Food and Agriculture Organization of the United Nations

MEETING DOCUMENT

Agriculture, Food Security and Agrifood Systems: Key concepts and definitions

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Introduction

Agriculture and food security have been central to the United Nations Framework Convention on Climate Change (UNFCCC) – which sets as a core objective the stabilization of greenhouse gas concentrations, including at a level that does not threaten food production – since its establishment in 1992. This centrality continued through the Paris Agreement's recognition of the fundamental priority of safeguarding food security and ending hunger, and through agriculture's designation as a reporting sector in national greenhouse gas (GHG) inventories under the UNFCCC and the Enhanced Transparency Framework, in line with the Intergovernmental Panel on Climate Change (IPCC) Guidelines. Agriculture has also been a standing negotiation agenda item under the Convention since its formal inclusion in 2011, advanced through the Koronivia Joint Work on Agriculture (KJWA) in 2017, and its successor, the Sharm el-Sheikh Joint Work on Implementation of Climate Action on Agriculture and Food Security (SJWA) in 2022.

Terms such as *agriculture, food systems, food production systems, smallholder farmers,* and *food and agricultural production systems* are starting to appear across other UNFCCC workstreams and decisions, including the first Global Stocktake (GST1), the Global Goal on Adaptation (GGA) and its Belém Adaptation Indicators, the UAE Just Transition Work Programme, the Standing Committee on Finance (SCF), and the Belém Gender Action Plan. However, their use varies across negotiations, technical bodies and Party submissions, reflecting the different conceptual and policy frameworks from which they originate, each with distinct boundaries, activities and purposes.

Building on the outcomes of the KJWA, the SJWA carried forward agriculture and food security as its core mandate, with sessions under both processes increasingly reflecting a systemic approach while retaining this focus. Outside the UNFCCC, meanwhile, related terminology has continued to evolve, from the food security definition endorsed by the World Food Summit in 1996, to IPCC's Sixth Assessment Report and Special Report on Climate Change and Land, and FAO's own Council-endorsed shift towards the broader concept of "*agrifood systems*". This evolution has fed into complex discussions, and divergences, around the concepts used under the SJWA.

As the four-year period of the SJWA reaches its reporting milestone at the UNFCCC's 31st Conference of the Parties (COP31), conceptual clarity on these terms may be helpful in supporting

Parties to build consensus on the future consideration of climate action on agriculture and food security under the UNFCCC. This note aims to provide greater clarity by distinguishing the boundaries, activities and purposes of the different concepts as they are used across relevant settings. It draws on IPCC terminology, concepts evolved over time and agreed by FAO Members, and the latest available data and reports to clarify how these concepts are understood and applied, including their relevance to GHG emissions, climate finance, and national plans, providing Parties with a common evidence-based reference.

1. Reference definitions

1.1 Definitions and concepts in the IPCC

The concepts of agriculture and land use, land-use change and forestry (LULUCF) have a specific methodological and reporting treatment in the context of national greenhouse gas (GHG) inventories. The Intergovernmental Panel on Climate Change (IPCC) Guidelines for National Greenhouse Gas Inventories used to address these separately. However, they were later merged under one sector in the 2006 IPCC Guidelines, the so-called agriculture, forestry and other land use (AFOLU) sector, while remaining separate for reporting to the United Nations Framework Convention on Climate Change (UNFCCC) and the Enhanced Transparency Framework (ETF) under the Paris Agreement. At the same time, IPCC assessment reports have progressively considered these concepts in relation to broader issues and climate change, including food production, food security, livelihoods and, more recently, food systems. This section distinguishes between the inventory and reporting classification of agriculture and land use and the broader concepts and interlinkages considered in IPCC assessments, which are addressed in the following subsections.

Evolution of the IPCC Guidelines for Agriculture and Land Use

Under the Revised 1996 IPCC Guidelines (IPCC, 1997), **agriculture** is categorized as one of the sectors for estimating and reporting national GHG inventories, covering non-carbon dioxide (CO_2) emissions directly associated with crop and livestock production. These comprise methane (CH_4) from enteric fermentation and rice cultivation, CH_4 and nitrous oxide (N_2O) from manure management, direct and indirect N_2O from agricultural soils, and non-CO_2 emissions from prescribed burning of savannahs and field burning of agricultural residues. Emissions and removals from land were covered by a separate land-use change and forestry (LUCF) sector.

The **land use, land-use change and forestry** (LULUCF) sector was first introduced by the IPCC Good Practice Guidance for Land Use, Land-Use Change and Forestry (IPCC, 2003). It adopted a land-based approach, through six main land-use categories (i.e. forest land, cropland, grassland, wetlands, settlements and other land) designed to represent all land areas within a country. It also introduced "managed land"[1] as a proxy for anthropogenic emissions and removals. LULUCF covers mainly CO_2 emissions and removals using as a proxy the carbon stock changes occurring in the carbon pools, such as biomass, dead organic matter and soils on managed land, as well as non-CO_2 emissions. These are estimated for each carbon pool within each land-use category, following a proper stratification (e.g. distinguishing between land remaining in the same land use and land converted to another use).

The 2006 IPCC Guidelines (IPCC, 2006) introduced **Agriculture, Forestry and Other Land Use (AFOLU)** as a single, unified sector for estimating and reporting anthropogenic GHG emissions and removals by sinks occurring on managed land. They also refined methods and parameters from previous guidelines. For reporting to the UNFCCC and the ETF, however, national GHG inventories keep agriculture and LULUCF as separate sectors, with agriculture covering the non-CO_2 sources described above, together with CO_2 emissions from liming, urea application and other carbon-containing fertilizers.

[1] Under the 2006 IPCC guidelines, "managed land" refers to land where human interventions and practices have been applied to perform production, ecological or social functions (IPCC, 2006).

The IPCC Guidelines provide methodological guidance for developing national GHG inventories across the inventory sectors, including agriculture and land use. Defining broader concepts such as food security or food systems falls outside their scope. These concepts therefore do not form part of the mandatory inventory reporting framework, which focuses on the estimation and reporting of GHG emissions and removals by sector.

Food security

In its early assessment cycles, the IPCC focused mainly on the impacts of climate change on food production, crop yields, and supply availability. While the term food security appeared in broader context, the reports did not explicitly reference or structure their assessment around its multidimensional definition. The contribution of the Working Group II to the Fifth Assessment Report of the IPCC (AR5), particularly Chapter 7 on Food Security and Food Production Systems (Porter *et al.*, 2014) was among the first IPCC assessments that explicitly referenced the comprehensive definition of food security adopted at the 1996 World Food Summit, retained in the IPCC Special Report on Climate Change and Land (SRCCL) on chapter 5 (Mbow *et al.*, 2019) and subsequent IPCC reports. The Sixth Assessment Report (AR6) further emphasized the nutrition dimensions of food security, concluding with high confidence that climate impacts on food availability and nutritional quality will increase the number of people at risk of hunger, malnutrition and diet-related mortality (Bezner *et al.*, 2022).

Food security is defined as a "*situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life*" (FAO, 1996). The widely accepted World Food Summit (1996) definition reinforces the multidimensional nature of food security, comprising the four dimensions of food availability, access, utilization and stability, described as follows:

- **Food availability:** The availability of sufficient quantities of food of appropriate quality, supplied through domestic production or imports (including food aid).
- **Food access:** Access by individuals to adequate resources (entitlements) for acquiring sufficient, safe and nutritious foods to meet their dietary needs and food preferences for an active and healthy life. Entitlements are defined as the set of all commodity bundles over which a person can establish command given the legal, political, economic and social arrangements of the community in which they live (including traditional rights such as access to common resources).
- **Utilization:** Utilization of food through adequate diet, clean water, sanitation and health care to reach a state of nutritional well-being where all physiological needs are met. This brings out the importance of non-food inputs in food security.
- **Stability:** To be food secure, a population, household or individual must have access to adequate food at all times. They should not risk losing access to food as a consequence of sudden shocks (e.g. an economic or climatic crisis) or cyclical events (e.g. seasonal food insecurity). The concept of stability can therefore refer to both the availability and access dimensions of food security.

