs as the custodian of critical adaptation and mitigation solutions, with the unique capacity of generating co-benefits for SDG 1 "No Poverty", SDG 2 "Zero Hunger", and SDG 15 "Life on Land and Biodiversity".

Almost all countries identify agrifood systems as a priority for climate change adaptation (94 percent) and mitigation (91 percent) in their NDCs. Agrifood systems constitute a complex web of actors, and their interlinked value-adding activities engaged in the production, aggregation, processing, distribution, consumption and disposal of all food and non-food products that originate from crop and livestock production, forestry, fisheries, and aquaculture. They also encompass broader economic, societal, and natural environments in which these diverse production systems are embedded and are essential for food security, nutrition, livelihoods and environmental sustainability for current and future generations.[20]

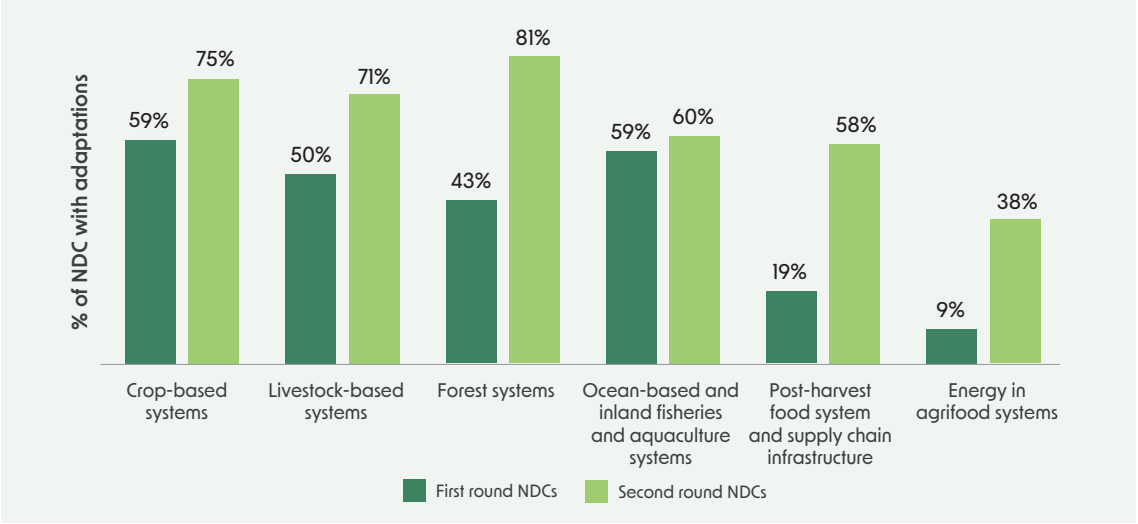
The overall comprehensiveness and coverage of adaptation components in agrifood systems has increased over time. Current NDCs reflect a wider range of adaptation planning elements in agrifood systems, compared to previous NDCs, including the i) assessment of climate-related hazards and risks; ii) the setting of long-term adaptation goals and visions; iii) the inclusion of near-to medium-term adaptation objectives and actions; and iv) the identification of quantifiable and time-bound adaptation targets and indicators to track adaptation progress in agrifood systems (Figure 2). Further, the breadth of adaptation components has widened, with greater coverage of all agrifood subsectors and value chain nodes, including agriculture, forestry and fisheries production stages, as well as post-harvest processes and energy use throughout, compared to previous NDCs (Figure 3).

FIGURE 2. Arc of adaptation ambition in agrifood systems, by adaptation element (% of first vs second round NDCs)



Source: Authors' own elaboration based on FAO analysis of latest NDCs submitted as of 1 January 2024.

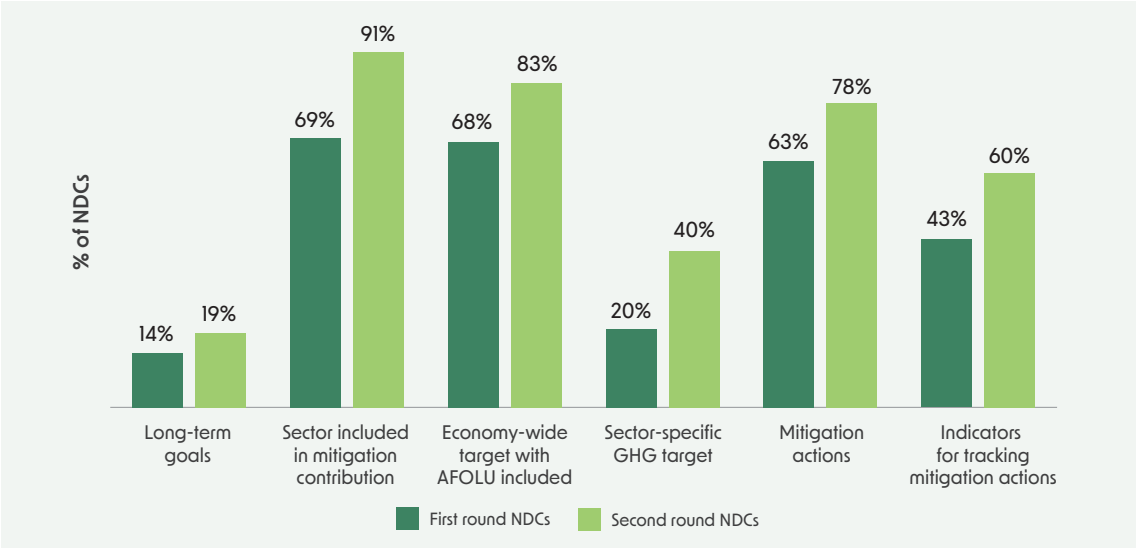
FIGURE 3. Coverage of agrifood systems in adaptation components, by subsystem/ sector (% of first vs second round NDCs)



Source: Authors' own elaboration based on FAO analysis of latest NDCs submitted as of 1 January 2024.

Similarly, the arc of mitigation ambition in agrifood systems (Figure 4) **is on the rise – when considering the robustness and coverage of agrifood subsystems – though some gaps persist.** Current NDCs reflect a wider range of mitigation planning elements in agrifood systems, compared to previous NDCs, including: i) the setting of economy-wide and sector-specific targets covering the agriculture, forestry and other land use (AFOLU) sector; ii) the formulation of near- to medium-term mitigation actions; and iii) the identification of indicators and quantified and time-bound targets for tracking progress on mitigation actions in agrifood systems.
Only some countries, however, include long-term mitigation goals or targets in the AFOLU sector despite the critical role of the sector in achieving net-zero emissions by mid-century. While the number of sector-specific GHG targets has doubled, still only half of all NDCs include them for the AFOLU sector. Further, the coverage of mitigation contributions has also risen over time to cover more agrifood system subsectors and components. However, while positive trends are observed in terms of the extent to which mitigation contributions are addressing emissions generated by energy use, waste and industrial processes in agrifood systems, absolute coverage is still relatively low (Figure 5).

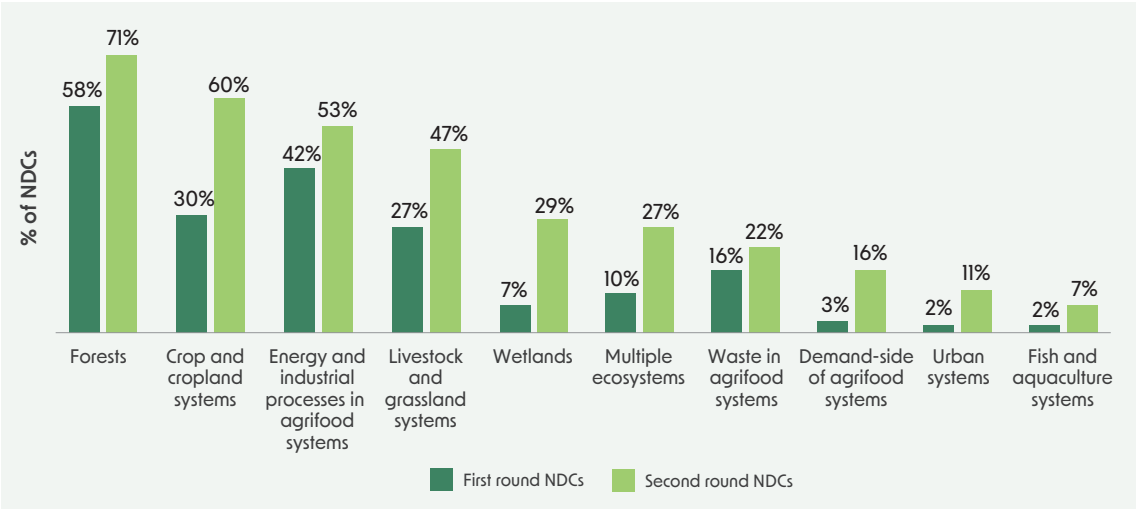
FIGURE 4. Arc of mitigation ambition in agrifood systems, by mitigation element (% of first vs second round NDCs)



Note: In the figure, sector-specific targets refer to IPCC sectors: Agriculture; Land use, land-use change, and forestry (LULUCF); and/or AFOLU; and mitigation actions refer to efforts to reduce emissions agrifood systems, including from IPCC sectors AFOLU, Waste, Energy and Industrial Processes and Product Use (IPPU).

Source: Authors' own elaboration based on FAO analysis of latest NDCs submitted as of 1 January 2024.

FIGURE 5. Coverage of agrifood systems in mitigation contributors, by subsystem/sector (% of first vs second round NDCs)

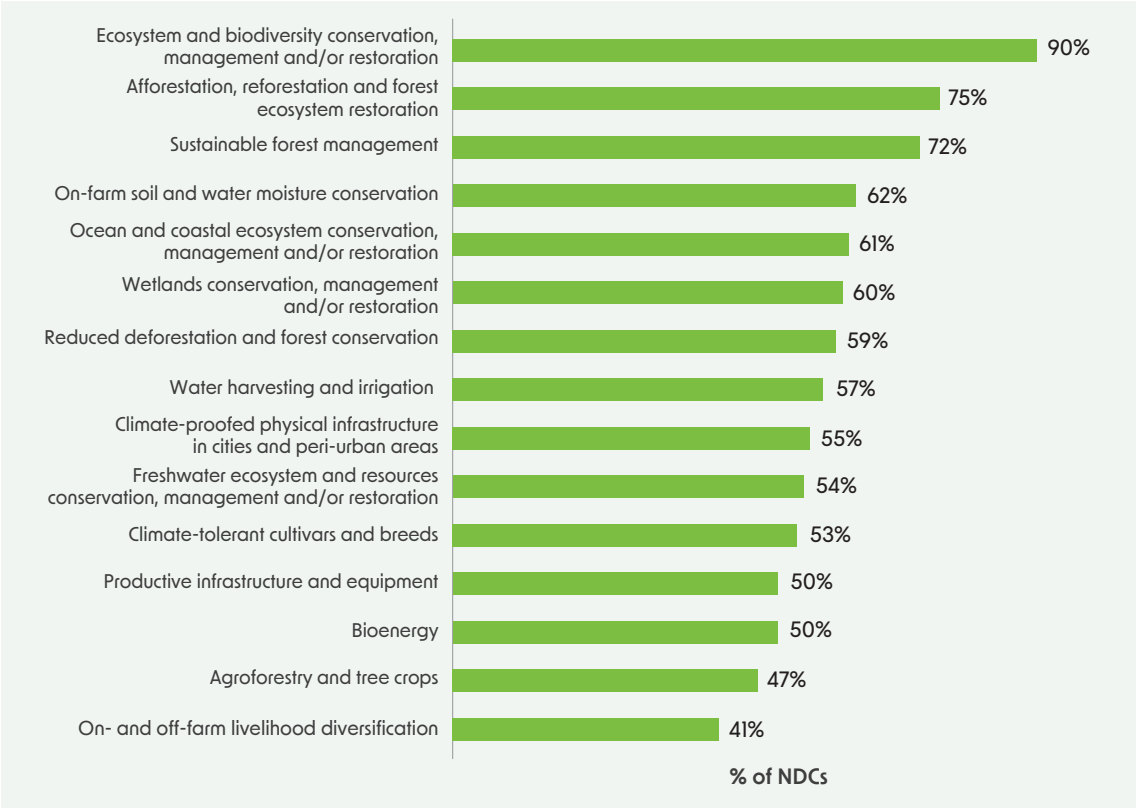


Source: Authors' own elaboration based on FAO analysis of latest NDCs submitted as of 1 January 2024.

