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FAO Science and Innovation Strategy



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FOREWORD

Science and innovation have always been crucial elements of my vision for a reinvigorated FAO. They will be instrumental in building a new future. In a world shaken by climate change, the impacts of the COVID-19 pandemic, economic downturns and conflicts, it is clear as never before that we must chart a different path. This will only be possible by employing state-of-the-art science and innovation. We urgently need innovation in technologies, policies, business models and mindsets.

Science and innovation are emerging as key components of the evolving global development agenda. A wide range of approaches, technologies and practices can contribute to transformation of agrifood systems. These range from digital tools and biotechnologies to innovations in agroecology and agroforestry. Science and innovation underpin them all.

FAO must be prepared to assume a leadership role in supporting its Members to access the latest and most appropriate solutions, adapted to their contexts. FAO's first-ever Science and Innovation Strategy sets out the way to reinforcing the use of science and innovation in FAO's technical interventions and normative guidance. The Strategy, which was endorsed by the FAO Council at its 170th Session, following an inclusive and transparent consultation process, represents a key tool for the implementation of the FAO Strategic Framework 2022–31. Its broad and inclusive scope emphasizes the need to consider all scientific disciplines and all types of innovation.

Nowhere is science and innovation more needed than in efforts to adapt to and mitigate climate change. The Science and Innovation Strategy will reinforce FAO's new Strategy on Climate Change. It will help enhance productivity, quality, diversity, efficiency, and environmental sustainability in agrifood systems. For the effective implementation of the Strategy, FAO will work hard with its Members and partners to increase efforts in mobilizing the required knowledge, partnerships and funding resources.

Strengthened by science and innovation, the Strategic Framework will better support the 2030 Agenda through the transformation to MORE efficient, inclusive, resilient and sustainable agrifood systems. This will result in better production, better nutrition, a better environment, and a better life, leaving no one behind.

QU Dongyu
FAO Director-General

ABBREVIATIONS AND ACRONYMS

AIRCA	Association of International Research and Development Centers of Agriculture
CGIAR	
FRAME	FAO's updated Due Diligence Framework for Risk Assessment and Management for Engagements
GCF	Green Climate Fund
GEF	Global Environment Facility
HLPE	High Level Panel of Experts on Food Security and Nutrition
IAEA	International Atomic Energy Agency
IPCC	Intergovernmental Panel on Climate Change
KPI	Key Performance Indicators
LMICs	low- and middle-income countries
MSMEs	micro-, small- and medium-sized enterprises
PPAs	Programme Priority Areas
SDGs	Sustainable Development Goals
SPI	science-policy interface
WHO	World Health Organization

EXECUTIVE SUMMARY

Recent sessions of FAO Governing Bodies have put a strong focus on science, technology and innovation and Members are increasingly requesting FAO's support to harness science and innovation. The FAO Science and Innovation Strategy (the Strategy) was adopted by the FAO Council at its 170th Session following an inclusive and transparent consultative process, with the participation of all Members through formal sessions of Governing Bodies (including the Regional Conferences in 2022), as well as two informal consultations and informal meetings with Regional Groups.

The Strategy aims to strengthen FAO's work on science and innovation by providing Organization-wide guidance, coherence and alignment on science and innovation. Science and innovation serve as a foundation for the FAO Strategic Framework 2022–31 and have cross-sectoral relevance across the Organization's programme of work. Innovation and technology are two of the four accelerators of the FAO Strategic Framework 2022–31 intended to speed up progress and maximize efforts in meeting the Sustainable Development Goals (SDGs). At the same time, science underpins all four accelerators (technology, innovation, data, and complements [governance, human capital, and institutions]). As such, science and innovation are integrated throughout the 20 Programme Priority Areas (PPAs), the accelerators, and cross-cutting themes.

The vision of the Strategy is a world free from hunger and malnutrition, where the potential of science and innovation is fully leveraged to overcome complex social, economic and environmental challenges of agrifood systems in a globally equitable, inclusive and sustainable manner. The goal is for Members to harness science and innovation to realize context-specific and systemic solutions for MORE efficient, inclusive, resilient and sustainable agrifood systems for *better production, better nutrition, a better environment, and a better life*, leaving no one behind, in support of the 2030 Agenda for Sustainable Development.

The Strategy is grounded in the following guiding principles: Rights-based and people-centered; Gender-equal; Evidence-based; Needs-driven; Sustainability-aligned; Risk-informed; and Ethics-based. The Strategy focuses on three pillars, which group together nine outcomes. Action under the pillars will be catalysed by two cross-cutting enablers: transformative partnerships and innovative funding and financing. The pillars are:

- I. Strengthening science and evidence-based decision-making;
- II. Supporting innovation and technology at regional and country level; and,
- III. Serving Members better by reinforcing FAO's capacities.

Monitoring will be fully aligned with the causal results chains and SDG targets established in the FAO Strategic Framework 2022–31, reflecting all three dimensions of sustainability. For the technology and innovation accelerators, monitoring will be linked directly to the relevant Key Performance Indicators (KPI), while activities under the PPAs will be measured through the most relevant SDG indicators.