The same definition is mentioned in further IPCC reports including the Special Report on Climate Change and Land (Shukla *et al.*, 2019; and Mbow *et al.*, 2019;) and the IPCC Sixth Assessment Report (2022).

Food systems

Similarly, the concept of food system was discussed more extensively in the contribution of Working Group II to the Fifth Assessment Report of the IPCC, particularly in Chapter 7 on Food Security and Food Production Systems, focusing on the impacts of climate on both production and non-production elements[2] and their adaptation to climate change (Porter *et al.*, 2014). The report defines the **food system** as "*all processes and infrastructure involved in satisfying a population's food security, that is, the gathering/catching, growing,*

[2] Porter *et al.* (2014) noted that most work since AR4 had remained focused on food production and had not addressed other aspects of the food system that connect climate change to food security, such as processing, distribution, access and consumption. These aspects had by then become research areas in their own right but remained only tangentially linked to climate change.

harvesting (production aspects), storing, processing, packaging, transporting, marketing, and consuming of food, and disposing of food waste (non-production aspects). It includes food security outcomes of these activities related to availability and utilization of, and access to, food as well as other socioeconomic and environmental factors".

The IPCC Special Report on Climate Change and Land (SRCCL) deepens this analysis. Chapter 5 on Food Security defines the **food system** as encompassing "*all the activities and actors in the production, transport, manufacturing, retailing, consumption, and waste of food, and their impacts on nutrition, health and well-being, and the environment*" (Mbow *et al.*, 2019). The report also draws on the definition of the High Level Panel of Experts on Food Security and Nutrition (HLPE, 2017), which describes the food system as "*all the elements (environment, people, inputs, processes, infrastructures, institutions, etc.) and activities that relate to the production, processing, distribution, preparation and consumption of food, and the output of these activities, including socio-economic and environmental outcomes*". It further notes that, while a global food system encompasses the totality of global production and consumption, each location's food system is unique, shaped by its particular mix of food produced locally, nationally, regionally or globally (Mbow *et al.*, 2019).

This systems approach[3] was further developed in the contribution of Working Group II to the Sixth Assessment Report, particularly Chapter 5 on Food, Fibre and Other Ecosystem Products (Bezner *et al.*, 2022), which describes the **food system** in terms of "*a supply (production) and demand (consumption) side, connected via processing, trade and retail, with loss and waste streams all along the food chain*".

1.2 Concepts in the UNFCCC context

Within the UNFCCC process, terminology relating to agriculture has broadened over time, encompassing references to food production, agriculture, food security, food production systems and, increasingly, food systems, alongside more specific terms used in different policy and technical contexts (See Annex 1). However, it is important to note that these terms are not subject to commonly agreed definitions within the UNFCCC process and may therefore be used with varying scope and meaning across different contexts. Section 1.2 provides a brief review of how this terminology has evolved and is applied across the UNFCCC process, including the different contexts in which these terms are used.

Agriculture, food production, and food security in the Convention and the Paris Agreement

The UNFCCC, adopted in 1992 in the context of the Rio Earth Summit and in force since 1994, establishes in Article 2 the objective of stabilizing GHG concentrations at a level that would prevent dangerous anthropogenic interference with the climate system. Importantly, the Convention recognizes that this objective should be achieved within a time frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that **food production** is not threatened and to enable economic development to proceed in a sustainable manner (UNFCCC, 1992). **Agriculture** is explicitly referenced in the Article 4 of the Convention, which sets out the commitments of the Parties. These references establish agriculture as relevant to both climate change mitigation and adaptation.

- Article 4.1 (c) calls on Parties to "*promote and cooperate in the development, application and diffusion, including transfer, of technologies, practices and processes that control, reduce or prevent anthropogenic emissions of greenhouse gases not controlled by the Montreal Protocol*". Agriculture and forestry are identified among the sectors in which such technologies, practices and processes are relevant, placing agriculture within the broader sectoral context of efforts to reduce GHG emissions.
- Article 4.1 (e) provides a more specific reference to agriculture in the context of adaptation. It calls on Parties to cooperate in preparing for adaptation to the impacts of climate change, including through "*the development of appropriate and integrated plans for coastal zone management, water resources*

[3] The SRCCL adopts a food systems approach to assess how climate change affects food security, including nutrition, as well as the adaptation and mitigation options available within the food system, their synergies and trade-offs, and the enabling conditions for their adoption. It recognizes that food demand and supply are interlinked and must be assessed jointly to identify the challenges of climate change adaptation and mitigation (Mbow *et al.*, 2019).

*and **agriculture**, and for the protection and rehabilitation of areas affected by drought and desertification, as well as floods*". This provision explicitly recognizes agriculture as an area requiring integrated planning and adaptation action in response to climate impacts.

The Paris Agreement (UNFCCC, 2015) does not explicitly use the term agriculture, but it gives clear recognition to **food security** and food production in the context of climate action. Its Preamble recognizes "*the fundamental priority of safeguarding food security and ending hunger*" and introduces the broader term of **food production systems,** acknowledging "*the particular vulnerability of food production systems to the adverse impacts of climate change*". Article 2.1 (b) maintains the Convention's reference to food production, including among the Agreement's aims increasing the ability to adapt to the adverse impacts of climate change and fostering climate resilience and low GHG emissions development "*in a manner that does not threaten food production*". However, neither the Paris Agreement nor the Convention explicitly defines these terms or what they entail.

Agriculture in UNFCCC reporting

The term agriculture is addressed through the categories of the IPCC for national greenhouse gas inventories and through the reporting requirements set out under the Convention and Article 13 of the Paris Agreement.

For Parties to the Paris Agreement, which include nearly all Parties to the Convention, GHG inventory reporting now takes place under the Enhanced Transparency Framework (ETF), superseding earlier arrangements for Annex I and non-Annex I Parties.[4]

Under the ETF, all Parties follow common Modalities, Procedures and Guidelines (MPGs), adopted by Decision 18/CMA.1 (UNFCCC, 2018), with flexibility for developing country Parties that need it in light of their capacities. All Parties are required to prepare their GHG inventories using the 2006 IPCC Guidelines, or any subsequent version agreed by the Conference of the Parties to the Paris Agreement (CMA), covering the energy, industrial processes and product use, agriculture, LULUCF and waste sectors. They report every two years through Biennial Transparency Reports (BTRs),[5] which replace the biennial reports and biennial update reports (Decision 1/CP.24). In their BTRs, Parties also report on sectoral policies and measures in tracking progress towards their Nationally Determined Contributions (NDCs), as well as on climate change impacts and adaptation under Article 7 of the Paris Agreement,[6] and, as applicable, on financial, technology transfer and capacity-building support provided, mobilized, needed and received.

National communications continue every four years under the Convention, following guidance under Decision 6/CP.25 for Annex I Parties and Decision 17/CP.8 for non-Annex I Parties, and may be submitted with their BTR as a single report (Decision 1/CP.24). Through both instruments, agriculture is addressed not only in terms of GHG emissions and removals, but also across mitigation, adaptation and means of implementation.

These classifications and reporting requirements provide an important basis for understanding how agriculture and related land-use activities are defined and addressed within the UNFCCC process and linked to the IPCC inventory categories described in the previous section. Understanding these different classifications and reporting dimensions is therefore essential for clarifying the scope of agriculture within the UNFCCC process and its relationship to the broader concepts of food production, food security and food systems discussed elsewhere in this chapter.

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[4] Under the Convention, Annex I Parties are required to prepare their annual GHG inventories using the 2006 IPCC Guidelines (IPCC, 2006), in accordance with Decision 24/CP.19, while non-Annex I Parties are required to use the Revised 1996 IPCC Guidelines (IPCC, 1996) and are encouraged to apply the IPCC good practice guidance (Decisions 17/CP.8 and 2/CP.17). Under the ETF, all Parties use the 2006 IPCC Guidelines, or any subsequent version agreed by the CMA (Decision 18/CMA.1).