NDCs provide national insights into the types of agrifood system solutions that can deliver on both adaptation and mitigation objectives in tandem, but some critical action areas are still missing. Among the top 15 action areas identified (Figure 6), the majority are ecosystem-based approaches and focus specifically on leveraging the carbon sequestration and adaptive benefits provided by terrestrial, forest and ocean and coastal ecosystems. Other prioritized action areas include on-farm soil and water moisture conservation; irrigation and water harvesting; agroforestry;

climate tolerant crops and livestock breeds; and investments in productive infrastructure, assets and urban–rural networks, among others. Many of the action areas identified are consistent with those proven to have the highest technical and financial mitigation potential in the sector[1, 24] and are aligned with the most effective and available adaptation options when contextualized to the local level.[22] However, some key climate action areas[4] are still underrepresented, including food loss and waste reduction, shifting towards sustainable healthy diets, and sustainable and adaptive fisheries and aquaculture management. The NDCs also highlight the increasingly important role of on- and off-farm livelihood diversification as a risk mitigation strategy, as climate change will drive economic transitions,[1] to reduce the impact of climate-induced income shocks and build longer-term resilience to climate and other risks.

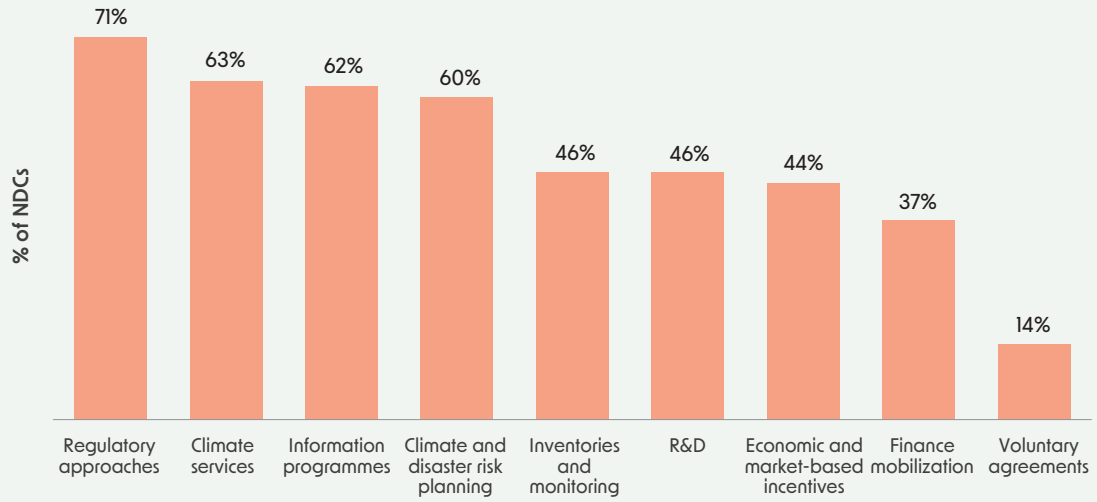
FIGURE 6. Top 15 agrifood system climate solutions promoted in the NDCs (% of NDCs)



Source: Authors' own elaboration based on FAO analysis of latest NDCs submitted as of 1 January 2024.

Regulatory approaches, climate services, including multi-hazard early warning systems and information programmes and trainings are highest on the list of necessary policy instruments in the NDCs for enabling effective climate action in agrifood systems (Figure 7). The IPCC finds that a range of factors, including governance, finance, and knowledge and capacity, can either enable or limit the effectiveness of climate change planning and implementation.[25]

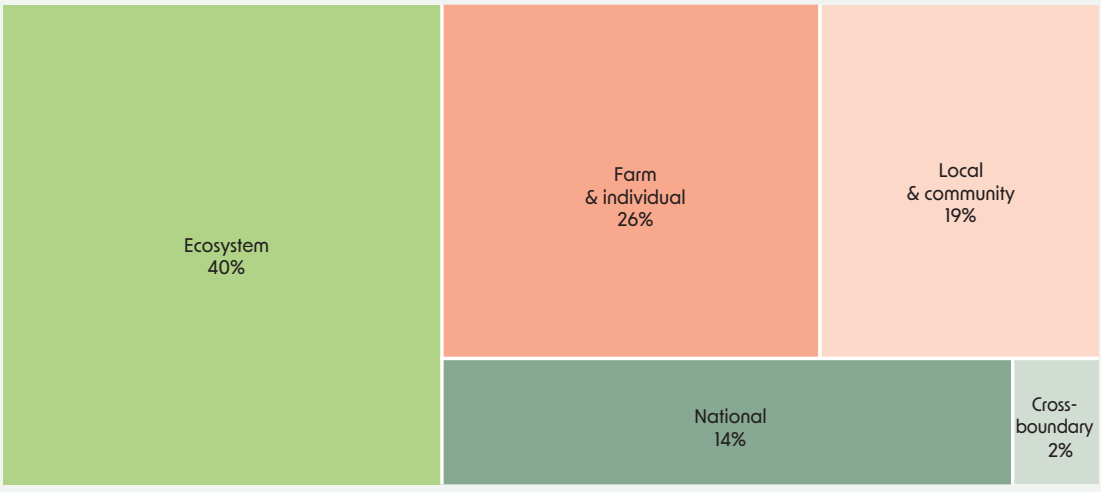
FIGURE 7. Key policy instruments for enabling climate action in agrifood systems identified in the NDCs (% of NDCs)



Source: Authors' own elaboration based on FAO analysis of latest NDCs submitted as of 1 January 2024.

Leveraging the power of agrifood system solutions for addressing climate change requires action on multiple scales, particularly ecosystem-wide and local level approaches to implementation (Figure 8). Besides national level planning, the majority of climate actions planned in the NDCs will take place at the ecosystem level, followed by the farm and community-level, suggesting that investments in local capacities and enhanced access to climate-resilient productive resources and services are crucial. Few cross-boundary approaches, however, are being employed despite the cross-cutting nature of ecosystem services and multifaceted risks, such as biodiversity loss, land degradation, conflict and migration.

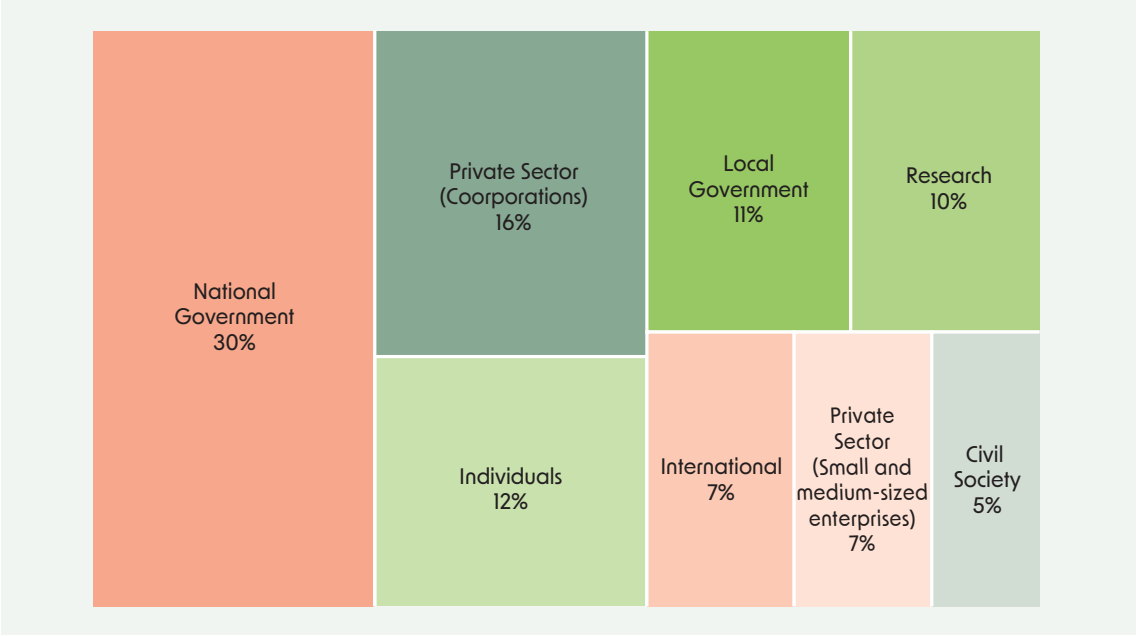
FIGURE 8. Scales of agrifood system climate action implementation identified in the NDCs (% of climate actions)



Source: Authors' own elaboration based on FAO analysis of latest NDCs submitted as of 1 January 2024.

Achieving agrifood system climate ambition requires the engagement of multiple actors across all walks of life. Besides the national government, the role of the private sector, individuals and local government is highlighted as fundamental for achieving national climate goals for agrifood systems laid out in the NDCs (Figure 9). Other key actors include research, international development organizations and civil society.

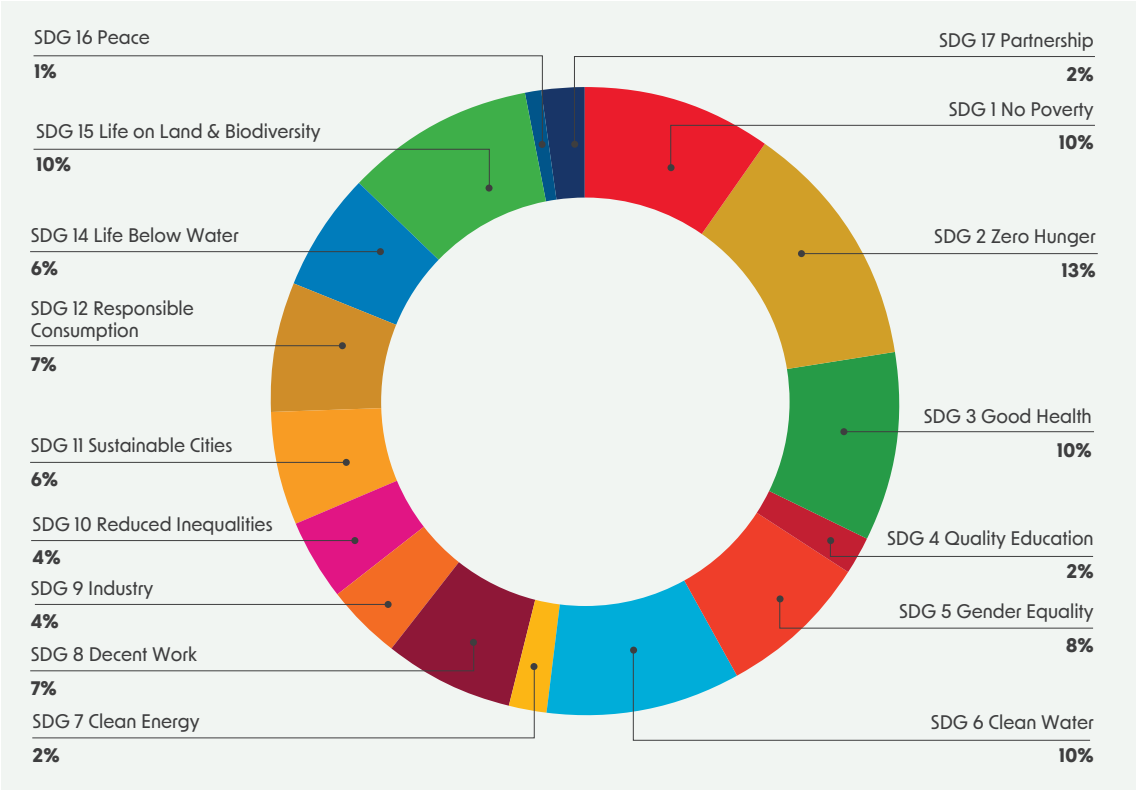
FIGURE 9. Key actors engaged in agrifood system climate action identified in the NDCs (% of actors)



Source: Authors' own elaboration based on FAO analysis of latest NDCs submitted as of 1 January 2024.