I. BACKGROUND

1. The challenges facing agrifood systems¹ are significant, wide-ranging, and interlinked. The world's biggest and often inter-twined challenges include poverty and hunger, as well as inequality and lack of access to resources and income-earning opportunities, climate change, loss of biodiversity, ecosystem degradation and desertification, disasters and conflicts. Agrifood systems both contribute to, and endure the negative consequences of, the climate crisis and degraded natural resources and their transformation should be made in a coherent manner, as appropriate, in accordance with and dependent on national contexts and capacities. Realizing more efficient, inclusive, resilient and sustainable agrifood systems is necessary to accelerate progress across most Sustainable Development Goals (SDGs) and targets, and is a major pathway to achieving the social, economic and environmental dimensions of sustainability.
2. A wide range of approaches, technologies² and practices exist that can contribute to transforming agrifood systems to nourish people, nurture the planet, advance equitable livelihoods and build resilient ecosystems. Science and innovation³ underpin them all. Indeed, science and innovation can be a powerful engine to transform agrifood systems and end hunger and malnutrition when accompanied by strong institutions, good governance, political will, enabling regulatory frameworks, and effective measures to promote equity among agrifood system actors.
3. Both within and beyond agrifood systems, the landscape of science and innovation is continuously evolving and ushering in new opportunities for achieving the SDGs. Important strides have been made in a range of scientific and technological fields ranging from biotechnologies, nuclear techniques in food and agriculture, digital tools, nanotechnology, big data, data analytics, data science, Artificial Intelligence and Machine Learning – to advancements in the fields of ecology, agronomy, sociology of rural development, and innovations related to agroecology, agroforestry, and facing the challenges of climate change. Public-private partnerships are on the rise in research and development. At the same time, market concentration (in technologies, products, and intellectual property) has heightened concerns about gaps in income and access to resources and knowledge between and within countries and social groups.
4. Science and innovation are also emerging as prominent components of the evolving global development agenda. Science, technology and innovation are at the heart of the 2030 Agenda for Sustainable Development and appear in numerous SDG targets, and feature strongly in several regional commitments and strategies.⁴ Further, the 2019 Global Sustainable Development Report identified science and technology as one of the levers for transformation that accelerate progress in achieving the SDGs while minimizing trade-offs.⁵ In 2021, both the UN Secretary-General's Chair's Summary and Statement of Action on the UN Food Systems Summit⁶ and the Glasgow Climate Pact⁷ affirmed the need to invest in

1 See Annex for description of key terms as they are used in this document.

2 See Annex for description of key terms as they are used in this document.

3 See Annex for description of key terms as they are used in this document.

4 For example, the Science, Technology and Innovation Strategy for Africa 2024, which informs strategic directions for the Malabo Commitments and Agenda 2063.

5 Independent Group of Scientists appointed by the Secretary-General, *Global Sustainable Development Report 2019: The Future is Now – Science for Achieving Sustainable Development*, United Nations, New York, 2019.

6 The UN Secretary-General's Chair's Summary and Statement of Action on the UN Food Systems Summit does not constitute a negotiated document. <https://www.un.org/en/food-systems-summit/news/making-food-systems-work-people-planet-and-prosperity>.

7 UNFCCC. 2021. The Glasgow Climate Pact. <https://ukcop26.org/wp-content/uploads/2021/11/COP26-Presidency-Outcomes-The-Climates-Pact.pdf>

science and innovation for the SDGs and effective climate action, as also reflected in the FAO Strategy on Climate Change 2022–2031.⁸

5. As the UN specialized agency for food and agriculture, FAO is called upon to be a driving force for facilitating solutions to agrifood system challenges through science and innovation. The Organization is taking major steps to rise to the challenge of harnessing the transformative potential of science and innovation. In 2020, the first-ever position of Chief Scientist was established to join the core leadership team of the Director-General. A new Office of Innovation was also created to ensure that FAO leverages the use of innovation, technology and new approaches across the Organization. Technology and innovation are rising on the agenda of FAO Members: recent sessions of Governing Bodies, including the Regional Conferences and Technical Committees, have included issues related to science, technology and innovation as important agenda items.
6. A number of recent initiatives further demonstrate FAO's commitment to strengthening its leadership role on science and innovation for the transformation of agrifood systems. In 2020, FAO established the International Platform for Digital Food and Agriculture. FAO participates actively in the implementation of the Science, Technology and Innovation component of SDG 17.⁹ As host of the Food Systems Coordination Hub, FAO has a key role in the UN Food Systems Summit follow-up, including through its work on science and innovation. Regional and country offices are moving forward with tailored and globally coordinated programmes, such as under the framework of the Hand-in-Hand Initiative and its Geospatial Platform, 1000 Digital Villages, and the Global Action on Green Development of Special Agricultural Products: One Country One Priority Product. FAO is also collaborating with other UN agencies on the elaboration of ethical issues raised by new technologies and innovations.¹⁰
7. The FAO Science and Innovation Strategy (the Strategy) aims to bolster these recent developments by providing Organization-wide guidance, coherence and alignment on science and innovation to better serve Members by strengthening FAO's capacities. The Strategy is a tool to support the delivery of the FAO Strategic Framework 2022–31 and hence the 2030 Agenda for Sustainable Development (see Table 1 for an overview of the main elements of the Strategy).
8. The Science and Innovation Strategy will contribute to the implementation of the Strategy on Climate Change.
9. The Science and Innovation Strategy is aligned with the FAO Strategy on Mainstreaming Biodiversity across the Agricultural Sectors and they mutually reinforce each other.
10. The Science and Innovation Strategy aims to strengthen the linkages with existing science-policy interface mechanisms of the three Rio Conventions.
11. The Science and Innovation Strategy is aligned with the FAO Strategy for Private Sector Engagement.
12. With FAO's normative work on and support to standard setting (e.g Codex Alimentarius and IPPC) and within its mandate, the Science and Innovation Strategy can contribute to the multilateral trading system in line with the rules of the World Trade Organization.

8 The FAO Strategy on Climate Change will be considered by the Programme Committee at its 133rd Session and by the Council at its 170th Session.