[5] The national inventory report (NIR) may be submitted as a component of the BTR or as a stand-alone report. Developed country Parties continue to submit their NIR annually, prepared in accordance with the MPGs.

[6] According to the Secretariat's first synthesis of biennial transparency reports and national inventory reports (UNFCCC, 2025), food security and nutrition was the area most frequently reported by Parties to the Paris Agreement for implemented adaptation action. Parties also identified it among the sectors most vulnerable to observed and potential climate change impacts, alongside health, water resources, terrestrial ecosystems, and urban areas and settlements. See also Murádas *et al.* (2026) for a deeper analysis of adaptation and loss and damage (L&D) reporting in the first BTRs.

Other agriculture-related terminology in the UNFCCC

Agriculture is addressed through a range of related terms whose scope and purpose vary across the UNFCCC process (see Annex 1). *Food production systems* have been primarily referenced in relation to their vulnerability to climate change and the need for context-specific solutions. The terms *farming systems* and *agricultural systems* have been used in relation to agricultural practices, technologies, productivity, food security and resilience, taking into account geographical and national differences, as well as adaptation co-benefits. *Food security* is recognized as a key objective of climate action on agriculture, while *food and nutrition security* has been used in the context of inclusive, sustainable, and climate-resilient agricultural systems, and of ensuring its equitable access for all.

The term *food systems* is not defined in UNFCCC decisions, but it has been used in several contexts encompassing interconnected dimensions beyond primary production. Decisions have referred to the limited resilience to climate change, and to the socioeconomic and food security dimensions of climate action in agriculture and food systems, including the needs of farmers. They also highlight its high potential for adaptation, adaptation co-benefits and mitigation, such as reducing food loss and waste, with positive direct and indirect links to biodiversity and ecosystem services, food security and the Sustainable Development Goals. Food systems are further identified among integrated, multisectoral solutions offering economic, social and environmental benefits. More recently, the term appears in relation to financing, underscored as essential for accelerating climate action and resilience, including for protecting biodiversity and supporting vulnerable communities, and to water–energy–food systems in the context of technology. More specific terms, such as *food and agricultural production, supply and distribution of food and agrifood sector*, are also used in particular contexts, including adaptation and the targets under the Global Goal on Adaptation[7] (see Annex 1). Beyond the mandated processes, agriculture and food systems also feature prominently in the COP30 Action Agenda led by the Presidency, whose Axis 3 on *Transforming Agriculture and Food Systems* focuses on land restoration and sustainable agriculture, more resilient, adaptive and sustainable food systems, and equitable access to adequate food and nutrition for all.

Overall, terminology remains varied and context-specific, with different terms highlighting different dimensions of the relationship between agriculture, food and climate change, yet without agreed definitions.

1.3 Definitions and concepts by the Food and Agriculture Organization of the United Nations

Agriculture

The FAO Constitution, in Article XVI, as approved by 193 Member Nations and one Member organization, states that the term **agriculture** and its derivatives include fisheries, marine products, forestry, and primary forestry products (FAO, 2017).

Food security

The concept of food security, applied by FAO, has evolved significantly since it was first defined at the 1974 World Food Conference, moving progressively from an initial focus on global food supply to the recognition of access, utilization and stability as equally central dimensions, culminating in the 1996 World Food Summit definition that remains the consensus in use today (FAO, 2006).

The concept of **food security** is defined as a situation when "*all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life. The four pillars of food security are availability, access, utilization and stability. The nutritional dimension is integral to the concept of food security.*" (CFS, 2009). The 2009 World Summit on Food Security reaffirmed this concept and further clarified that the nutritional dimension is integral to food security, while acknowledging the additional and severe risks posed by climate change (CFS, 2009).

[7] See target 9(b) of the UAE Framework for Global Climate Resilience (Decision 2/CMA.5) on "*attaining climate-resilient food and agricultural production and supply and distribution of food, as well as increasing sustainable and regenerative production and equitable access to adequate food and nutrition for all*", and its set of five indicators, including indicator 9(b)-e on equitable access to adequate food and nutrition (Decision 12/CMA.7, Annex). For more information see also Zehra *et al.* (2026).

In 2020, the High Level Panel of Experts on Food Security and Nutrition (HLPE) of the Committee on World Food Security (CFS) proposed two additional dimensions of food security, agency and sustainability, alongside the four established dimensions of availability, access, utilization and stability (HLPE, 2020). This broader six-dimensional understanding has since been increasingly reflected in FAO and HLPE analytical and policy work,[8] although the six-dimensional framework has not formally replaced the established four-dimension definition through a CFS-endorsed definition.

Food systems and agrifood systems

There is no single agreed definition of food systems among FAO Members. However, the term has been increasingly used across FAO work, drawing on different conceptual frameworks and definitions, including the definition developed by the HLPE.

The HLPE has progressively developed a food systems framework that recognizes the interlinkages between food production, processing, distribution and consumption, and nutritional and broader environmental, economic and social outcomes. The HLPE (2014) defines **food systems** as "*all the elements (environment, people, inputs, processes, infrastructures, institutions, etc.) and activities that relate to the production, processing, distribution, preparation and consumption of food, and the output of these activities, including socio-economic and environmental outcomes*". This systems approach was further developed in the HLPE 2017 report (HLPE, 2017), which reflects the need to go beyond food availability alone and address the four dimensions of food security.[9] The relevance of this approach has since been reaffirmed across the United Nations system, with food systems identified as one of six key transitions for accelerating progress towards the 2030 Agenda and the Sustainable Development Goals (SDGs) (United Nations Sustainable Development Group, 2023). It should be noted, however, that this framework was not conceived in the context of climate change, nor in relation to the categories used for reporting GHG emissions and removals under the UNFCCC.

Building on the systemic evolution of the food security and food systems concepts, FAO's 166th Council Session (2021) encouraged a holistic approach to accelerate the transformation of **agrifood systems,** to be implemented at country level in a coherent manner, as appropriate, according to, and dependent on, national contexts and capacities, formally adopting the term to cover "*the journey of food from farm to table – including when it is grown, fished, harvested, processed, packaged, transported, distributed, traded, bought, prepared, eaten and disposed of. It also encompasses non-food products that also constitute livelihoods and all of the people as well as the activities, investments and choices that play a part in getting us these food and agricultural products*" (FAO, 2021). Agrifood systems thus offer a broader lens than agriculture or food systems alone, encompassing not only food production but also non-food agricultural, fisheries and forestry products, such as biofuels, fibres, wood and non-wood forest products and marine products, consistent with the scope of "agriculture" already recognized in the FAO Constitution (FAO, 2017). These non-food products remain an integral part of agrifood systems, as they contribute to rural economies and livelihoods and are closely interconnected with food security through their influence on the management and sustainable use of land, water and other natural resources (FAO, 2026).

A systems-level view enables decision makers to prioritize and combine responses that generate value across multiple, interconnected functions, reinforcing the implementation of climate actions to realize the full potential of inclusive, climate-resilient and low-carbon agrifood systems (FAO, 2025b). This framing has progressively reshaped FAO's technical products. Analyses previously framed under "agriculture" alone, such as FAOSTAT's GHG emissions estimates, FAO's analysis of NDCs, and climate-related development finance, among others, have since been reoriented around agrifood systems, extending their scope to include land-use change and pre- and post-production processes along the full value chain (see Annex 2).

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[8] Building on the four pillars and the inclusion of agency and sustainability as additional dimensions of food security, efforts to achieve food security should promote access to healthy diets. According to the FAO/WHO joint statement, healthy diets are founded on four core principles: adequacy, balance, moderation and diversity, with food safety as an essential prerequisite (WHO and FAO, 2024).

[9] This perspective was further reinforced by the Voluntary Guidelines on Food Systems and Nutrition (CFS, 2021), which recognize that food systems should contribute to healthy diets and improved nutrition outcomes, highlighting the need to align food production, processing, distribution, marketing and consumption with nutrition objectives.