Agrifood system climate solutions are also sustainable development solutions, when designed carefully. There is increasing evidence that agriculture and forestry sectors offer more potential for climate-resilient development than others when deliberate decisions are made to address long-term structural vulnerabilities, attention is given to mitigation–adaptation mismatches between and across sectors and maladaptation is avoided.[26] Around one-third of all countries explicitly recognize the co-benefits of climate action in agrifood systems for achieving the SDGs in their NDCs (Figure 10), particularly SDG 2 "Zero Hunger", SDG 1 "No Poverty", and SDG 15 "Life on Land". At the same time, around half of all countries explicitly identify synergies between adaptation and mitigation actions that are unique to agrifood systems. In a context of limited resources and often competing national priorities, investments in locally appropriate agrifood climate solutions – when coupled with enabling policies that ensure equitable distribution of benefits and mitigate tradeoffs – can co-deliver "triple wins" on adaptation and mitigation, while contributing to sustainable development outcomes.[1]

FIGURE 10. Sustainable development co-benefits of climate actions in agrifood systems, by SDG (% of NDCs with explicit reference to co-benefits)



Note: In the figure SDG 13 is excluded from the analysis.
Source: Authors' own elaboration based on FAO analysis of latest NDCs submitted as of 1 January 2024.

Key finding #3

The reduction of poverty and inequality are increasingly seen as necessary for closing the climate adaptation gap in agrifood systems and enabling just transitions. However, only a fraction of NDCs target the specific vulnerabilities, risks and capacities of different segments of the agrifood population, and not a single mitigation measure acknowledges the poor.

There is high scientific confidence that, under all emission scenarios, climate change will reduce capacities for adaptive responses and limit choices and opportunities for sustainable development. The IPCC finds that the intersection of inequality and poverty presents significant limits to adaptation, resulting in residual risks for people and segments of the population that are vulnerable and depend on climate-sensitive livelihoods, particularly smallholder farmers, fisheries communities, women, youth, elderly, ethnic and religious minorities, Indigenous Peoples and the poor.[1]

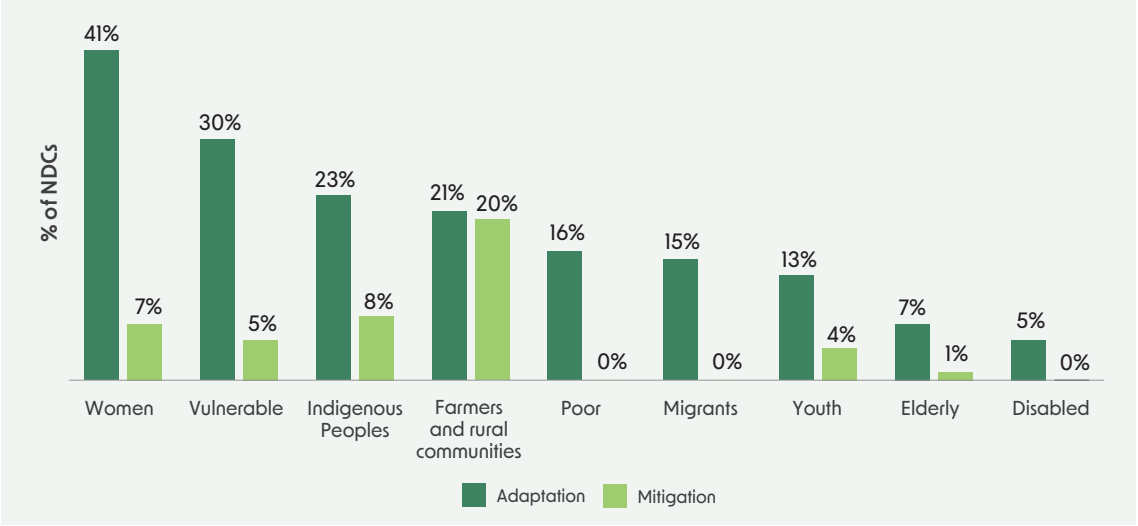
Climate change disproportionately impacts the most vulnerable and marginalized groups in agrifood systems1 and often those with the least capacity to adapt bare the greatest burden.[27] Despite having contributed the least to global warming, marginalized groups in agrifood systems – including young women and men, poor rural people, small-scale producers, informal workers and agricultural wage workers and landless people – suffer more from the impacts of climate change and disasters due to underpinning social and structural inequalities, including unequal access to resources, services, employment opportunities and decision-making.[27, 28] Nearly half of all countries make explicit reference in the NDCs to the differential impacts of climate change that are already being felt or expected to occur in the future among vulnerable segments of agrifood system populations, particularly women. LDCs, LICs and countries in sub-Saharan Africa report climate-related impacts and risks posed to vulnerable groups in agrifood systems more frequently than other regional groups and country economic classifications.

Around half of all countries' NDCs acknowledge the important role of gender equality and social inclusion within the context of climate action in agrifood systems. Gender-sensitive, equity- and justice-based adaptation approaches that prioritize the reduction of poverty and inequality are increasingly seen as necessary to minimize loss and damage from climate change.[1] Among the spectrum of interventions proposed in the NDCs to promote gender equality and social inclusion in agrifood systems within the context of climate risk, economic inclusion programmes, enhanced access to and adoption of adaptive practices and technologies, and climate risk transfer and management mechanisms, such as village savings, insurance and collective action, are the most frequent. Other important strategies that are less frequently integrated include gender/inclusivity mainstreaming into climate and agrifood policies and budgets; the promotion of local, traditional and indigenous knowledge for adaptation; reducing underlying inequalities and vulnerabilities through for instance tenure rights and tackling discriminatory cultural norms; and empowerment in decision-making processes at different scales.

However, only a fraction of NDCs include concrete measures that explicitly target the differential vulnerabilities, needs and adaptive capacities of different segments of agrifood

system populations (Figure 11). The evidence suggests that climate change affects rural communities and people differently depending on wealth status, gender and age and, therefore, multi-faceted policies and programmes are required to tackle the multidimensionality of climate vulnerability.[27] Additionally, efforts to achieve mitigation goals can generate negative socioeconomic outcomes for agrifood system dependent populations.[29] However, only around half of all countries include explicit actions in their NDCs designed to address specific socioeconomic vulnerabilities or aim to equitably benefit vulnerable segments of agrifood system populations through improved resilience or reduced reliance on maladaptive coping strategies. Less than half of countries' adaptation strategies in the NDCs explicitly consider or aim to benefit women in agrifood systems. Even fewer include targeted measures for building the adaptive capacity and resilience of other Indigenous Peoples, smallholder farmers and rural communities, the poor, youth, migrants, elderly and disabled. Despite the inherent risks of tradeoffs between mitigation and inequitable socioeconomic outcomes, not a single mitigation action in the NDCs explicitly acknowledges or aims to benefit poor agrifood system populations.

FIGURE 11. Climate actions in agrifood systems that explicitly target or aim to benefit vulnerable groups, by climate objective (% of NDCs)



Source: Authors' own elaboration based on FAO analysis of latest NDCs submitted as of 1 January 2024.

Greater coherence between the NDCs and social protection programmes is necessary for achieving the global goal on adaptation. Growing evidence points to the critical role social protection plays in ensuring climate-resilient development.[1] In agrifood systems, social protection can facilitate the adoption of climate-adaptive agricultural practices; support the diversification of livelihoods to those less exposed to climate risk; facilitate natural resource management and ecosystem restoration; contribute to climate change mitigation; and offset potentially adverse impacts of mitigation on vulnerable groups.[30] In 2023, social protection was embedded as a key pillar of the framework for assessing global progress on adaptation under the Paris Agreement.[31] Despite their crucial role for enabling and safeguarding just transitions in agrifood systems, only 13 percent of current NDCs promote social protection programmes or policies for agrifood systems, primarily in sub-Saharan Africa and in LICs, demonstrating an opportunity for greater coherence in next round NDCs.

Key finding #4

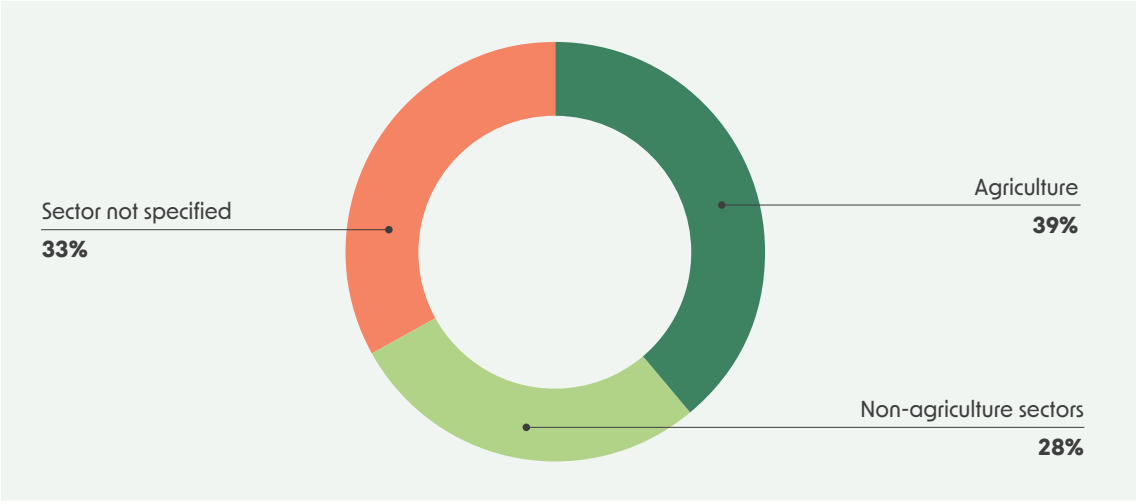
Approximately one-third of all countries report on "loss and damage" in their NDCs, out of which agriculture is considered the single most impacted sector.