9 The 2030 Agenda's Technology Facilitation Mechanism and its UN Interagency Task Team on Science, Technology and Innovation, in which FAO is an active member, provide a multi-stakeholder cooperation mechanism to promote coordination within the UN system.

10 FAO contributed to the development of the Recommendation on the ethics of artificial intelligence, adopted by the General Conference of UNESCO in 2021. <https://unesdoc.unesco.org/ark:/48223/pf0000380455>

13. The Science and Innovation Strategy promotes planning and implementation of gender transformative, youth-engaging, participatory and socially inclusive action, including strengthening of knowledge, technologies, practices and efforts of local communities and Indigenous Peoples in the development and use of science and innovation. Moreover, FAO emphasizes ensuring equal opportunities and sharing of benefits of science and innovation, engagement of women, youth and Indigenous Peoples debates relating to science and innovation and providing support to countries to reduce social exclusion, including through legal, regulatory and institutional frameworks.

II. THE ROLE OF FAO ON SCIENCE AND INNOVATION

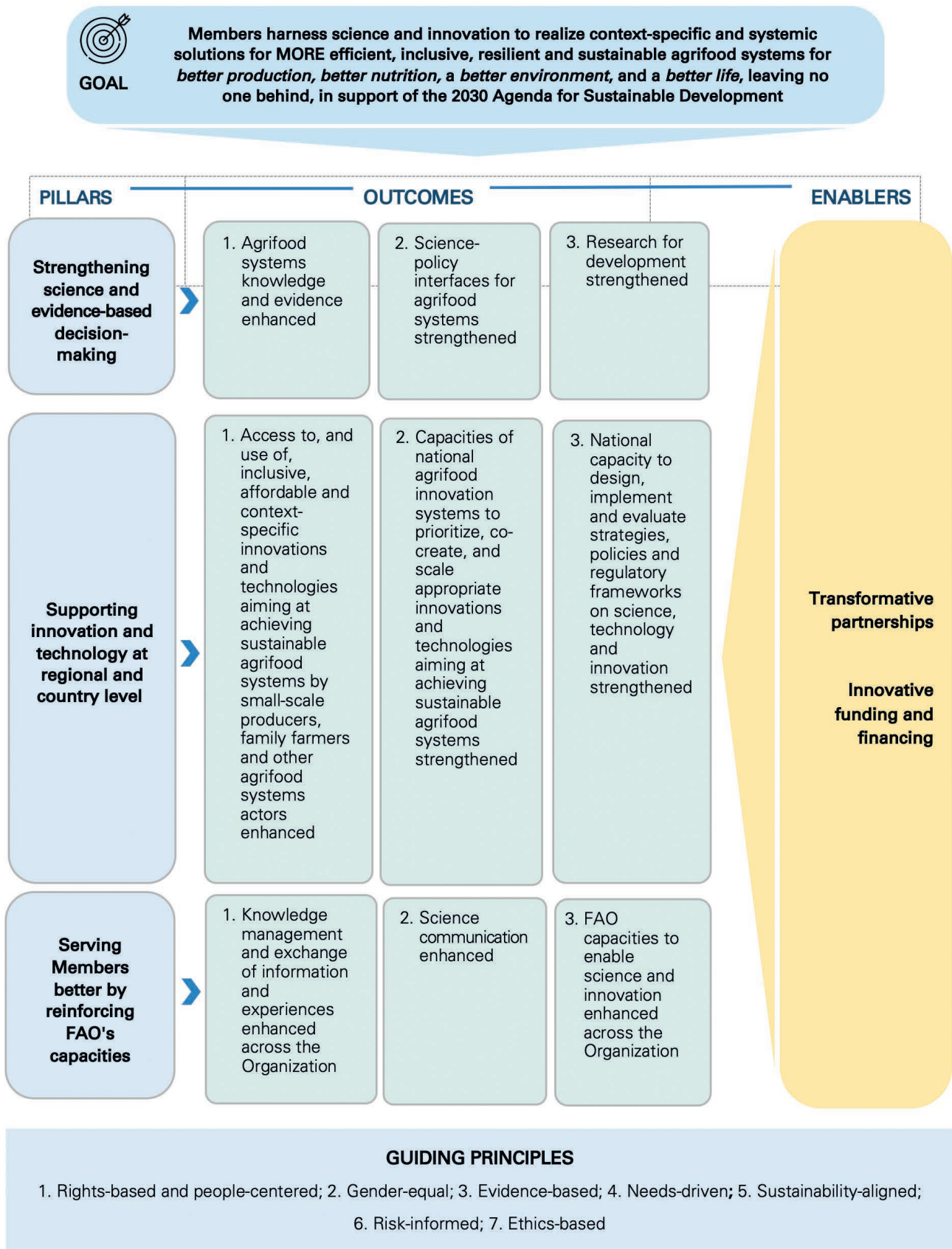
14. FAO facilitates solutions to agrifood system challenges, with particular attention to low- and middle-income countries (LMICs), including through science and innovation. In undertaking this work, FAO will avoid duplication with other organizations by clearly focusing on science and innovation for agrifood systems in alignment with its mandate¹¹ and core functions.¹²
15. Due to its unique position as a facilitator of intergovernmental processes, FAO provides a neutral platform and scientific analysis for exchange between countries and serves as an authoritative source of guidance through its indispensable work on norms and standards, regulatory frameworks, guidelines, codes of conduct and other standard setting instruments. FAO also synthesizes scientific knowledge and presents it to policy makers. It provides evidence and analysis, including on benefits, risks, trade-offs and potential for adaptation to different contexts, thus empowering Members to decide their development pathways. These functions underpin FAO's role of providing global public goods for agrifood systems.¹³
16. FAO provides information and shares knowledge and experiences among countries on the range of existing and emerging innovations. It provides support to countries on innovative technologies, policies, practices, processes, approaches, methodologies, tools, and platforms. It also implements projects at country level, using its technical expertise to assist small scale producers directly while ensuring that innovations are adapted to local needs and that no one is left behind. Being the foremost convening partner on science and innovation for agrifood systems, FAO is wellpositioned to bring relevant stakeholders together in scaling up pilot initiatives. FAO's technical interventions allow it to learn lessons that will be incorporated into its normative guidance leading to more effective interventions in a continuous loop of learning and improvement.
17. While FAO is not a research organization, it is mandated to translate science and innovation into normative and policy guidance and practical tools for development. FAO has an important role in supporting the essential contribution of national, regional and international research organizations. FAO's Governing and Statutory Bodies provide an interface for science and policy. Finally, FAO has an important role in analysing and communicating the latest scientific evidence to Members and the public.