TABLE 1: Overview of the four concepts: agriculture, food security, food systems and agrifood systems

Concept	Definition	Core focus	References
Agriculture	In the FAO Constitution, the term "*agriculture*" and its derivatives include fisheries, marine products, forestry, and primary forestry products. No commonly agreed definition under the UNFCCC, but formally addressed as a GHG inventory category, covering direct emissions from livestock (enteric fermentation, manure management), rice cultivation, prescribed burning of savannahs and field burning of agriculture residues, and direct and indirect N_2O emissions from managed soils, CO_2 emissions from liming, urea application and other carbon containing fertilizers.	FAO Constitution: crops, livestock, fisheries, aquaculture and forestry. IPCC inventory category: Agriculture, reported separately from Land-use, Land-Use Changes and Forestry (LULUCF).	FAO, 2017 IPCC, 1996, 2006
Food security	*Food security exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life*. The four pillars of food security are availability, access, utilization and stability. *The nutritional dimension is integral to the concept of food security*. No commonly agreed definition under the UNFCCC but referenced in multiple decisions and mandated processes (see Annex 1).	A multidimensional outcome for individuals and populations, recognized across four interrelated dimensions: availability, access, utilization, stability, with agency and sustainability proposed as two additional dimensions.	FAO, 1996, CFS, 2009 HLPE, 2020
Food systems	*All the elements (environment, people, inputs, processes, infrastructures, institutions, etc.) and activities that relate to the production, processing, distribution, preparation and consumption of food, and the output of these activities, including socio-economic and environmental outcomes* (HLPE, 2017). *All processes and infrastructure involved in satisfying a population's food security, that is, the gathering/catching, growing, harvesting (production aspects), storing, processing, packaging, transporting, marketing, and consuming of food, and disposing of food waste (non-production aspects). It includes food security outcomes of these activities related to availability and utilization of, and access to, food as well as other socioeconomic and environmental factors* (Porter *et al.*, 2014). *All the activities and actors in the production, transport, manufacturing, retailing, consumption, and waste of food, and their impacts on nutrition, health and well-being, and the environment* (Mbow *et al.*, 2019). *A supply (production) and demand (consumption) side, connected via processing, trade and retail, with loss and waste streams all along the food chain* (Bezner *et al.*, 2022). No commonly agreed definition under the UNFCCC but referenced in multiple decisions and mandated processes (see Annex 1).	The chain of actors and activities linking food production to consumption, and the socioeconomic and environmental outcomes of these interactions; also adopted by the IPCC (AR6) as an analytical frame.	HLPE, 2017 Porter *et al.*, 2014; Shukla *et al.*, 2019; Mbow *et al.*, 2019; IPCC, 2022a, 2022b; Bezner *et al.*, 2022
Agrifood systems	FAO terminology: *Journey of food from farm to table – including when it is grown, fished, harvested, processed, packaged, transported, distributed, traded, bought, prepared, eaten and disposed of. It also encompasses non-food products that also constitute livelihoods and all of the people as well as the activities, investments and choices that play a part in getting us these food and agricultural products*.	The full network from primary production (crops, livestock, forestry, fisheries and aquaculture) through aggregation, processing, distribution, consumption and disposal, including non-food products and the economic, social and environmental systems in which production is embedded.	FAO, 2021, 2025, 2026

Source: Authors' own elaboration based on multiple sources. For a full list of sources, please see the References section.

2. What each concept covers

Agriculture is classified and reported as a separate sector in national GHG inventories prepared in accordance with the MPGs and covering emissions from crop and livestock production. In reporting to the UNFCCC, its emissions are estimated mandatorily using the 2006 IPCC Guidelines, while countries may use the 2019 IPCC Refinement (IPCC, 2006; 2019) on a voluntary basis. The sources of emissions reported under the agriculture sector include enteric fermentation, manure management, rice cultivation, direct and indirect N_2O from managed soils, prescribed burning of savannahs and field burning of agricultural residues, as well as CO_2 from liming, urea application and other carbon-containing fertilizers. Inventory sectors group related processes, sources and sinks, rather than economic activities, ensuring comparability across countries. As a result, emissions from activities linked to agriculture, such as on-farm fuel use, irrigation pumping, fertilizer manufacture, processing and transport, are reported under other sectors, including energy, industrial processes and product use (IPPU) and waste. Similarly, mainly carbon stock changes (i.e. CO_2) on agricultural land are reported under LULUCF, even though they are closely linked to agricultural production and livelihoods.

According to the IPCC Sixth Assessment Report (IPCC, 2022b), AFOLU accounted for 22 percent (13 $GtCO_2$-eq) of global net anthropogenic GHG emissions in 2019 (59 $GtCO_2$-eq). About 51 percent of this corresponded to net CO_2 from LULUCF and about 49 percent to agricultural CH_4 and N_2O (Dhakal *et al.*, 2022). Over 2010–2019, AFOLU accounted for 41 percent of global CH_4 and 69 percent of global N_2O emissions, almost entirely from agriculture (Nabuurs *et al.*, 2022). In FAO GHG emissions estimates,[10] crop and livestock production are included in the farm-gate emissions,[11] which totalled 8.1 Gt CO_2eq in 2023 (49 percent of agrifood systems emissions). Livestock is the largest single component (4.3 Gt CO_2eq), mainly from methane (CH_4) generated in enteric fermentation and nitrous oxide (N_2O) from manure, followed by crops (1.5 Gt CO_2eq) (FAO, 2025a; See Annex 3). Agriculture features also as a priority in national climate plans and policies. Crop-based systems are prioritized for adaptation and mitigation in 78 percent of latest NDCs, and livestock systems in 72 percent (Crumpler *et al.*, forthcoming). In developing-country NAPs, climate impacts on crops are reported in 94 percent and on livestock and grasslands in 75 percent. All NAPs also include adaptation actions for crops, and 83 percent include actions for livestock (Crumpler *et al.*, 2025). Despite their central place in national planning, food-producing sectors (crops, livestock, forestry and fisheries) received only 5 percent of total climate-related development finance in 2024 (Caputo *et al.*, forthcoming).

Food security is a multidimensional outcome, entailing availability, access, utilization and stability (HLPE, 2017). While agricultural production contributes directly to availability, food security also depends on factors outside the IPCC agriculture boundary, such as fisheries, aquaculture, processing, storage, trade and markets (availability); incomes and prices (access); food safety and water and sanitation (utilization); and system-wide resilience to shocks (stability). An estimated 7.8 percent of the global population (around 645 million people) faced hunger in 2025, down from 8.1 percent in 2024 and 8.6 percent in 2022. In 2025, an estimated 2.1 billion people (25.8 percent of the global population) were moderately or severely food insecure, down from 28.7 percent in 2020 (FAO *et al.*, 2026). Climate impacts on food security and nutrition are reported in 56 percent of NDCs and 83 percent of developing-country NAPs (Crumpler *et al.*, 2025; forthcoming). Yet food security and nutrition represent only 1 percent of agrifood finance needs in NAPs and received less than 1 percent of total climate-related development finance in 2024 (Caputo *et al.*, forthcoming).

Agrifood systems offer a broader lens than agriculture or food security alone, capturing the full range of opportunities for climate action. By taking a systems-level view, decision makers can prioritize and combine responses that generate value across interconnected functions, realizing the full potential of inclusive,

[10] FAOSTAT provides country, regional and global estimates of agrifood systems emissions, computed using the Tier 1 methods of the IPCC Guidelines for National Greenhouse Gas Inventories. Estimates cover agriculture production processes for the 1961–2023 period and are based on activity data officially reported by countries to FAO, such as livestock numbers, harvested area and fertilizer use. Land-use and land-use change emissions and removals are instead generally available only for the period 1990–2024 (see Annex 3).