Agrifood systems and the communities that support and depend on them are also on the front lines of loss and damage associated with climate change. Loss and damage can generally be described as the negative impact of climate change that occurs despite mitigation and adaptation efforts.[32] In other words, loss and damage represents the negative climate change impacts that could not be avoided or owing to insufficient adaptation.[32] In other words, loss and damage represents the negative climate change impacts that could not be avoided owing to insufficient adaptation. These residual impacts affect natural ecosystems, productive infrastructure and the health and livelihoods of people in agrifood systems all over the world. However, there is currently no internationally agreed definition for loss and damage associated with climate change.[23]

Each year hundreds of billions of US dollars' worth of crops and livestock production is lost due to disaster events, corresponding to 5 percent of annual global agricultural gross domestic product over the last 30 years.[23] While global estimates on climate-related loss and damage in agrifood systems are currently unavailable, the evidence suggests that losses and damages are on the increase and represent a high cost for agriculture overall.[32] Between 2007 and 2022, agricultural losses made up an average of 23 percent of the total impact of disasters across all sectors, and that over 65 percent of losses caused by droughts were experienced in the agriculture sector.[23]

More than one-third of all countries report on "loss and damage" in their NDCs, out of which agriculture is considered the single most impacted sector (Figure 12). Among those NDCs with loss and damage reported, the agriculture sector holds a 40 percent of all economic losses, such as crop losses or damage to productive infrastructure, while a 33 percent share of non-economic losses, including loss of biodiversity, livelihoods and cultural identities, are reported in the agriculture sector. Extreme events are more frequently cited as the primary driver of economic losses in agriculture, compared to slow-onset events.[32]

FIGURE 12. Economic and non-economic losses and damages reported, including for agriculture (% of NDCs with loss and damage mentioned)

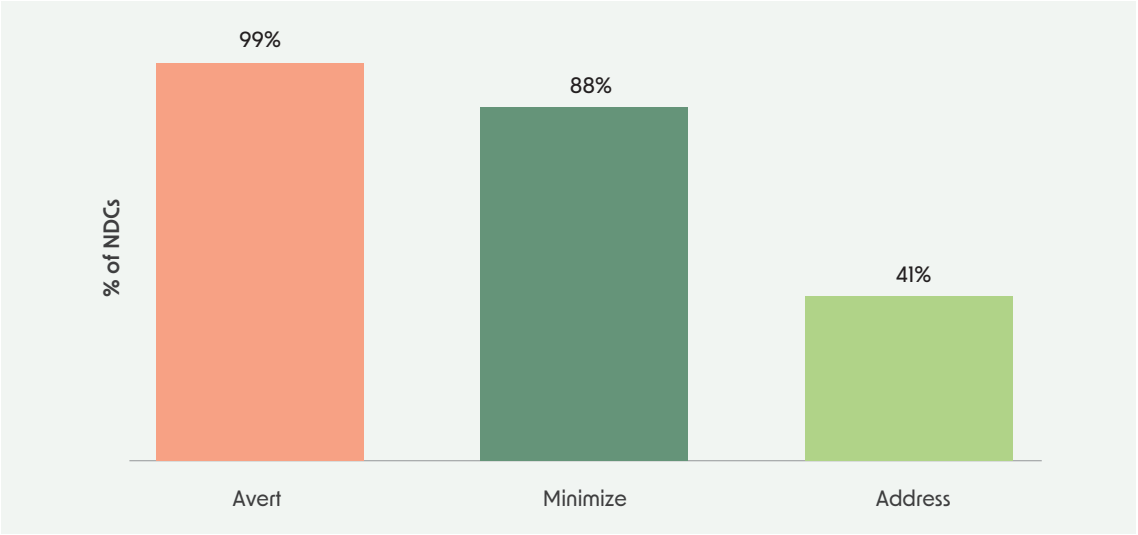


Source: Authors' own elaboration based on FAO analysis of latest NDCs submitted as of 30 June 2023.

Without effective adaptation, losses and damages are expected to be concentrated among the poorest and most vulnerable populations and perpetuate other socioeconomic risk factors. A growing range of economic and non-economic losses attributed to climate extremes and slow-onset events are already being observed and expected to increase in the future, threatening to interact with and compound other drivers of poverty, food insecurity, violent conflict, displacement and forced migration in the future.[1] Since agriculture represents one of the most climate-sensitive livelihood source upon which the poor1 and around half of the world's population at large depend for their livelihoods,[33] it is striking that only a small sample (10 percent) of NDCs are reporting on climate-related "loss and damage" in agrifood systems and even fewer evaluate the cost. This is likely due to data and capacity gaps and the challenge of attributing the actual share of losses and damages due to climate change, particularly for non-economic losses.[34]

The NDCs, particularly those from LDCs, provide insights into the spectrum of interventions required for averting, minimizing and addressing loss and damage in agrifood systems (Figure 13). Climate change adaptation and disaster risk reduction and management overlap and rely on a set of common measures for responding before, during and after a disaster strikes.[32, 35, 36] The largest majority of measures set forth in the NDCs with respect to loss and damage in agrifood systems are focused on *averting* and *minimizing* loss and damage in the first place, while less focus on *addressing* it. For example, nearly all countries include mitigation actions to reduce GHG emissions and consequently *avert* loss and damage in their NDCs.[4] *Minimizing* loss and damage in agrifood systems entails an integrated approach to adaptation and disaster risk reduction efforts, such as the implementation of nature-based solutions at the ecosystem level, disaster risk reduction (DRR)/climate change adaptation (CCA) good practices at the farm level, climate proofing infrastructure, scaling up climate services and early action and utilization of risk-informed and shock-responsive social protection schemes and insurance, among others. Fewer countries, however, include measures in their NDCs to *address* loss and damage in agrifood systems, for instance, through emergency response and recovery programmes.

FIGURE 13. Measures to avert, minimize and address loss and damage in agrifood systems (% of NDCs)



Source: Authors' own elaboration based on FAO analysis of latest NDCs submitted as of 1 January 2024.

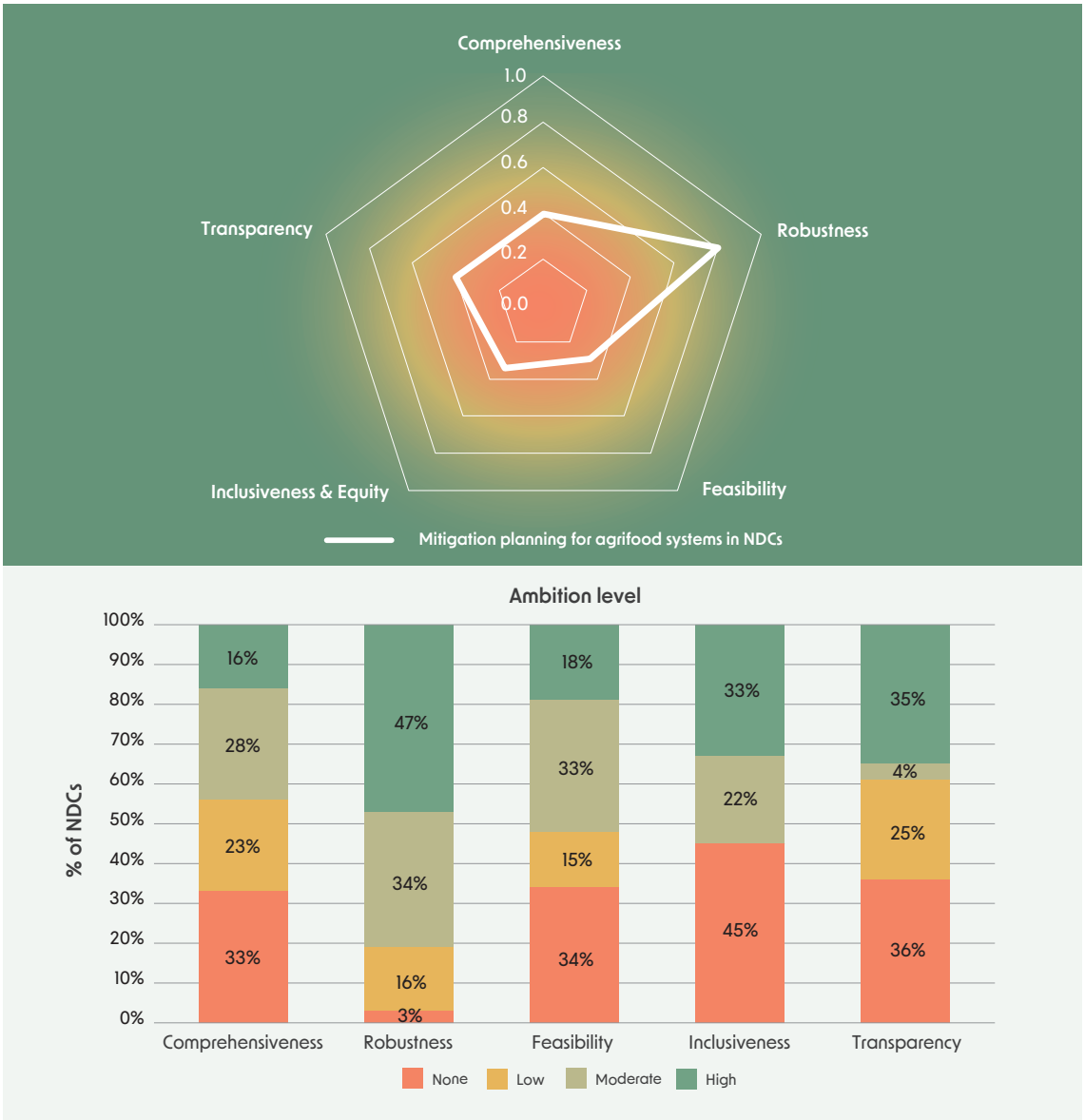
Key finding #5

While great strides have been made to reflect the role of agrifood systems in NDCs as a solution area for addressing the global climate crisis, current NDCs still present an agrifood system mitigation action gap that is equivalent to 60 percent of agrifood system emissions and 20 percent of global GHG emissions.

Achieving the global temperature goals of the Paris Agreement is not possible without rapid and deep emission reductions across key systems, including agrifood systems.[4] Even if fossil fuel emissions were eliminated, emissions from global agrifood systems alone would make it impossible to limit warming to 1.5 °C and difficult even to realize the 2 °C target.[37] Reductions in the emission intensity of agricultural production, enhancing carbon sequestration in biomass and soils, and reducing emissions along the pre- and postproduction value chain processes can significantly contribute to mitigating the 31 percent share of global GHG emissions generated by the global agrifood system each year.[38] Greater conservation, restoration and management of the world's forests, wetlands, grasslands, and agricultural lands is regarded as one of the most cost-effective natural solutions to climate change, with an emission reduction potential equivalent to one-third of global GHG emissions, and a centerpiece to building the resilience of ecosystems and communities.[11]

When compared against five pillars of mitigation ambition, three-quarters of current NDCs reflect either low or moderate ambition levels in agrifood systems (Figure 14). Mitigation ambition levels are lower on average when evaluated against criteria of feasibility and inclusiveness, and moderate with respect to transparency, comprehensiveness and robustness (refer to methodological annex for details). At the regional level, higher agrifood system mitigation ambition levels are observed in sub-Saharan Africa and Latin America and the Caribbean, while the lowest are found in Europe and Central Asia, and in Asia and the Pacific. LICs and LDCs present more ambitious mitigation contributions in agrifood systems in their NDCs, compared to high-income countries (HICs), despite being historically less responsible for climate change.

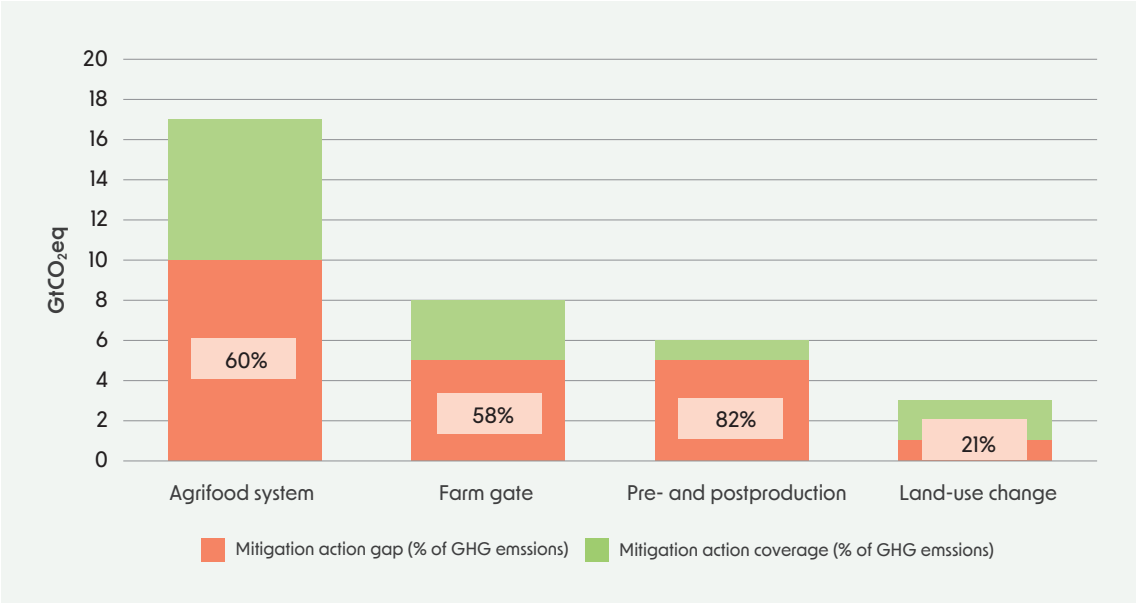
FIGURE 14. Agrifood system mitigation ambition levels, by ambition criterion and level (min–max range: 0–1)



Source: Authors' own elaboration based on FAO analysis of latest NDCs submitted as of 1 January 2024.