11 FAO Constitution. Article I, paragraph 2. "The Organization shall promote and, where appropriate, shall recommend national and international action with respect to a) scientific, technological, social and economic research relating to nutrition, food and agriculture; b) the improvement of education and administration relating to nutrition, food and agriculture, and the spread of public knowledge of nutritional and agricultural science and practice." <https://www.fao.org/3/mp046e/mp046e.pdf>

12 FAO's core functions are described in the FAO Strategic Framework 2022–31, paragraph 43. <https://www.fao.org/3/cb7099en/cb7099en.pdf>

13 FAO provides a range of global public goods. For example, the Global Information and Early Warning System on Food and Agriculture (GIEWS) is the world's leading source of information on global food production, consumption and trade. It continuously monitors the food security situation in every country of the world and alerts the world to emerging food shortages. A further example is the courses offered by the FAO elearning Academy.

Table 1: Goal, pillars, outcomes and enablers of the FAO Science and Innovation Strategy



III. VISION

18. A world free from hunger and malnutrition, where the potential of science and innovation is fully leveraged to overcome complex social, economic and environmental challenges of agrifood systems in a globally equitable, inclusive and sustainable manner.

IV. GOAL

19. Members harness science and innovation to realize context-specific and systemic solutions for MORE efficient, inclusive, resilient and sustainable agrifood systems for *better production*, *better nutrition*, *a better environment*, and *a better life*, leaving no one behind, in support of the 2030 Agenda for Sustainable Development.

V. SCOPE

20. The FAO Science and Innovation Strategy facilitates coherence of the Organization's extensive and ongoing work on science and innovation, which is articulated through the PPAs, accelerators and cross-cutting themes. It seeks to be consistent with, and to mutually reinforce, FAO strategic documents,¹⁴ including the FAO Strategy on Climate Change 2022–2031,¹⁵ as well as relevant platforms. As a tool to deliver the FAO Strategic Framework 2022–31, the Strategy considers all innovations that are needed to deliver the 20 PPAs.
21. The Strategy covers all sectors and areas of agrifood systems, including crop, livestock, forestry, fisheries and aquaculture – from natural resource management, to production, storage, transportation, marketing, consumption, and food losses and waste.
22. The full range of scientific disciplines (i.e. the natural, social, economic and applied sciences) are considered relevant, as well as sustainability science, interdisciplinarity and transdisciplinarity in order to address systemic challenges in a holistic manner.
23. FAO recognizes the need for a diversity of innovations (technological [including digital], social, policy, financial, and institutional). The knowledge of Indigenous Peoples and small-scale producers is recognized as an important source of innovation for agrifood systems and is considered within the scope of the Strategy.
24. Particular attention is given to the needs of LMICs, including Small-Island Developing States, focusing on small-scale producers, family farmers, Indigenous Peoples, women, youth, and other under-represented agrifood systems actors, including micro-, small- and medium-sized enterprises (MSMEs), in order to accelerate progress towards the achievement of the SDGs.
25. FAO will consider the importance of the specificities of global, regional, national, and local contexts when implementing the Strategy to ensure that all types of knowledge, science and innovation are accessible and adaptable to local realities.

14 Other FAO strategies include: the Strategy for FAO's Work in Nutrition. <https://www.fao.org/3/ne853en/ne853en.pdf>, the FAO Strategy for Mainstreaming Biodiversity across the Agricultural Sectors. <https://www.fao.org/3/ca7722en/ca7722en.pdf>, the FAO Policy on Gender Equality 2020–2030. <https://www.fao.org/3/cb1583en/cb1583en.pdf>, and the Rural Youth Action Plan. <https://www.fao.org/3/ng776e/ng776e.pdf>

15 The FAO Strategy on Climate Change will be considered by the Programme Committee at its 133rd Session and by the Council at its 170th Session.

26. Data is an integral part of science- and evidence-based decision-making. FAO's strategic priorities on data are articulated in the plan for the modernization of FAO statistics¹⁶ and the proposal for improved governance of FAO statistical activities.¹⁷ The FAO Science and Innovation Strategy complements these initiatives, and will be implemented in strict compliance with the FAO policies on protection of data and intellectual property rights, currently under development.