[11] FAOSTAT emissions domains do not always match UNFCCC reporting categories. FAO (2025a) groups agrifood systems emissions into three components: farm gate, land-use change, and pre- and post-production. Farm-gate emissions, for example, include crop and livestock production, on-farm energy use, drained organic soils and savanna fires. In national GHG inventories, these are split across different sectors.

climate-resilient and low-carbon agrifood systems (FAO, 2025b). This framing has also reshaped FAO's technical products. FAOSTAT emissions estimates, NDC analyses and climate-related development finance tracking, previously framed around agriculture, now cover land-use change and pre- and post-production processes along the full value chain (see Annex 3). On this basis, FAO estimates agrifood systems emissions in 2023 at 16.5 Gt CO_2eq, about one-third (32 percent) of global GHG emissions. Pre- and post-production processes accounted for 32 percent of this total (5.2 Gt CO_2eq), while land-use change, principally deforestation, accounted for 19 percent (3.2 Gt CO_2eq) (FAO, 2025a).

Agrifood systems are increasingly central to national climate priorities. Nearly all NDCs (93 percent) include agrifood systems, recognizing their role in delivering climate solutions and their vulnerability to climate change, while 86 percent report climate impacts on them. However, only 16 percent of latest NDCs refer to implementation plans and 24 percent to financing plans covering these sectors, which account for 18 percent of total NDC finance needs (Crumpler *et al.*, forthcoming). In developing-country NAPs, agrifood systems account for 54 percent of identified adaptation finance needs but receive only 20 percent of adaptation finance (FAO and UNDP, 2025). Their share of climate-related development finance fell from 24 percent in 2015 to 19 percent in 2024, with a 10 percent decline in 2024 compared with 2 percent across all sectors.

Annex 2 provides a brief, non-exhaustive overview of key evidence from FAO reports and analysis. It shows how crops, livestock, forestry, fisheries and aquaculture, environment and biodiversity, and food security and nutrition feature in FAO's analysis of GHG emissions, NDCs, NAPs and climate-related development finance.

3. Conclusions

This paper examined how agriculture, food security, food systems and agrifood systems are defined and applied across the FAO, IPCC and UNFCCC. The comparison shows that each term has served different purposes and has therefore developed different boundaries and functions in each context. In the IPCC and UNFCCC, agriculture is primarily structured around sectoral classification and the measurement and reporting of greenhouse gas emissions and removals. Food security and food systems, by contrast, have been progressively addressed in IPCC assessments and special reports as broader analytical concepts. Under the UNFCCC, food security and food systems have begun to feature in different workstreams, but without a common definition or methodological basis for reporting. FAO applies all four terms more broadly, to support analysis and policy development on food security, nutrition, livelihoods, sustainable development and the transformation of agrifood systems. These differences should not necessarily be read as inconsistencies, but as reflecting distinct institutional mandates, objectives and analytical purposes. At the same time, the comparison underlines the importance of clarifying the scope and intended use of each term when it is brought into the UNFCCC context, particularly as discussions broaden to encompass food security, adaptation and resilience, sustainable development and the implementation of climate action, recognizing that solutions are context-specific and take into account national circumstances.

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ANNEXES. Summary of key data

ANNEX 1. Non-exhaustive overview of the use of concepts under the UNFCCC and the Paris Agreement

Illustrative examples of the use of "agriculture", "food production", "food production systems", "food security" and "food systems" in the Convention and the Paris Agreement

Concept	Mention	References
Agriculture	*"Promote and cooperate in the development, application and diffusion, including transfer, of technologies, practices and processes that control, reduce or prevent anthropogenic emissions of greenhouse gases not controlled by the Montreal Protocol in all relevant sectors, including the energy, transport, industry, **agriculture**, forestry and waste management sectors"*	Article 4.1 (c), UNFCCC (1992)
	*"Cooperate in preparing for adaptation to the impacts of climate change; develop and elaborate appropriate and integrated plans for coastal zone management, water resources and **agriculture**, and for the protection and rehabilitation of areas, particularly in Africa, affected by drought and desertification, as well as floods"*	Article 4.1 (e), UNFCCC (1992)
	*"Implement and/or further elaborate policies and measures in accordance with its national circumstances, such as: (...) (iii) Promotion of sustainable forms of **agriculture** in light of climate change considerations"* *"Formulate, implement, publish and regularly update national and, where appropriate, regional programmes containing measures to mitigate climate change and measures to facilitate adequate adaptation to climate change: (i) Such programmes would, inter alia, concern the energy, transport and industry sectors as well as **agriculture**, forestry and waste management"*	Decision 1/CP.3 (adoption of the Kyoto Protocol), Article 2, para. 1 (a) (iii); Article 3, para. 4; Article 10, para. 1 (b) (i); Annex A (sectors/source categories).
	*"Starting to implement adaptation activities promptly where sufficient information is available to warrant such activities, inter alia, in the areas of water resources management, land management, **agriculture**, health, infrastructure development, fragile ecosystems, including mountainous ecosystems, and integrated coastal zone management"*	Decision 5/CP.7, para. 8 (a), (Implementation of Article 4 of the Convention)
	*"Decides also that a special climate change fund shall be established to finance activities, programmes and measures, relating to climate change (...), in the following areas (...) (c) Energy, transport, industry, **agriculture**, forestry and waste management (...)"*	Decision 7/CP.7, para. 2 (c)
	*"Non-Annex I Parties should use the Revised 1996 Intergovernmental Panel on Climate Change (IPCC) Guidelines for National Greenhouse Gas Inventories (...) for estimating and reporting their national GHG inventories" "Table 1 (...) Greenhouse gas source and sink category: 4. **Agriculture**"*	Decision 17/CP.8 (Guidelines for the preparation of national communications from Parties not included in Annex I to the Convention)
	*"Promoting the transfer of technologies for adaptation under decision 5/CP.7, paragraph 7 (b) (iv), on an urgent basis in priority sectors, including **agriculture** and water resources, for example through the exchange of experiences and lessons learned in enhancing resilience to the adverse effects of climate change in key sectors"*	Paragraph 5 (b) (iii), Decision 1/CP.10 (Buenos Aires Programme of work on adaptation and response measures)
	*"Requests the Subsidiary Body for Scientific and Technological Advice to consider **issues related to agriculture** at its thirty-sixth session, with the aim of exchanging views and the Conference of the Parties adopting a decision on this matter at its eighteenth session"*	Paragraph 75, Decision 2/CP.17 (Introduction of agenda item on issues related to agriculture)

Concept	Mention	References
Agriculture	*"Each Annex I Party shall provide information on its mitigation actions, including on the policies and measures it has implemented or plans to implement since its last national communication or biennial report to achieve its economy-wide emission reduction target. To the extent appropriate, Parties shall organize the reporting of mitigation actions by sector (energy, industrial processes and product use,* ***agriculture****, LULUCF, waste and other sectors) and by gas (carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons and sulphur hexafluoride)"*	Annex I, Decision 2/CP.17 (Annex I reporting requirement)
	"Annex I Parties may report as a memo item indirect N_2O emissions from other than the ***agriculture*** *and LULUCF sources"* *Outline and general structure of the national inventory report. Chapter 5:* ***Agriculture*** *(CRF sector 3); Chapter 6: Land use, land-use change and forestry (CRF sector 4)*	Para. 29 and Appendix, Decision 24/CP.19 (UNFCCC reporting guidelines on annual inventories for Parties included in Annex I)
	"Each Party shall report the following sectors: energy, industrial processes and product use, ***agriculture****, LULUCF and waste, according to the IPCC guidelines referred to in paragraph 20 above"* *"(...). Each Party should report indirect N_2O emissions from sources other than those in the* ***agriculture*** *and LULUCF sectors as a memo item"* *"To the extent possible, Parties shall organize the reporting of actions by sector (energy, transport, industrial processes and product use,* ***agriculture****, LULUCF, waste management and other)"* Among others	Decision 18/CMA.1, paras. 50, 51, 81, 82 (f), 109 (b), 123 (i), 124 (l), 125 (h) (Modalities, procedures and guidelines) 2. Sectors and gases; III. D. Mitigation policies and measures, actions and plans; IV. D. Adaptation strategies, policies, plans, goals and actions; V. C. 1, 2 and 3. Information on financial support provided and mobilized
	"Welcomes the work of the Technology Executive Committee in 2014 on technologies for adaptation, including the TEC Briefs on technologies for adaptation in the ***agriculture*** *and water sectors (...)"*	Paragraph 7, Decision 17/CP.20
	"Requests the Subsidiary Body for Scientific and Technological Advice and the Subsidiary Body for Implementation to jointly address issues related to ***agriculture****, including through workshops and expert meetings, working with constituted bodies under the Convention and taking into consideration the vulnerabilities of agriculture to climate change and approaches to addressing food security"*	Decision 4/CP.23 (landmark decision on the KJWA)
	"Requests the Subsidiary Body for Scientific and Technological Advice and the Subsidiary Body for Implementation to establish the four-year Sharm el-Sheikh joint work on implementation of climate action on ***agriculture and food security,*** *including implementation of the outcomes of the Koronivia joint work on agriculture and previous activities addressing issues related to agriculture (...)"*	Decision 3/CP.27 (SJWA)