Less than half of agrifood system GHG emissions are being targeted by concrete mitigation actions in the NDCs (Figure 15), **leaving a mitigation action gap equivalent to 60 percent of agrifood system emissions and 20 percent of global GHG emissions.** The largest mitigation action gap is observed in relation to emissions from pre- and postproduction, since only a fraction of those emissions are being targeted by concrete NDC mitigation actions. Secondly, less than half of emissions from within the farm gate are being targeted by concrete mitigation actions, leaving a mitigation action gap equivalent to 58 percent of farm gate-related GHG emissions. Lastly, a larger share of land-use change (LUC)-related emissions is being targeted by concrete mitigation actions (79 percent), leaving a mitigation action gap equivalent to 21 percent of LUC-related GHG emissions.

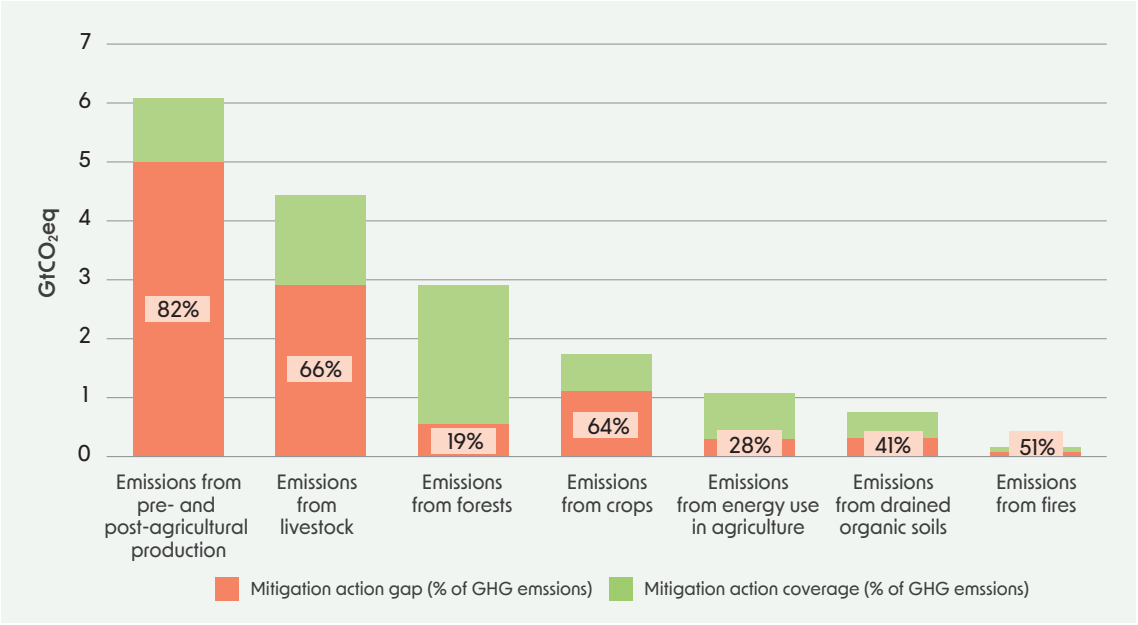
FIGURE 15. Mitigation action gap in agrifood system, by agrifood system component (% of GHG emissions covered vs not covered, in gigatonnes of carbon dioxide equivalent [$GtCO_2eq$])



Source: Authors' own elaboration based on FAO analysis of latest NDCs submitted as of 1 January 2024; and **FAO**. 2023. *FAOSTAT Climate Change: Agrifood systems emissions, Emissions Totals*. https://www.fao.org/faostat/en/#data/GT.

Emissions from pre-and postproduction processes and from livestock constitute the highest mitigation action gaps in agrifood systems, with 82 percent and 66 percent of respective emissions not currently being targeted by concrete mitigation actions in the NDCs (Figure 16). Other mitigation action gaps observed in the NDCs across agrifood systems are in descending order (as a relative share of total): emissions from crops, from fires, from drained organic soils, from energy use in agriculture, and from forests. Identifying major drivers and sources of greenhouse gas emissions is a foundational step in the mitigation planning process in agrifood systems.

FIGURE 16. Mitigation action gap in agrifood system, by emissions category (% of GHG emissions covered vs not covered, in $GtCO_2eq$)



Source: Authors' own elaboration based on FAO analysis of latest NDCs submitted as of 1 January 2024; and **FAO**. 2023. FAOSTAT *Climate Change: Agrifood systems emissions, Emissions Totals*. https://www.fao.org/faostat/en/#data/GT.

Mitigation action gaps in agrifood systems are highest with respect to short-term climate pollutants, such as nitrous oxide (N_20) and methane (CH_4), which are essential to limiting global warming to 1.5 °C by 2030.[39] N_20 emissions from agrifood systems account for three-quarters of global N_20 (CO_2eq) emissions[40] and, yet 70 percent of those emissions are not being addressed by mitigation actions in the NDCs. CH_4 emissions from agrifood systems account for half of global CH_4 (CO_2eq) emissions worldwide[40] and yet 59 percent of those emissions are also not being addressed by mitigation actions in the NDCs.

Mitigation contributions defined in the NDCs for agrifood systems are moderately robust, with lower levels of robustness observed in Europe and Central Asia and higher levels found in sub-Saharan Africa. This is due to the relatively high share of countries that include economy-wide GHG targets with AFOLU sectoral coverage (90 percent of NDCs) and near-term agrifood system mitigation actions (78 percent). Less than half of all countries, however, define AFOLU-sector specific GHG targets (39 percent) and only one-third articulate the mitigation co-benefits from adaptation actions in agrifood systems (37 percent), which is considered a contributory factor to the robustness of a mitigation strategy in agrifood systems.

On average, mitigation contributions in agrifood systems score low in terms of feasibility, with lower levels observed in Europe and Central Asia and Asia and the Pacific and higher levels found in Latin America and the Caribbean, and North America. Low levels of feasibility are evidenced by the limited allocation of domestic finance for agrifood system mitigation (19 percent of NDCs), as well as the low presence of enabling policy instruments either established or promoted in the NDCs, including governance, knowledge and finance-based instruments, to support the uptake of mitigation action in agrifood systems (30 percent). Further, less than half of all countries (41 percent) identify the actors responsible for implementing mitigation action in agrifood systems.

Alarmingly, mitigation contributions in agrifood systems score low in terms of inclusiveness, with lower levels observed in Europe and Central Asia and in Asia and the Pacific, and higher levels found in North America, and in Latin America and the Caribbean. This is evidenced by the limited consideration of vulnerable and marginalized groups when planning mitigation actions (36 percent of NDCs) and moderate promotion of local- and community-based approaches to implementation of mitigation actions in agrifood systems (42 percent). In addition, the sustainable development co-benefits of mitigation action in agrifood systems are rarely identified (19 percent of NDCs), which may suggest the absence of multi-criteria analysis underpinning mitigation strategies in agrifood systems. For mitigation planning in agrifood systems to be effective and avoid generating unintended trade-offs with SDGs, it must emphasize the engagement of all relevant stakeholders, including vulnerable and marginalized populations, as well as promote co-benefits and avoid negative tradeoffs with adaptation and sustainable development outcomes, such as food security, gender equality and poverty.[1, 5]

On average, mitigation contributions in agrifood systems are moderately transparent, with lower levels observed in Europe and Central Asia and in North America, and higher levels found in sub-Saharan Africa. This is due to several reasons, including the low share of countries that identify GHG emissions reference points for the AFOLU sector (23 percent of NDCs) against which to track the achievement of net emission reductions. Around one-third of countries define the timeframe (33 percent) and the scope of GHG targets in the AFOLU sector and gases covered (40 percent). However, over half of all countries do include GHG and/or non-GHG (e.g. hectares [ha] of land) indicators to track progress of mitigation actions (61 percent). According to the Paris Agreement Rulebook,[17] including quantifiable information on the reference point, timeframe, scope and coverage of mitigation, including mitigation co-benefits from adaptation can enhance the clarity, transparency, and understanding of mitigation contributions in the NDCs.

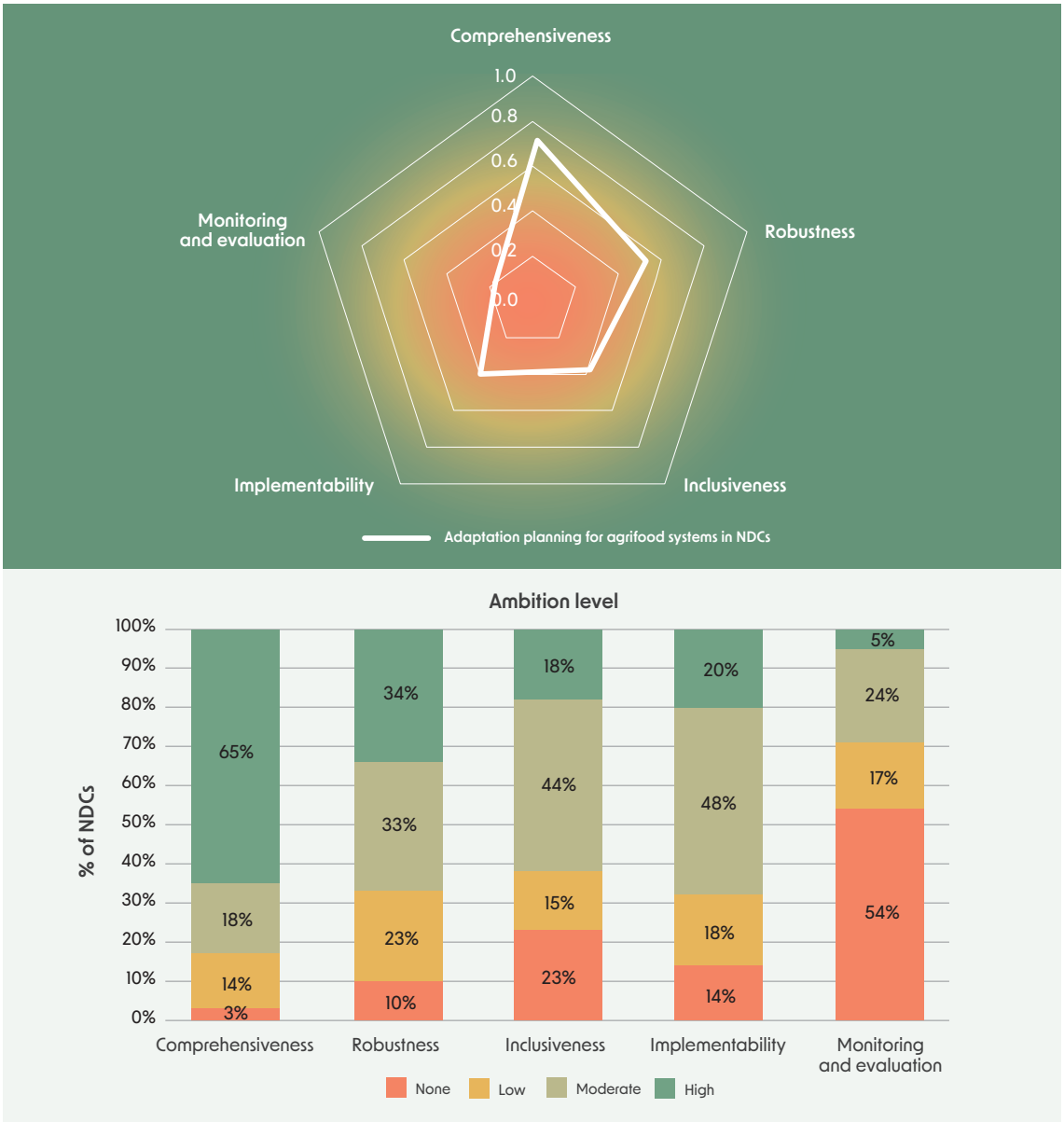
Key finding #6

Without signs of more effective and adequate NDC planning, global adaptation efforts may fail to keep pace with increasing climate risks in agrifood systems.