VI. THEORY OF CHANGE

27. The strategic deployment of science and innovation is a central and significant enabling factor for agrifood system transformation and ultimately, contributes to the 2030 Agenda for Sustainable Development and the three inter-linked dimensions of sustainability. FAO recognizes that countries have diverse challenges, needs and capacities with respect to science and innovation, including in relation to infrastructure, levels of education and technical capacities. At the same time, there are major common challenges at national, regional and global levels. Addressing these challenges requires the coordinated efforts of a range of actors, with FAO playing a key role in the provision of global public goods, knowledge, guidance, coordination and policy coherence.
28. Achieving the Strategy's vision means that all countries have access to the science and innovation they need to overcome complex social, economic and environmental challenges of agrifood systems. To achieve this vision in a globally equitable, inclusive and sustainable manner means that under-represented stakeholders – in particular small-scale producers, including women and youth – are actively included in processes of developing and using science and innovation.
29. The challenges in harnessing science and innovation for agrifood systems range from under-investment in research, lack of accessibility and uptake of innovations, and gaps in using science and evidence for decision-making. Among other inequalities, the highly uneven global distribution of scientific capacity and access to knowledge threatens to derail the 2030 Agenda.¹⁸
30. After a decade of slow growth in the 1990s, global investments in agricultural research grew by 50 percent during 2000–2016, mostly driven by large middle-income countries. During the same period, public sector spending in high-income countries stalled while private sector investments in agricultural research doubled. Nevertheless, the public sector continues to play a key role in setting policy frameworks, investing in research in basic sciences and in topics with lower financial returns in the short-term (a key feature of small-scale production systems).¹⁹
31. Providing the science and evidence base for policy making faces numerous challenges. Science and evidence are essential for sound decision-making, but do not necessarily provide a singular course of action. Scientific findings may be limited by insufficient data, uncertainties, contrasting results, and can be contested. Decision-making is often influenced by a variety of both structural and behavioral drivers and barriers as well as numerous stakeholders with diverse values and with significant power asymmetries.

16 Report of the Food and Agriculture Organization of the United Nations on recent developments in agricultural and rural statistics, 2020. E/CN.3/2020/1. <https://unstats.un.org/unsd/statcom/51st-session/documents/2020-13-AgriculturalStats-E.pdf>

17 Proposal for improved governance of FAO statistical activities, 2021. <https://www.fao.org/3/ng778e/ng778e.pdf>

18 Independent Group of Scientists appointed by the Secretary-General, *Global Sustainable Development Report 2019: The Future is Now – Science for Achieving Sustainable Development*, United Nations, New York, 2019.

19 Beintema, N., Nin Pratt, A., and Stads, G. 2020. Key trends in global agricultural research investment. International Food Policy Research Institute, Washington, DC.

32. There is a gap between existing science, innovation and technologies, and their accessibility and uptake at local level – particularly in LMICs and among small-scale producers. Most recently, the digital divide has become a key concern for many countries. A key challenge for science and innovation in agrifood systems is the strategic importance of responding to the needs of a diversity of local contexts, including the needs of the large number of small-scale producers and family farmers. In addition, there is under-investment in national agrifood innovation systems, which are crucial to adapting innovations to local contexts. Public extension systems have been neglected over the last two decades. National policies and regulatory frameworks on science and innovation are challenged by fast-paced changes to technologies and legal frameworks.
33. FAO will address these challenges by focusing on strengthening science- and evidence-based decision-making at global, regional and national levels and by supporting innovation and technology at country level. To enable progress on these priorities, FAO will strengthen transformative partnerships and innovative funding and financing. In addition, FAO will take the necessary steps to ensure that it has the capacities needed to deliver on these priorities for its Members. A more complete description of FAO's intended interventions is included under the section on the pillars, outcomes, and enablers below.
34. The Strategy is based on several assumptions, including strong mobilization of resources through voluntary contributions to ensure impact on the ground (including unearmarked funds to support a programmatic approach), enabling policies, the disposition of stakeholders to collaborate, developing transformative partnerships, and continued prioritization of the science and innovation agenda by countries.

VII. GUIDING PRINCIPLES

35. The guiding principles aim to ensure that FAO harnesses science and innovation in alignment with global values, including the five inter-dependent principles that underscore the 2030 Agenda for Sustainable Development: People, Planet, Prosperity, Peace, and Partnership.²⁰ The guiding principles are inter-linked and will guide all of the Organization's science and innovation-related work in line with Agenda 2030.
- i. **Rights-based and people-centered.** FAO maintains that science and innovation must contribute to a *better life*, leaving no one behind, through the progressive realization of the right to adequate food in the context of national food security. This requires equitable access to science and innovation, investments and participation in decision-making for small-scale producers, family farmers, Indigenous Peoples, women, youth, consumers and other under-represented agrifood systems actors. FAO will therefore ensure their meaningful and informed engagement in all its work related to science and innovation.
 - ii. **Gender-equal.** FAO aims to achieve equality and equity between women and men in agrifood systems for the elimination of hunger and poverty. In its approach to science and innovation, FAO will consider the heterogeneous roles of women and men and ensure that its interventions respond to the needs of women as well as men, including by promoting women's inclusion and providing equal decision-making power to shape relevant legal frameworks, policies, programmes and initiatives.
 - iii. **Evidence-based.** FAO's technical work and normative guidance will be based on the most credible, relevant and legitimate evidence available, including findings from scientific research in the natural and social sciences – including systemic approaches, such as

²⁰ United Nations General Assembly (UNGA), 2015. Transforming our world: the 2030 Agenda for Sustainable Development. UN Doc A/RES/70/1.

sustainability science, interdisciplinarity and transdisciplinarity – as well as the knowledge of Indigenous Peoples and small-scale producers. Evidence will be assessed in a rigorous, transparent and neutral manner.