Concept	Mention	References
Agricultural systems	*"Workshop on the current state of scientific knowledge on how to enhance the adaptation of agriculture to climate change impacts while promoting rural development, sustainable development and productivity of **agricultural systems** and food security in all countries, particularly in developing countries, taking into account the diversity of the **agricultural systems** and the differences in scale as well as possible adaptation co-benefits"*	FCCC/SBSTA/2013/L.35, as well as in FCCC/ SBSTA/2013/L.20 FCCC/SBSTA/2014/L.14
	KJWA Workshop on topic 2(d): *"Improved nutrient use and manure management towards sustainable and resilient **agricultural systems**"*	Decisions 4/CP.23 (KJWA)
	*"Also recognized the fundamental priority of safeguarding food security and ending hunger by designing sustainable and climate-resilient **agricultural systems,** applying a systemic approach in line with the long-term global climate objectives, further recognizing the importance of long-term investment in agriculture focused on this objective"*	Decision 3/CP.27 (SJWA), para. 2 (l and m)
	*"Welcomes (...) accelerating climate action and resilience through financing for sustainable food and **agricultural systems** as the topic for the 2025 Forum"*	Decision 5/CP.28, para. 12
Food production	*"The ultimate objective of this Convention and any related legal instruments that the Conference of the Parties may adopt is to achieve, in accordance with the relevant provisions of the Convention, stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system (...) ensure that **food production** is not threatened and to enable economic development to proceed in a sustainable manner"*	Article 2, UNFCCC (1992), and recalled in Decision 7/CP.20, 9/CP.20, and Decision 3/CP.27 (on the SJWA)
	Appendix B on Project design document for afforestation and reforestation project activities under the clean development mechanism; and Appendix A on Project design document for small-scale afforestation and reforestation project activities under the clean development mechanism: *"This analysis should include, where applicable, information on, inter alia, local communities, indigenous peoples, land tenure, local employment, **food production,** cultural and religious sites, and access to fuelwood and other forest products"*	Decisions 5/CMP.1, para. 2 (k) (i) Decision 6/CMP.1, para. 1. (l) (i)
	*"Increasing the ability to adapt to the adverse impacts of climate change and foster climate resilience and low greenhouse gas emissions development, in a manner that does not threaten **food production**"*	Article 2.1(b), Paris Agreement (2015), recalled in Decisions 1/CMA.5 (GST1), 3/CMA.5, 2/CMA.7 (JTWP), and referenced in Decisions 9/CMA.3 (para. 15), 5/CMA.4, and 1/CMA.6 (para. 1) (NCQG)
	*"The multisectoral and multidimensional nature of just transitions and the resultant need for whole-of-economy approaches to just transitions that engage the private sector, including micro-, small and medium-sized enterprises, and rural economy actors, especially smallholder farmers, and that contribute to the creation of decent work and quality jobs and **food production**"*	Decision 2/CMA.7 (JTWP), para. 12 (f)
Food production systems	*"Recognizing the fundamental priority of safeguarding food security and ending hunger, and the particular vulnerabilities of **food production systems** to the adverse impacts of climate change"*	Paris Agreement, preamble (para. 9) (2015) recalled in Decision 1/CMA.4, 1/CMA.5, 2/CMA.5, and Decision 1/ CP.27 and 3/CP.27 (SJWA)
	*"Highlighting that each **food production system** has its own challenges and that solutions must be context-specific and take into account national circumstances, especially if they are to be scaled up"*	Preamble (para. 8) and para. 2 (h) under Decision 3/ CP.27 (SJWA)

Concept	Mention	References
Farming systems	Discussion topic 3(d) on issues related to agriculture: "*Identification and assessment of agricultural practices and technologies to enhance productivity in a sustainable manner, food security and resilience, considering the differences in agroecological zones and* ***farming systems,*** *such as different grassland and cropland practices and systems*"	FCCC/SBSTA/2014/L.14
Food security	*"Having considered the report (...) regarding the specific needs and concerns of developing country Parties, and the specific needs and special situations of the least developed countries (...), including, inter alia, water resources,* ***agriculture*** *and* ***food security,*** *economic activities"* *"Decides that a workshop be organized (...) on the consideration of initial actions, including actions related to funding, insurance and the transfer of technology, needed to meet the specific needs and concerns of developing country Parties, and the specific needs and special situations of the least developed countries, arising from the adverse effects of climate change on, inter alia, water resources,* ***agriculture*** *and* ***food security*** *(...)"*	Decision 12/CP.5, preamble (para. 8) and para. 5
	"Capacity building is crucial to developing countries (...). The special circumstances of least developed countries and small island developing States need to be taken into account in the implementation of this framework. They include (...) (g) Inadequate ***food security***" *"A set of locally-driven criteria will be used to select priority adaptation activities.(...) These criteria for prioritization will be applied to, inter alia: (...) c)* ***food security*** *and* ***agriculture***"	Decision 2/CP.7, para. 9 (g) Decision 28/CP.7, para. 16 (c) (NAPAs)
	"*Invites all Parties to enhance action on adaptation under the Cancun Adaptation Framework (...) by undertaking, inter alia, the following: (a) Planning, prioritizing and implementing adaptation actions, including projects and programmes [footnoteRef:1] (...) "1:Including in the areas of water resources; health;* ***agriculture*** *and* ***food security*** *(...)"*	Decision 1/CP.16, para. 14 (a), note 1. (Cancun Agreement)
	"*Recognizing the fundamental priority of safeguarding* ***food security and ending hunger,*** *and the particular vulnerabilities of food production systems to the adverse impacts of climate change*"	Paris Agreement, preamble para. 9 (2015), recalled in Decisions 1/CMA.4 and 1/CMA.5 (GST1); Decision 1/CP.27 (Sharm el-Sheikh Implementation Plan) and Decision 3/CP.27 (SJWA)
	"*Requests the Subsidiary Body for Scientific and Technological Advice and the Subsidiary Body for Implementation to jointly address issues related to agriculture, including through workshops and expert meetings, working with constituted bodies under the Convention and taking into consideration the vulnerabilities of agriculture to climate change and approaches to addressing* ***food security***" KJWA Workshop Topic 2(f): "*Socioeconomic and* ***food security*** *dimensions of climate change in the agricultural sector*"	Decision 4/CP.23 (KJWA)
	"*Requests the Subsidiary Body for Scientific and Technological Advice and the Subsidiary Body for Implementation to establish the four-year Sharm el-Sheikh joint work on implementation of climate action on* ***agriculture and food security****, including implementation of the outcomes of the Koronivia joint work on agriculture and previous activities addressing issues related to agriculture*" "*Further acknowledges that the Koronivia joint work on agriculture has highlighted the need for enhanced climate action on* ***agriculture and food security,*** *and for enhanced coordination with and among actors outside the UNFCCC*" Among others	Decision 3/CP.27 (inclusion of Food Security as part of the agenda item on issues related to Agriculture, and takes note of the KJWA recommendations), paras. 2 (g, h, k, l, o, t), 3, 8, 10, 14 (a-f), 15 (b), 16