Global efforts in adaptation planning and implementation continue to make incremental progress but fail to keep pace with increasing climate risks.[6] Most observed adaptation is fragmented, small in scale, incremental, sector-specific and designed to respond to current impacts or near-term risks, and the largest adaptation gaps exist among lower-income population groups.[5] The IPCC finds that current on-farm adaptations are insufficient to meet SDG 2, and the largest adaptation gaps exist among lower-income population groups, especially smallholders with insufficient adaptive capacities and compounding non-climatic drivers of vulnerability. Increasing weather and climate extreme events have affected the productivity of all agriculture sectors and already exposed millions of people to acute and severe food insecurity for people living in sub-Saharan Africa, Asia, small islands, Central and South America, and the Arctic, and small-scale food producers globally. Climate change has increasingly caused irreversible losses, in terrestrial, freshwater and coastal and open ocean marine ecosystems in every region, and the risk of biodiversity loss will continue to rise exponentially with every degree of warming.[1]

Adaptation planning components for agrifood systems included in the NDCs reflect relatively moderate to low levels of effectiveness and adequacy globally, with variation across regions and evaluation criteria (Figure 17). Based on an adaptation of the United Nations Environment Programme (UNEP) framework for assessing the potential effectiveness and adequacy of adaptation planning for agrifood systems, the NDCs were evaluated against five pillars (refer to methodological annex for details). Overall, adaptation adequacy and effectiveness levels are low on average when evaluated against criteria of transparency (monitoring and evaluation); moderate with respect to inclusiveness, feasibility and robustness; and high in comprehensiveness. At the regional level, signs of more adequate and effective adaptation planning are found in North America and sub-Saharan Africa, while the lowest levels are found in Europe and Central Asia, and in Asia and the Pacific.

FIGURE 17. Adaptation planning adequacy and effectiveness levels in agrifood systems, by criterion (% of NDCs)



Source: Authors' own elaboration based on FAO analysis of latest NDCs submitted as of 1 January 2024.

Overall, adaptation components in the NDCs demonstrate comprehensive coverage of agrifood systems, and planned actions generally match up against subsectors and ecosystems considered most at risk. This entails identifying climate hazards and risk hot spots in agrifood systems, prioritizing subsectors and then developing adaptation options that respond to observed and projected climate-related risks, hazards and vulnerabilities faced as part of a comprehensive adaptation plan for agrifood systems. Current NDCs suggest that comprehensive adaptation entails planning interventions across all stages of agrifood value chains and subsectors, spanning from production to post-harvest and consumption, and addressing key risks identified for ecosystems that provide critical ecosystem services and biodiversity for agrifood systems.

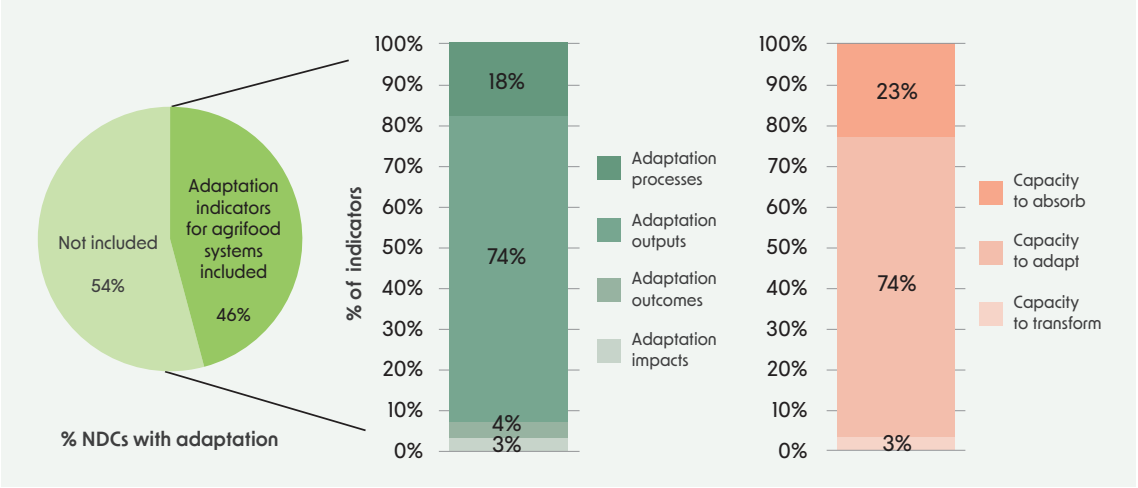
However, the actual effectiveness of the planned adaptation efforts in the NDCs in addressing current and future climate risks in agrifood systems requires further *ex post* assessment.

The elements of the adaptation planning cycle for agrifood systems in the NDCs are also generally present but skewed towards near- to medium-term actions as opposed to longer-term strategies. Defining long-term adaptation goals or visions, alongside near- to medium-term adaptation objectives and actions can contribute to the robustness of adaptation planning in agrifood systems, especially when accompanied by quantified and time-bound targets, indicators and monitoring and evaluation systems.[6,41] However, current NDCs focus primarily on the identification of near- to medium-term adaptation actions in the absence of longer-term adaptation strategies and – more often than not – leave out quantified and time-bound indicators and targets for tracking progress over time.

Adaptation components in agrifood systems, as formulated in the NDCs, are moderately inclusive, owing to their high emphasis on local-level approaches and principles of gender equality and social inclusion; but the use of differential climate risk and vulnerability assessment and targeting of different segments of the population is often lacking. For adaptation planning to adequately address existing and future risks and to effectively enhance the ownership of adaptation in agrifood systems, it must emphasize the engagement of all relevant stakeholders and take gender into consideration.[6] The inclusiveness of adaptation planning is important, as it helps to ensure the credibility, relevance and legitimacy of adaptation action and reduces the chance of maladaptive outcomes, thereby leading to more effective and enduring outcomes.[42]

The "implementability" of agrifood adaptation components in the NDCs is moderately evidenced, with fewer indications observed in Europe and Central Asia and in Asia and the Pacific and more found in North America and sub-Saharan Africa. This is due to the moderate presence of enabling policy instruments, including governance, knowledge and finance-based instruments, to support the uptake of adaptation action in agrifood systems. Additionally, less than half of all countries allocate domestic finance for adaptation in agrifood systems in their NDCs. However, many adaptation components do identify key actors that are responsible for or involved in the implementation of adaptation actions in agrifood system. On the other hand, only some countries identify the potential SDG co-benefits of adaptation in agrifood systems, limiting the "implementability" of the NDC.

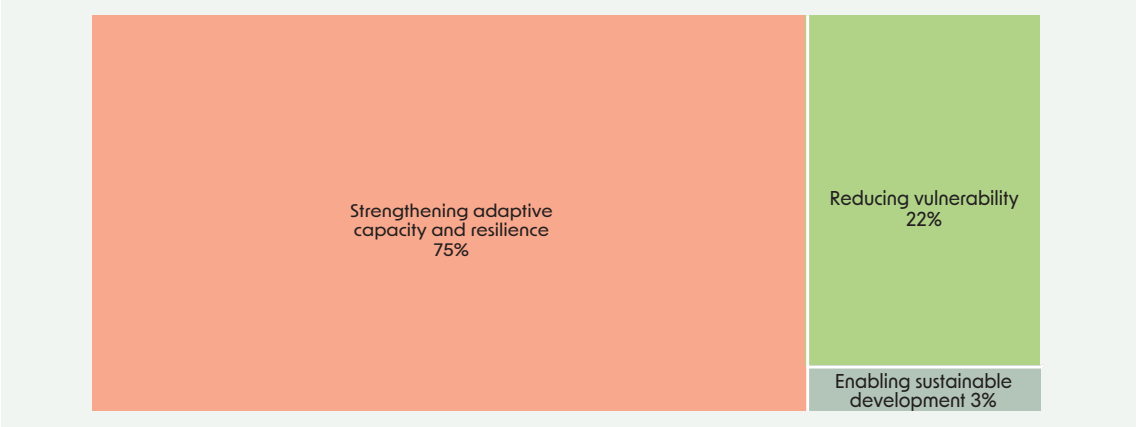
FIGURE 18. Adaptation indicators in agrifood systems (% of NDCs with adaptation), by indicator type and by resilience capacity measured (% of indicators)



Source: Authors' own elaboration based on FAO analysis of latest NDCs submitted as of 1 January 2024.

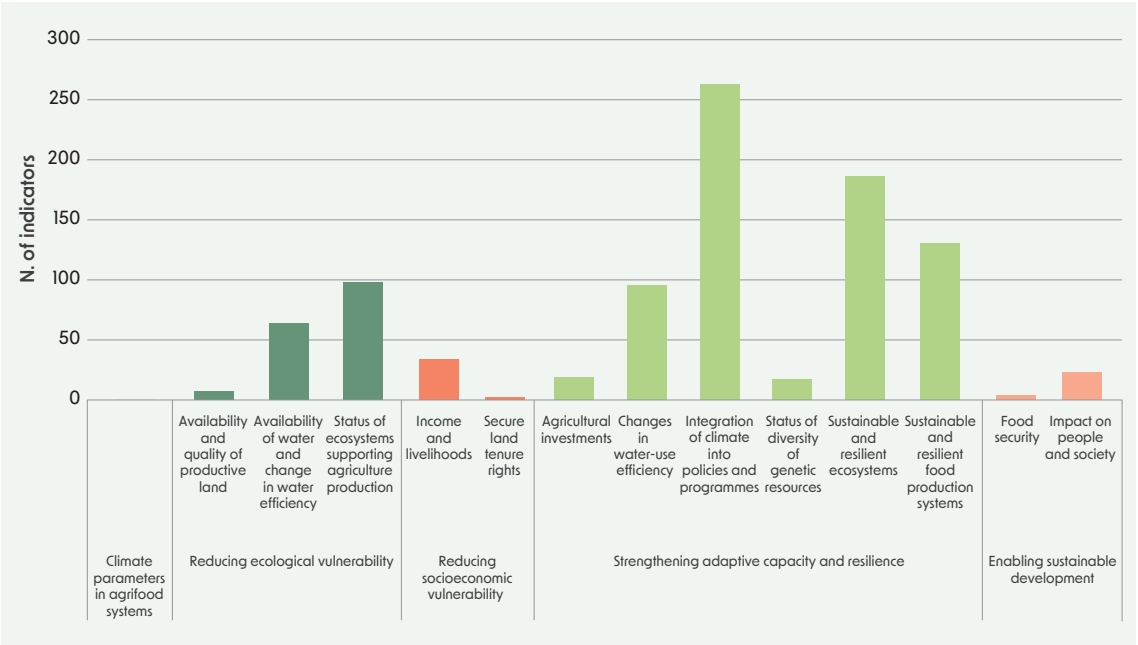
The measurability of adaptation components for agrifood systems in the NDCs is relatively low, and the relevance of indicators for tracking progress against the four domains of the global goal on adaptation (GGA) is partial. For adaptation planning to remain adequate and effective, it must be periodically monitored and evaluated.[6, 43] Collective and national progress on adaptation in agrifood systems can be measured against the GGA framework and its thematic target for food and agriculture.[44] While the share of countries including adaptation indicators for agrifood systems has doubled compared to previous NDC submissions (Figure 18), their relevance for measuring progress against the four domains of the GGA is partial (Figure 19). For instance, three-quarters of indicators are designed to measure changes in adaptive capacity and resilience in agrifood systems, while approximately one-fourth measure changes in ecological and socioeconomic vulnerability levels and very few measure the longer-term impacts of adaptation in agrifood systems on sustainable development (Figure 20). Further, stand-alone adaptation indicators that measure changes in climate parameters and risks in agrifood systems, such as exposure to agricultural drought or incidence of pest and diseases, are absent in current NDCs, which are critical for measuring the effectiveness of adaptation against climate-risk baselines. The overwhelming majority of adaptation indicators included in the NDCs (Figure 18) track the immediate outputs of adaptation (74 percent of indicators); while some measure adaptation planning processes (18 percent) and very few measure near- to medium-term adaptation outcomes (4 percent) and the longer-term sustainable development impacts of adaptation in agrifood systems (3 percent).