- iv. **Needs-driven.** FAO recognizes that countries are at different levels of harnessing science and innovation and have diverse needs, priorities and capacities and will thus avoid a one-size-fits-all approach. A participatory, needs-driven and problem-focused approach to science and innovation will be adopted to ensure that science and innovation are adapted to local, national and regional contexts, responding to the needs of small-scale producers and other under-represented groups and securing ownership at national level.²¹
- v. **Sustainability-aligned.** FAO will support innovations that have been shown to enhance sustainability by respecting its social, economic and environmental dimensions through analysis of synergies and trade-offs, impact assessments, and monitoring and evaluation.
- vi. **Risk-informed.** Science and innovation can best be harnessed for development when risks are identified and mitigated. FAO recognizes the importance of assessing potential benefits and risks of using new technologies and innovations– including unintended consequences – based on the three dimensions of sustainability²² according to evidencebased, transparent and rigorous processes.
- vii. **Ethics-based.** FAO recognizes the importance of considering ethical issues related to science and innovation within its mandate,²³ including the need for transparency, accountability,²⁴ managing conflicts of interest, avoiding potential for harm, protecting the knowledge of Indigenous Peoples and small-scale producers,²⁵ and respecting the importance of Free Prior and Informed Consent of Indigenous Peoples, as applicable. It will establish mechanisms to provide guidance on any relevant ethical, legal, scientific and social issues in its work.²⁶

VIII. PILLARS

36. The Strategy is built on three inter-dependent and mutually reinforcing pillars that define its thematic priorities. The pillars define pathways to contribute to the overall goal of the Strategy and will thus incorporate an integrated approach to achieving *better production, better nutrition, a better environment, and a better life*, leaving no one behind. Action under the pillars will contribute to nine outcomes which will be catalysed by two cross-cutting enablers (transformative partnerships and innovative funding and financing). The enablers are key to delivering each of the outcomes (Table 1). The guiding principles of the FAO Science and Innovation Strategy will be mainstreamed in each of the outcomes through appropriate mechanisms.

A. Pillar 1: Strengthening science and evidence-based decision-making

37. In recent years, Members have reiterated the essential role of FAO's scientific and evidencebased normative and standard-setting work and called for its normative work to

21 In line with paragraph 25. e) of the Report of the 168th Session of the FAO Council.

22 In line with paragraph 25. j) of the Report of the 168th Session of the FAO Council.

23 In line with paragraph 25. k) of the Report of the 168th Session of the FAO Council.

24 In line with paragraph 25. d) of the Report of the 168th Session of the FAO Council.

25 As requested by the 168th Session of the FAO Council (paragraph 25. b) of the report). Protection of local and indigenous knowledge can entail ensuring that it is appropriately credited, acknowledged, and compensated and that the resulting knowledge is transferred back to those sources, as recommended by the UNESCO World Conference on Science, Declaration on Science and the Use of Scientific Knowledge, 1999 (paragraph 26)

26 FAO will take into consideration UNESCO guidance on ethics in science, including the UNESCO Conference Recommendation on Science and Scientific Researchers, 2017. <https://unesdoc.unesco.org/ark:/48223/pf0000260889.page=116>

be based on robust scientific evidence and risk analysis principles.²⁷ Although FAO is not a research organization, it contributes to strengthening the link between science, research and development at national, regional and global levels,²⁸ and responds to the need for science-based and accessible information materials.²⁹

38. FAO manages a range of global databases and knowledge portals, and strengthens national and regional institutional capacities to generate, collect and use relevant information and data.³⁰ Efforts are underway to break down silos and support systemic approaches.³¹
39. Due to its unique position as a facilitator of intergovernmental processes, FAO provides an essential and neutral platform for exchange between countries, allows Members to establish international consensus on global policy issues related to science and innovation, serves as an authoritative source of guidance, and supports the development of new codes of practice, guidelines and standards. FAO has many opportunities to strengthen the interface between science and policy, including through its Governing and Statutory Bodies.³²
40. Three outcomes are grouped under this pillar to further enhance FAO's efforts to strengthen science- and evidence-based decision-making:
 - i. Agrifood systems knowledge and evidence enhanced. FAO will strengthen its provision of global public goods by reinforcing its work to generate, collate, analyse and widely disseminate information and knowledge on an ongoing basis at national, regional and global levels, through interoperable platforms. It will reinforce multi-stakeholder platforms and facilitation mechanisms for sharing countries' experiences on issues related to science and innovation. Knowledge on emerging technologies, including synergies, trade-offs and possible benefits and risks, will be reinforced and shared. FAO will establish systems that incorporate multi-disciplinary knowledge for strengthened science- and evidence-based decision-making. It will create platforms for comprehensive mappings of existing science, technology and innovation initiatives, mechanisms, and programmes within and beyond FAO. A more coherent approach to assessing the quality of science and evidence will be promoted. Countries will be supported to better prepare for alternative plausible futures by strengthening strategic participatory foresight, and continuous, rigorous, and systematic horizon scanning and scenario-building exercises. FAO will strengthen its presence in UN scientific assessments to highlight issues related to agrifood systems, food security and nutrition.
 - ii. Science-policy interfaces for agrifood systems strengthened.³³ FAO will strengthen its contribution to science-policy interfaces (SPIs) at national, regional and global levels to support organized dialogue between scientists, policy-makers and other relevant stakeholders in support of inclusive science-based policy making for greater policy coherence, shared ownership and collective action. The added value of FAO's contribution is to focus at national and regional levels in addition to the global level, to address issues

27 Report of the 42nd Session of the Conference of FAO, 2021. <https://www.fao.org/3/ng170en/ng170en.pdf>, and Report of the 41st Session of the Conference of FAO, 2019. <https://www.fao.org/3/na421en/na421en.pdf>

28 For example, FAO hosts the Secretariat of the Tropical Agriculture Platform (TAP) which was formed with a coalition of 52 partners from various stakeholder groups to strengthen the capacity of agricultural innovation systems by consolidating the different approaches of agricultural innovation.