Concept	Mention	References
Food security	"*The critical role of forests, including boreal, temperate and tropical forests, as well as mangroves, as carbon stocks and sinks and in enhancing climate resilience, biodiversity, water and* ***food security,*** *livelihoods in the context of poverty eradication, and sustainable development, as well as* ***food security****"*	Decision 13/CMA.7 (MWP), para. 13 (a) (d), Findings 2025 report
	"*The challenges in addressing drivers of deforestation and forest degradation, taking into account the need to be mindful of pursuing sustainable development and* ***food security,*** *and the challenges in addressing increasing climate-related risks such as wildfires, droughts, pests and diseases, and higher temperatures, including though sustainable and climate-adaptive forest management*"	
	Fifth dialogue under the United Arab Emirates Just Transition Work Programme on: "*Just transition pathways for holistic approaches to* ***food security,*** *including with a focus on agriculture and oceans, in the context of element c) paragraph 2 of Decision 3/CMA.5*".	Decision 3/CMA.5, para. 5
	The SBSTA concluded that future NWP thematic areas should focus on emerging issues in relation to climate change such as: (d) "***Agriculture and food security***"	FCCC/SBSTA/2018/4, para. 21 (d) (NWP: SBSTA 48)
	The SBSTA requested the secretariat to prioritize the following NWP thematic areas mandated at SBSTA 48: (e) "***Agriculture and food security***"	FCCC/SBSTA/2019/2. para. 18 (e) (NWP: SBSTA 50)
Food and nutrition	"*Noted the importance of scaling up support to enhance action on safeguarding* ***food and nutrition security*** *and ending hunger, aiming for inclusive, sustainable and climate resilient agricultural systems, taking into consideration the vulnerability of agriculture to the impacts of climate change*"	Decision 3/CP.27 (SJWA), para. 2 (i) (m) Decision 2/CMA.5, para. 9 (b) (GGA Target); Decision 1/CMA.5, para.63 (b); Decision 12/CMA.7, Annex (Belém Adaptation Indicators), paras. 1 (h) and 4 (a-e)
	"*Attaining climate-resilient food and agricultural production and supply and distribution of food, as well as increasing sustainable and regenerative production and equitable access to* ***adequate food and nutrition*** *for all*"	
	Indicator 9(b)-e: "*Proportion of the population with equitable access to adequate* ***food and nutrition,*** *including as an outcome of adaptation actions where applicable*"	
Food systems	"*Also recognizing that the impact of the coronavirus disease 2019 pandemic and other global challenges has exposed the limited resilience of* ***global food systems*** *to the adverse impacts of climate change and the limited progress towards achieving the Sustainable Development Goals and ensuring* ***food security****"*	Decision 3/CP.27, preamble ("global food systems"); para. 2 (d, k, t) ("farmers and food systems", "agriculture and food systems", "land and food systems")
	"*Also recognized the importance of the continued involvement of scientific and technical knowledge in transforming the* ***agriculture sector,*** *enabling conditions, the crucial role of farmers, youth, local communities and indigenous peoples, including gender considerations, and of meeting the needs of* ***farmers and food systems****"*	
	"*Recognized that socioeconomic and food security dimensions are critical when dealing with climate change in* ***agriculture and food systems****"*	
	"*Noted that many approaches with high potential for adaptation, adaptation co-benefits and mitigation relate* ***to land and food systems,*** *such as conserving and restoring ecosystems, improving sustainability of agricultural practices and reducing food loss and waste from* ***sustainable food systems,*** *and have significant positive direct and indirect links with biodiversity and ecosystem services, food security and the Sustainable Development Goals*"	
	"*National systems of innovation,* ***water–energy–food systems,*** *energy systems, buildings and resilient infrastructure, business and industry, and technology needs assessments*"	Decision 18/CP.27, 9/CP.28, Decision 10/CP.29, Decision 19/CMA.4, 14/CMA.5, and 17/CMA.6, TEC footnotes, para. 2 ("water–energy–food systems")

Concept	Mention	References
Food systems	*"Underscores that accelerating climate action and resilience through financing for **sustainable food systems and agriculture** is essential, including for protecting biodiversity and supporting vulnerable communities"*	Decision 1/CP.30 (SCF), paras. 5 and 7 ("sustainable food systems and agriculture")
	*"Encourages the implementation of integrated, multi-sectoral solutions, such as land use management, **sustainable agriculture, resilient food systems,** nature-based solutions and ecosystem-based approaches, and protecting, conserving and restoring nature and ecosystems, including forests, mountains and other terrestrial and marine and coastal ecosystems, which may offer economic, social and environmental benefits (...)"*	Decision 1/CMA.5, para. 55, GST1 ("resilient food systems")
Food and agricultural production **Supply and distribution**	*"Attaining climate-resilient **food and agricultural production** and **supply and distribution of food,** as well as increasing **sustainable and regenerative production** and equitable access to adequate **food and nutrition** for all"*	Decision 2/CMA.5, para. 9 (b) (GGA Target); Decision 1/CMA.5, para. 63 (b); Decision 12/CMA.7, Annex (Belém Adaptation Indicators), paras. 1 (h) and 4 (a-e)
Agrifood sector	*"Notes with appreciation the workshop convened by the Adaptation Committee on fostering engagement of the **agrifood sector** in resilience to climate change"*	Decision 8/CP.24, para. 13

Source: Authors' own elaboration, based on a review of relevant UNFCCC documents and decisions. See References for full list.

ANNEX 2. Overview of key FAO evidence and data for the different sectors

Sector	GHG emissions (FAO, 2025a)	NDC 3.0 (Crumpler *et al.*, forthcoming)	NAP *(Crumpler* et al., 2025)	Climate finance (Caputo, Galbiati & Bernoux, 2026)
Crops	Farm gate: 8.1 Gt CO_2eq, largest component of agrifood systems emissions in 2023 (49%), including crops at 1.5 Gt CO_2eq (9% of total agrifood systems emissions).	Agriculture and crop-based systems prioritized for adaptation and mitigation in 78% of NDCs.	Climate impacts on crops reported in 94% of NAPs; adaptation actions in 100%; crops represent 8% of agrifood finance needs in NAPs; private investment opportunities for crops identified in 41% of NAPs.	Around 2.5% of total climate-related development finance in 2024. Agricultural development, largest agrifood systems recipient, received about 30% of climate-related development finance to agrifood systems flows in 2024, corresponding to 5% of total climate-related development finance in 2024.
Livestock	Largest single source of agrifood system emissions: 4.3 Gt CO_2eq in 2023 (+22% since 2001).	Livestock systems prioritized for adaptation and mitigation in 72% of NDCs.	Climate impacts on livestock and grasslands reported in 75% of NAPs; adaptation actions in 83%; livestock represent 3% of agrifood finance needs; private investment opportunities for livestock identified in 39% of NAPs.	0.5% of total climate-related development finance in 2024.
Forestry and land use	Land-use change (deforestation and fires): 3.2 Gt CO_2eq in 2023 (19% of agrifood systems emissions), down 6% since 2021, of which deforestation 2.8 Gt CO_2eq (–13% since 2001), the second-largest single source.	Forests and land use are the most common adaptation and mitigation priority, in 89% of NDCs.	Climate impacts on forests reported in 69% of NAPs; adaptation actions in 94%; forests represent 9% of agrifood finance needs; private investment opportunities for forests identified in 20% of NAPs.	USD 2 billion in 2024 (1.4% of total climate-related development finance; –11% from 2023).
Fisheries and aquaculture	Not reported separately; the series covers land-based sources.	Prioritized for adaptation and mitigation in 55% (fisheries) and 38% (aquaculture) of NDCs.	Climate impacts on ocean-based and inland fisheries and aquaculture reported in 56% of NAPs; adaptation actions in 70%; fisheries and aquaculture represent 2% of agrifood finance needs; private investment opportunities for fisheries and aquaculture identified in 28% of NAPs.	0.3% of total climate-related development finance in 2024.
Environment and biodiversity	Not assessed as a separate emissions category; relevant through mitigation and adaptation co-benefits.	Ecosystem and biodiversity loss reported as a climate risk in 88% of NDCs.	Climate impacts on ecosystems that support food and agriculture reported in 95% of NAPs; adaptation in agrifood systems and surrounding ecosystems prioritized in all NAPs; ecosystems and biodiversity represent 69% of agrifood finance needs.	Among the largest agrifood recipients in 2024: about 29% of agrifood flows but only 5% of total climate-related development finance; Flows to Africa amounted to USD 1.9 billion in 2024.