FIGURE 19. Relevance of adaptation indicators in agrifood systems for measuring progress against the four global goal on adaptation domains (% of indicators)



Note: Climate risks in agrifood systems do not appear in the figure, as 0 percent of countries included related indicators.
Source: Authors' own elaboration based on FAO analysis of latest NDCs submitted as of 1 January 2024.

FIGURE 20. Types of adaptation metrics used for measuring adaptation in agrifood systems in the NDCs, by global goal on adaptation domain (n. of indicators)



Source: Authors' own elaboration based on FAO analysis of latest NDCs submitted as of 1 January 2024.

Similarly, the indicators identified in the NDCs predominantly measure adaptive (74 percent) and absorptive (23 percent) capacities in the face of climate risk in agrifood systems, while very few (3 percent) measure the capacity to transform (Figure 18). This finding concurs with the outcome report of the first UNFCCC Global Stocktake Report,[5] which found that most of the observed adaptation responses to date are incremental and fragmented in nature. It stressed that achieving the GGA entails a combination of incremental and long-term transformational changes across key sectors and systems, including agrifood systems.

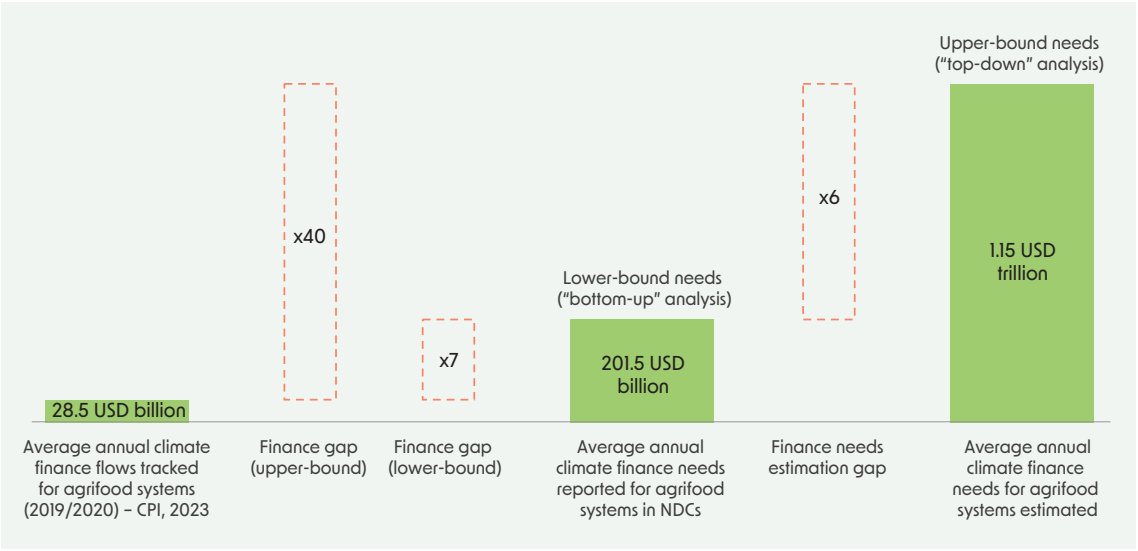
Key finding #7

Current climate finance flows towards agrifood systems are seven times too small to meet the lower-bound needs expressed in the NDCs and would have to increase by 40-fold to reach the most conservative of upper-bound needs.

Without accelerated climate finance, delayed emission reductions will push critical ecosystems and human systems, including agrifood systems, beyond their environmental and social tipping points.[4] Current global financial flows towards agrifood systems are strikingly insufficient, receiving just 4.3 percent of total project-level climate finance tracked in 2019/2020[45] and merely 0.8 percent is reaching small-scale agriculture, covering only a small fraction of their actual needs.[46] The latest estimates state that climate finance for agrifood systems must increase at least 40-fold from current levels to reach the most conservative of estimated needs, which is in the order of one trillion dollars annually.[47] Instead of rising to meet these needs, global trends over the past two decades reveal a sharp decline in agrifood system climate-related development finance flows relative to total.[48] Closing the widening finance gap will require incentivizing agrifood systems transformation through enabling policies and innovative public–private investment.[48]

A bottom-up analysis of climate finance needs expressed in the NDCs reveals that current climate finance flows towards agrifood system are still nearly seven times too small (Figure 21). An extrapolation of average annual climate finance needs for agrifood systems stated in the NDCs (see methodological annex for details) amount to USD 201.5 billion needed each year until 2030. This suggests that the USD 28.5 billion in current annual climate finance flows tracked towards agrifood systems (2019/2020)[45] is insufficient and would have to increase by a factor of seven to meet the needs reported in NDCs.

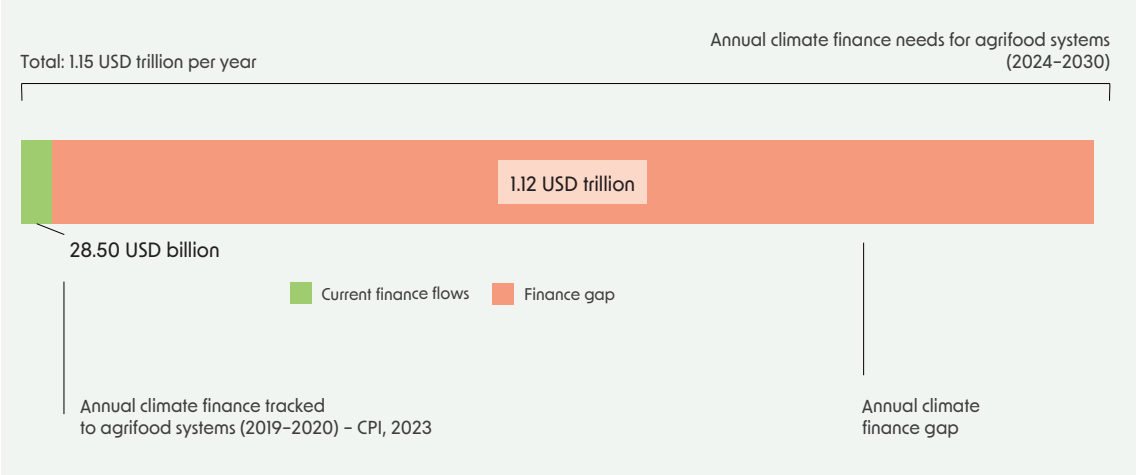
FIGURE 21. Annual agrifood finance needs estimated (in the NDCs versus top-down modeling approaches) against current yearly flows to agrifood systems (annual averages, 2024–2030, USD billion)



Source: **CPI and FAO.** 2024. *The Triple Gap: Climate Finance Needs for Agrifood Systems.*

Further, when current flows are compared to top-down sectoral needs estimates, climate finance for agrifood systems would need to increase forty-fold. A top-down analysis[47] reveals that, in an average scenario, climate finance for global agrifood systems should reach USD 1.15 trillion annually until 2030. This leaves an annual climate finance gap of USD 971 billion when compared against the annual 2019/2020 average[45] (Figure 22). However, this climate finance gap is likely underestimated, as current estimates only involve certain agrifood practices, that do not comprehensively represent the full scope of agrifood systems (see taxonomy in CPI and FAO (2024).[47]

FIGURE 22. Average annual climate finance gap for agrifood systems (USD billion)

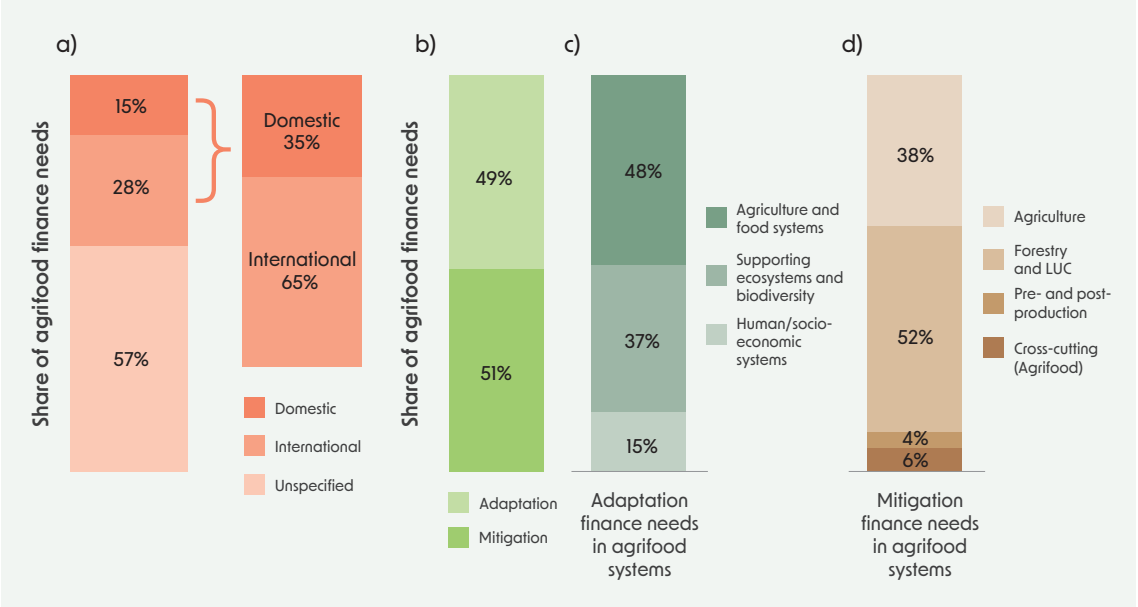


Source: **CPI and FAO.** 2024. *The Triple Gap: Climate Finance Needs for Agrifood Systems.*

The volume of climate finance needs estimated for agrifood systems in the NDCs reflect only a fraction – one-sixth – of what is likely needed. Agrifood system climate needs stated in the NDCs extrapolated to the global level amount to an annual average of USD 201.5 billion until 2030, representing only a portion of the estimated USD 1.15 trillion needed yearly.[47] This suggests that NDCs are underestimating the investment needed for agrifood system climate solutions, representing a missed opportunity when it comes to influencing the flow of international finance support towards developing countries and formulating reliable investment plans.

Despite the estimation gap, NDCs still provide insights into the overall distribution of climate finance needs across agrifood subsectors, climate objectives and finance sources (Figure 23). For instance, the NDCs illustrate that an almost equal flow of finance towards adaptation and mitigation objectives in agrifood systems is required, suggesting a needed re-direction of the bias in current flows towards mitigation objectives.[45] Similarly, finance needs expressed in the NDCs illustrate that achieving adaptation objectives in agrifood systems requires a distribution of finance not only directed at strengthening the resilience of agriculture production, value chains and livelihoods but also towards interlinked ecosystems that provide essential ecosystem services and biodiversity for agrifood systems. The distribution of mitigation climate finance needs across agrifood systems reveals that a greater share of finance is required to address emissions from forestry and land-use change as opposed to farm gate emissions, while only a small share is reserved for pre- and postproduction processes. However, it should be noted that – given the finance data gap in NDCs – these documents do not provide reliable information on absolute values but rather offer insights, more generally, into the types of agrifood system priorities to which finance flows should be directed.