29 For example, in 2021 FAO launched the Information Toolkit on Food Biotechnologies with a Focus on Food Safety.

30 For example, the FAO platform, Access to Global Online Research in Agriculture (AGORA), provides free or low-cost online access to academic and professional peer-reviewed content related to food and agriculture through a public-private partnership with up to 150 of the world's leading science publishers.

31 For example, FAO's manages early warning systems on animal, plant, aquaculture, and forest health risks, which will be integrated under the One Health PPA.

32 The High Level Panel of Experts of the Committee on World Food Security, whose Secretariat is hosted at FAO, is a prominent example of an inclusive science-policy interface. Other expert bodies and platforms include the Joint FAO/WHO Expert Committee on Food Additives (JECFA) and the Global-Hub on Indigenous Peoples' Food Systems.

33 The term 'Science-Policy Interface' refers to mechanisms for organized dialogue between scientists, policy-makers and other relevant stakeholders in support of inclusive science-based policy making. Effective science-policy interfaces are characterized by relevance, legitimacy, transparency, inclusivity, and ongoing and effective dialogue through an appropriate institutional architecture.

that are relevant to agrifood systems taking into account as appropriate information and analyses produced by existing SPIs, such as the High Level Panel of Experts (HLPE) and the Intergovernmental Panel on Climate Change (IPCC), and to enable ongoing and effective dialogue through the institutional architecture provided by the FAO Governing Bodies. *Ad hoc* interdisciplinary and regionally balanced scientific committees of global experts will be established on key issues to respond to Members' needs for information and analysis. Based on robust science and evidence, FAO will strive to provide understanding of the differences of view on contentious scientific issues, and help to explain areas of disagreement in order to support continued dialogue and convergence. In support of open dialogue, FAO will consider in its analyses the varied and sometimes competing needs, goals and interests of different agrifood system actors.

- iii. Research for development strengthened.³⁴ FAO will strengthen its cooperation with national, regional and international agrifood research organizations, such as CGIAR and AIRCA,³⁵ and relevant global inter-governmental organizations, to maximize collective impact while leveraging the comparative advantages and building on the institutional strengths of each partner organization. FAO will promote public investments in research and support the strengthening of capacities of regional, national and local research and higher education institutions – both formal and informal,³⁶ while building on existing networks, programs and partnerships. Co-creation and co-innovation approaches that promote dialogue between scientific knowledge and local knowledge will be promoted. The participation of beneficiaries of research throughout the entire research cycle, including setting research agendas and developing demand-driven participatory research and systemic approaches, will be promoted to ensure effective outcomes that are adapted to the local context and respond to the need of small-scale producers. Centres of excellence, global networks, reference centres and mutual learning processes between national, regional and international research organizations will be supported. Working through reinvigorated partnerships with the full range of relevant actors, FAO will co-develop a shared global agenda on science and innovation in agrifood systems.

B. Pillar 2: Supporting innovation and technology at regional and country level

41. The need to accelerate impact at country level to achieve the SDGs is highlighted in the FAO Strategic Framework. Supporting the development and uptake of innovations (technological (including digital), social, policy, financial, and institutional), plays a decisive role in this effort. Regional cooperation plays an important role in supporting country level action by facilitating mutual learning processes among countries with shared features. Synergies between regions will be harnessed through inter-regional cooperation on key issues of common interest.
42. FAO provides information and shares technologies, innovations, good practices and case studies, and assists in their adaptation to local contexts. It also provides support to countries on innovative methodologies and tools. While many actors are involved in piloting, FAO's considerable convening capacity gives it the potential of playing a major role, in partnership with other relevant actors, in scaling up pilot initiatives. It also has an important role in ensuring that the uptake of innovation and technology is adapted to local needs and contexts and that no one is left behind. FAO's technical interventions allow it to learn lessons that are incorporated into its normative guidance which then improve technical interventions in a continuous loop of learning and improvement.

³⁴ Research for development demonstrates a clear path to impact development outcomes and includes crisis situations.

³⁵ CGIAR is a global partnership that unites organizations engaged in research for a food-secure future, and AIRCA is the Association of International Research and Development Centers of Agriculture.

³⁶ In line with paragraph 25. n) of the Report of the 168th Session of the FAO Council.

43. This pillar will reinforce FAO's role in supporting innovation and technology at regional and country level through:
- i. Access to, and use of, inclusive, affordable and context-specific innovations and technologies aiming at achieving sustainable agrifood systems by small-scale producers, family farmers and other agrifood system actors enhanced. FAO will deliver updated information about the full range of technological, social, policy, financial and institutional innovations, including evidence of their effectiveness in given contexts. It will develop evidence-based guidance on options for accessing innovations and technologies with sustainable institutional and business models, and support access for small-scale producers and MSMEs across the agrifood system, in particular women and youth. Guidance will be provided on overcoming barriers such as infrastructure, affordability and education, as well as on the institutions that need to be in place to ensure that innovations are inclusive. FAO will work with the private sector to promote incentive mechanisms to make appropriate new technologies accessible in LMICs. Equitable access to education, information and innovations will be promoted through adequate services, including advisory and rural communication services. Innovative, timely and coherent communication and dissemination of available innovations, technologies and good practices will be enhanced.
 - ii. Capacities of national agrifood innovation systems to prioritize, co-create, and scale appropriate innovations and strengthened technologies aiming at achieving sustainable agrifood systems. FAO will assist countries in increasing the capacity of agrifood innovation systems for the co-creation, local adaptation and uptake of innovations through a rigorous approach to the prioritization of innovations and technologies, in line with the guiding principles of this Strategy. Evidence of risks will be assessed and possible risks of the introduction of technologies will be mitigated through the application of the Environmental and Social Management Guidelines. The introduction of new technologies will be informed by relevant UN guidance. FAO will promote co-creation and co-innovation approaches in national agrifood innovation systems. Working in collaboration with its partners, it will promote coordinated pluralistic extension and advisory services that support farmer-to-farmer knowledge sharing. FAO will support the establishment and strengthening of national and regional innovation platforms and hubs for knowledge sharing and capacity development for innovation.
 - iii. National capacity to design, implement and evaluate strategies, policies and regulatory frameworks on science, technology and innovation strengthened. FAO will provide guidance to countries, upon requests, on national policies and regulatory frameworks, institutional arrangements and governance systems for strengthening science and innovation for sustainable agrifood systems. It will provide guidance on dealing with opportunities and challenges posed by new technologies. FAO will promote policies and incentives that create the conditions for innovation to flourish at local, national and regional levels, supported through enhanced regional cooperation, and include consideration of how to identify and manage trade-offs resulting from science and innovation interventions. It will also support the development of national capacities for the implementation and evaluation of policies and frameworks.