Sector	GHG emissions (FAO, 2025a)	NDC 3.0 (Crumpler *et al.*, forthcoming)	NAP (Crumpler *et al.*, 2025)	Climate finance (Caputo, Galbiati & Bernoux, 2026)
Food security and nutrition	Not assessed as a separate emissions category.	Climate impacts on food security and nutrition reported in 56% of NDCs; consumption and food security prioritized for climate action in 67% of NDCs.	Climate impacts on food security and nutrition reported in 83% of NAPs (availability 70%, safety and quality 37%, access 23%, stability 12%, utilization 11%); adaptation actions for food security and nutrition in 78% of NAPs; FSN represent 1% of agrifood finance needs; FSN non-economic losses and damages referenced in 11% of NAPs.	Food security received 0.5% of total climate-related development finance in 2024 (–14% to 2023); nutrition received 0.2% (+1% compared to 2023).
Agrifood systems	Agrifood systems emissions: 16.5 Gt CO_2eq in 2023, about one-third (32%) of global GHG emissions, down from 38% in 2001. Composition: farm gate 8.1 Gt CO_2eq (49%), land-use change 3.2 Gt CO_2eq (19%) and pre- and post-production 5.2 Gt CO_2eq (32%). Pre- and post-production emissions rose 80% since 2001.	Agrifood systems featured in 93% of NDCs; climate impacts on agrifood systems reported in 86% of NDCs. Only 16% refer to implementation plans and 24% to financing plans covering the sector. Agrifood systems account for 18% of total NDC finance needs, rising to 36% in low-income countries.	Climate impacts on agrifood systems reported in 97% of NAPs; agrifood systems central to adaptation strategies in all NAPs; agrifood systems represent 54% of adaptation finance needs but receive only 20% of adaptation finance (FAO and UNDP, 2025); private investment opportunities for agrifood value chains identified in 33% of NAPs.	Agrifood systems' share of climate-related development finance fell from 24% in 2015 to 19% in 2024; flows fell by 10% in 2024, compared with 2% across all sectors.

Note: Annex 2 summarizes key evidence from FAO reports divided by main agrifood subsectors. NDC figures refer to countries' latest NDCs (Crumpler *et al.*, forthcoming), NAP figures to the 64 NAPs submitted by developing countries (Crumpler *et al.*, 2025), and finance figures to climate-related development finance (Caputo *et al.*, forthcoming). FAOSTAT emissions domains do not always correspond directly to UNFCCC reporting categories, see Annex 3 for a quick review.

Source: **FAO.** 2025. *Greenhouse gas emissions from agrifood systems – Global, regional and country trends, 2001–2023*. FAOSTAT Analytical Brief Series, No. 115. Rome. https://doi.org/10.4060/cd7300en; **Crumpler *et al.*** (forthcoming). *Agrifood systems in nationally determined contributions: A global analysis. Synthesis report 2026*. Rome, FAO; **Crumpler, K., Wybieralska, A., Nelson, S., Hammett, L., Margiotta, G., Haensel, M., Raison, M., Roffredi, L., Angioni, C., Gialletti, A., Galbiati, G., Caputo, I., Alvar-Beltrán, J., Kanamaru, H., Wang, X., Bernoux, M., Kohli, R., Teng, J., & Wolf, J.** 2025. *Agrifood Systems in National Adaptation Plans – An analysis*. Rome, FAO, and New York, NY, USA, UNDP. https://doi.org/10.4060/cd7579en; and **Caputo, I., Galbiati, G.M., and Bernoux, M.** (forthcoming). *Climate-related development finance to agrifood systems, 2026 update*. Rome, FAO.

ANNEX 3. Weight in GHG emissions

FAO's GHG analysis (2025a) structures agrifood systems into three components, each comprising specific subsectors and activities, as set out below:

Component	Subsectors
Farm-gate emissions	Crop and livestock production activities, including on-farm energy use and drained organic soils and savannah fires. Crop emissions include: 1) crop residues, 2) burning of crop residues, 3) rice cultivation and 4) application of nitrogen (N) fertilizers, including mineral and chemical fertilizers, to soils. Livestock emissions include: 1) enteric fermentation; 2) manure left on pastures; 3) manure management; and 4) manure applied to soils. Emissions from Drained Organic Soils consist of the N_2O and CO_2 losses to the atmosphere due to the oxidation of the organic matter when organic soils are drained for agricultural activities. Energy use in agriculture contains data on energy used in agriculture (including forestry, aquaculture and fisheries), for instance to operate machinery, irrigate, heat stables, operate aquaculture ponds and fishing vessels, and related GHG emissions. It also includes on-farm use of, and related GHG emissions from, electricity and heat generated off-farm.
Land-use change	Forests and fires (Forestland emissions and removals are tracked for comparison but are not counted within the agrifood systems total). Emissions from Forests consists of CO_2 emissions and removals corresponding to forest carbon stock changes (aboveground and belowground living biomass). Emissions from Fires consists of estimates of CH_4, N_2O and CO_2 emissions generated from biomass burning in a range of vegetation types and from fires in organic soils.
Pre- and post-production processes	Includes the greenhouse gas (GHG) emissions, and related activity data, generated from pre- and post-agriculture production stages of the agri-food systems: Manufacturing of inputs; food processing; transport, packaging and retail; household consumption; waste disposal.

Note: FAOSTAT emissions domains do not always correspond directly to UNFCCC reporting categories. See FAOs mapping and comparison of UNFCCC emissions categories, IPCC guidelines and FAOSTAT emissions domains and items: https://files-faostat.fao.org/production/GT/Mapping_to_UNFCCC_IPCC.pdf

Source: **FAO.** 2025. *Greenhouse gas emissions from agrifood systems – Global, regional and country trends, 2001–2023.* FAOSTAT Analytical Brief Series, No. 115. Rome. https://doi.org/10.4060/cd7300en; **FAO.** 2025. FAOSTAT Climate Change: Agrifood systems emissions, Emissions from Forests. Rome, Italy. http://www.fao.org/faostat/en/#data/GF/

ANNEX 4. Climate finance

FAO's climate-related development finance to agrifood systems analysis tracks bilateral and multilateral development finance that donors report to the OECD Development Assistance Committee (OECD-DAC) as climate-related, flagged through the Rio Markers for mitigation and/or adaptation, and directed to the agrifood systems sectors defined by its purpose codes (see Galbiati *et al.*, 2025).

Dimension	Categories
Climate focus	Mitigation; adaptation; cross-cutting.
Donor type	Bilateral (OECD-DAC members); multilateral development banks (MDBs).
Groups of recipients	By region (Africa, Asia and the Pacific, Latin America and the Caribbean, Europe and Central Asia, Near East and North Africa); by income group (least developed countries and other income groups).
Sector	Eleven agrifood systems sectors defined by OECD-DAC purpose codes, including agricultural development, crop production, livestock, food security, environment and biodiversity, fishery, forestry, cross-cutting, emergency and resilience and energy (See Galbiati *et al.*, 2025).

Source: **Galbiati, G.M., Caputo, I., Brierley, I., Ducastel, A. & Bernoux, M.** 2025. *Climate-related development finance to agrifood systems – Global and regional trends. Report 2025.* Rome. https://doi.org/10.4060/cd7500en

For more information, visit:
https://www.fao.org/climate-change/projects-and-programmes/imp-act--supporting-climate-resilient--inclusive-and-low-emission-agrifood-systems

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