FIGURE 23. Distribution of climate finance needs for agrifood systems expressed in the NDCs, by a) finance source; b) climate objective; c) sectoral distribution of adaptation finance; and d) sectoral distribution of mitigation finance

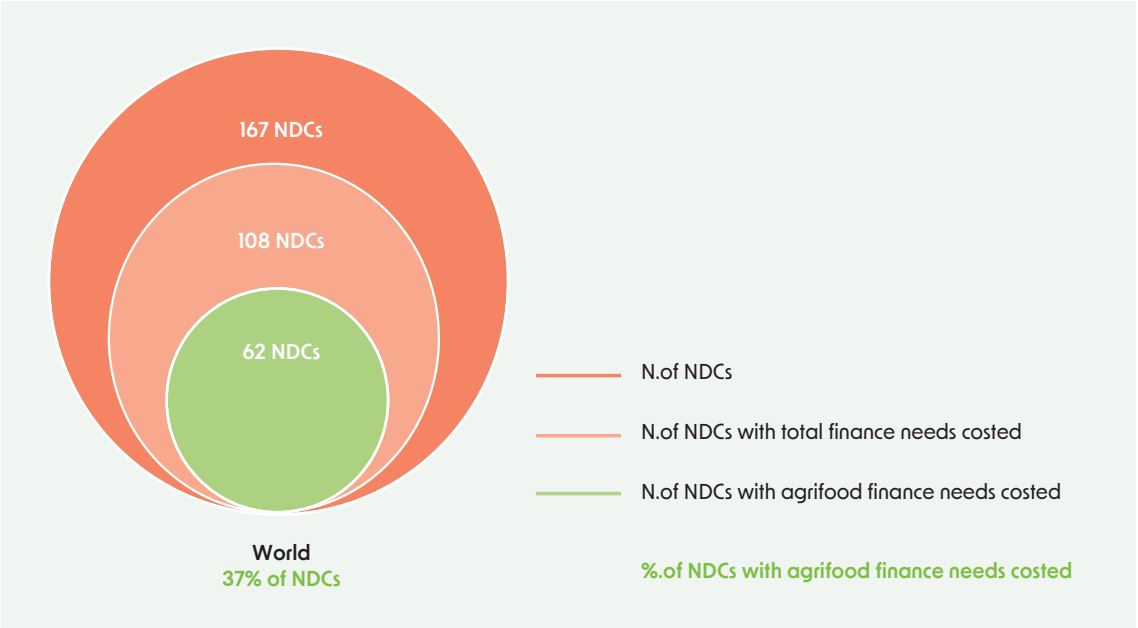


Note: The figure presents average 2021–2030 annual climate finance needs costed in the NDCs for agrifood systems.
Source: Authors' own elaboration based on FAO analysis of latest NDCs submitted as of 1 January 2024.

Sixty-five percent of climate actions in agrifood systems costed in the NDCs are conditional on the provision of international finance, while one-third is expected to be financed domestically. LICs (67 percent of total finance), LDCs (69 percent) and SIDS (66 percent) also rely more heavily on international climate finance than domestic finance for agrifood systems, indicating that these low-income and special country groups are particularly dependent on the provision of international support for addressing climate change in agrifood systems, compared to other countries.

Future NDC iterations should provide more quantified and granular information to represent the true cost of climate action in agrifood systems. Currently, only one-third of NDCs provide specific climate finance information related to agrifood systems. This significant data limitation (Figure 24) prevents an accurate understanding of the magnitude of climate finance needed for agrifood systems globally and its distribution across regions, subsectors, and climate objectives. As such, the data quality gap limits the opportunity for NDCs to serve as reliable policy signals capable of directing the flow of climate finance to where it is needed most. More effort should be dedicated to building the bottom-up capacities of countries, and the availability of data sources and standardized methodologies, to estimate agrifood climate finance needs in the NDCs so that they can serve as national blueprints for public and private sector investment.

FIGURE 24. Overview of the agrifood system climate finance data gap in NDCs submitted to the UNFCCC



Source: **CPI and FAO.** 2024. *The Triple Gap: Climate Finance Needs for Agrifood Systems.*

The way forward

The evidence makes clear that achieving the global goal on adaptation and the long-term temperature goal of the Paris Agreement is not possible without sustainable, resilient and inclusive agrifood system transformation.[4] Current NDCs reflect a progressively positive trajectory where agrifood systems are increasingly being recognized as fundamental to addressing the global climate crisis and agrifood system solutions are being integrated into national adaptation and mitigation strategies across the globe.

However, the outcomes of the UNFCCC's first "Global Stocktake",[5] which reviewed collective progress towards the global goals laid out in the Paris Agreement, revealed that the world is significantly off track in avoiding the worst impacts of climate change on people, communities and ecosystems – regardless of economic development status. Agrifood systems are particularly vulnerable due to their intrinsic dependence on climate-sensitive natural resources[22] and deep ties with over 4 billion people worldwide.[33] Without a step-up in the global response to climate change, losses and damages in agrifood systems, in particular, will continue to undo hard-earned sustainable development gains, exacerbating drivers of food insecurity, poverty, conflict and migration.[1]

Based on a review of adaptation and mitigation planning elements in the NDCs against five pillars of ambition in agrifood systems – comprehensives, robustness, feasibility, inclusiveness and transparency – the results suggest that the "ambition" of NDCs depends on much more than high-level commitments to address climate change. Rather, NDCs that are based on robust evidence; address context-specific needs, priorities, and capacities; are investment-ready and enabled by a supportive policy environment; and can safeguard a just transition reflect the true ambition that is required to facilitate effective climate action on the ground. The following recommendations have emerged as entry points for strengthening the ambition of agrifood system planning components in the next iteration of NDCs expected in 2025 and beyond:

STRENGTHEN the evidence base for climate-risk informed agrifood solutions in the NDCs

- Conduct climate-risk and vulnerability assessments that account for multidimensional factors, including the interaction of environmental, agroecological and socioeconomic dimensions over different spatial and temporal scales.
- Conduct loss and damage assessments in agrifood systems and incorporate strategies for addressing the soft and hard limits to adaptation.
- Link climate information services and multi-hazard early warning systems to adaptation planning.
- Identify and target GHG hot spots across all agrifood system components, including emissions from within the farm gate, pre- and postproduction processes and land-use change.

BROADEN the scope and context-specificity of agrifood system climate solutions in the NDCs

- Establish long-term visions for climate-resilient and low-emission agrifood system transformation so that NDCs serve as iterative near- to medium-term milestones.
- Consider the wide range of agrifood solutions available, including nature-based solutions; adaptive and low-emission on-farm and on-boat practices; and climate-resilient value chain development and shifts towards sustainable consumption.
- Identify agrifood solutions that are fit for the context and differentiated by geographical location; agroecological and socioeconomic status; and climate relevance.

ADDRESS underlying vulnerabilities and inequalities in agrifood systems and avoid maladaptive outcomes

- Couple agrifood system strategies in the NDCs with national visions for a just transition.
- Design targeted climate actions that address the needs, vulnerabilities and capacities of vulnerable and marginalized groups, including women, youth, the poor and Indigenous Peoples and address the potential risks of trade-offs between mitigation, adaptation and sustainable development outcomes.
- Ground NDC development in participatory, gender-transformative and locally led planning and implementation approaches.
- Enhance the coherence between NDCs and social protection and economic inclusion programmes to prevent and protect vulnerable agrifood and rural populations from poverty and social exclusion within the context of climate risk.

INTEGRATE climate, disaster and development governance structures to minimize and address loss and damage in agrifood systems

- Integrate a spectrum of measures that span adaptation, climate-risk management and disaster risk reduction to avert, minimize and address loss and damage in agrifood systems.
- Align climate, humanitarian and peacebuilding initiatives, particularly in fragile and conflict-affected states.
- Ensure cross-sectoral planning and coordination mechanisms are in place to support adaptation and disaster risk reduction convergence at the local level, optimizing resources and impact.

IMPROVE the "implementability" of NDCs and climate action in agrifood systems on the ground

- Define clear time frames, roles and responsibilities, including the engagement of agricultural, natural resource and social development-related ministries, civil society, research and universities, private sector and other key partners.
- Establish an enabling policy environment, including governance-, knowledge- and capacity-based and finance-based instruments to enable the adoption of agrifood system climate solutions.
- Strengthen institutional mechanisms to mainstream NDCs into agricultural and subnational polices, plans and budgets.
- Identify the SDG co-benefits of climate action in agrifood systems to incentivize greater buy-in and optimize impact.

ENHANCE the investment-readiness of agrifood system solutions in NDCs

- Develop standardized methods and enhance national capacities for estimating climate finance needs for agrifood systems in the NDCs.
- Identify domestic finance sources for implementation of the agrifood system components in the NDCs and incorporate into a national climate budget tagging system.
- Include a financing plan disaggregated at the agrifood system sectoral level.
- Assess the risks and barriers to private sector investment in agrifood system climate solutions and identify de-risking solutions.

UNDERPIN the NDCs with iterative systems to track adaptation and mitigation progress in agrifood systems over time

- Develop AFOLU sector-specific GHG emission reduction targets and identify the GHG emission reference level against which to measure progress, including scope and coverage (e.g. sectors, sources and sinks, pools and gases, etc).
- Identify priority agrifood system sub-sectors and country-specific variables (e.g. emission factors).
- Develop mitigation actions with quantified and time-bound GHG and non-GHG targets.
- Identify adaptation indicators to track changes in vulnerability, adaptive capacity and resilience and longer-term sustainable development outcomes against a climate-risk baseline.
- Enhance the institutional arrangements and technical capacities underpinning national and sectoral monitoring, reporting and verification (MRV) and monitoring and evaluation (M&E) systems to support NDC tracking and reporting.
- Put in place iterative learning processes to course-correct NDC planning and implementation.

ALIGN NDCs with other climate and multilateral environmental agreements relevant to agrifood systems

- Align adaptation components in the NDCs with existing or planned national adaptation plans (NAPs) so that the latter can serve as an operational implementation plan.
- Ensure coherence between NDCs and other multilateral environmental agreements relevant to agrifood systems, including the United Nations Convention on Biological Diversity (CBD) and United Nations Convention to Combat Desertification (UNCCD).
- Promote convergence between NDCs and national food system transformation pathways.

Note: The list of recommendations is based on a review of current agrifood system components in the NDCs against the findings and recommendations documented in the latest scientific evidence on NDC planning and implementation to date, including the IPCC Sixth Assessment Report;[1, 49] the report on the outcomes of the global stocktake;[5] the 2023 UNEP Adaptation Gap Report;[6] the 2024 UNEP Emissions Gap Report,[7] as well as FAO's long-standing sectoral expertise and experience supporting NDC planning and implementation in agrifood systems. The recommendations are in line with the objectives of the Paris Agreement (Decision 1/CP.21)[3] and related COP decisions, including Decision -/CMA.5[5] and Decisions 3/CMA.1[50] and 9/CMA.1.[51]

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This report presents the key findings of a comprehensive FAO analysis into the status of agrifood systems in nationally determined contributions (NDCs). It provides insights into the extent to which current NDCs are contributing to the climate-resilient and low-emissions agrifood system transformation needed to achieve the Paris Agreement. It provides an overview of the major climate-related risks and greenhouse gas hot spots in agrifood systems. And it synthesizes the main climate change adaptation and mitigation strategies being set forth in the NDCs to address them.

The report also takes stock of the underpinning governance, knowledge and capacity and finance needs articulated to enable climate action in agrifood systems. And it highlights mitigation, adaptation and climate finance ambition gaps in agrifood systems to inform enhanced ambition, action and support.

The seven key findings presented here are primarily for national planners and policymakers involved in climate change and agrifood system planning for conceptualizing the role and potential of agrifood system climate solutions within the context of NDC enhancement and implementation.

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