C. Pillar 3: Serving Members better by reinforcing FAO's capacities

44. The Strategy is a tool to accelerate implementation of the FAO Strategic Framework 2022–31, which underlines the need to reinforce FAO's capacities through a reinvigorated business model. Reinforcing FAO's capacities on science and innovation is an essential prerequisite for serving Members better and delivering the Strategy, and therefore constitutes its third pillar. While the focus of the Strategy is on FAO Members, the primary responsibility of implementing the Strategy rests with FAO, which acts in support of its Members. FAO will focus on enhanced knowledge management to improve access to information, improved science communication to provide clear messaging and facilitate informed debate, and

enhancing its capacities across the Organization. The Strategy will focus on the following outcomes:

- i. Knowledge management and exchange of information and experiences enhanced. Documentation and sharing of information on science and innovation will be enhanced across the Organization, from country to global level through improved knowledge management. FAO will ensure that all science- and innovation-focused knowledge products are easily accessible. Knowledge management will be designed to facilitate capturing project evaluations and feeding this into the design of new innovation-focused projects.
- ii. Science communication improved. Science communication practices will be improved both within and by FAO to strengthen public awareness and debate, and support science- and evidence-based decision-making. Building on FAO's convening power, science and evidence-based exchange of knowledge will be fostered. Guidance will be provided on communication on new technologies and innovations and scientific uncertainties. Science communication will be timely, consistent and coherent. Special attention will be given to communication on contentious issues.
- iii. FAO capacities to enable science and innovation enhanced across the Organization. FAO will strengthen the use of science and innovation across its programme of work, with particular attention to country offices. FAO's core capability as a trusted source of neutral and scientific based information and analysis, and ability to engage effectively with stakeholders at the local, national and regional level with cultural awareness will be reinforced. It will strengthen its work on keeping up with the latest developments in science and innovation, impact assessment, monitoring and evaluation capabilities, and cross-Organization coordination. Capacities to adopt systemic approaches will be strengthened, including through the modular, flatter structure, which will break down silos and strengthen cross-sectoral collaboration, as foreseen in the FAO Strategic Framework 2022–31. FAO will strengthen its capacities and capabilities in science and innovation through capacity development and better targeted skills profiling to fill gaps, and will draw on lessons from the UN Innovation Network. Progress will be monitored throughout the Organization to allow it to learn lessons from past interventions.³⁷

D. Enablers: Partnerships and innovative funding and financing

45. Transformative partnerships. Partnerships are essential for leveraging technical expertise, accessing research and knowledge, harnessing investments and social capital, creating momentum, sparking innovation, avoiding duplication and enhancing complementarities, expanding capacity development and strengthening communication, outreach and inclusiveness to deliver impact at scale for the SDGs. FAO will develop effective and transformative partnerships for harnessing science and innovation, based on an understanding of the differentiated roles, responsibilities and knowledge of partners. Partnerships with local, national and regional organizations are particularly important for delivering impact on the ground. Partnerships will be guided by relevant FAO policies.³⁸
46. Partnerships with research organizations at national, regional and international levels will be prioritized, including CGIAR, AIRCA, regional research consortia, relevant associations, networks, programs and partnerships, universities, academies of science, national ministries and extension and advisory organizations.

³⁷ Lessons will be incorporated from the Evaluation of FAO's quality of science, which is included in FAO's Indicative rolling plan of evaluations 2022–2025 (see Programme Committee's document PC 132/8).

³⁸ These include the FAO Strategy for Private Sector Engagement 2021–2025, the FAO Strategy for Partnerships with Civil Society Organizations, and the FAO Policy on Indigenous and Tribal Peoples.

47. Other key knowledge holders in agrifood systems include academic institutes, private sector and civil society organizations and these partnerships will be promoted to enhance FAO's access to relevant knowledge networks and support knowledge dissemination.
48. Private sector partnerships will be enhanced – with special attention to MSMEs and entrepreneurs, start-ups and incubators (particularly women and youth). FAO will engage with private sector-led innovations and harness them to achieve the *four betters* through open innovation initiatives, challenges, dedicated grants, prizes, etc.
49. Collaboration with UN entities on science and innovation will be enhanced while avoiding duplication of roles,³⁹ especially the Rome-based Agencies,⁴⁰ and the UN Technology Facilitation Mechanism.⁴¹ FAO will aim to learn lessons from other UN agencies' experiences on innovation. FAO's ongoing collaboration with relevant UN science-policy interfaces will be strengthened in line with FAO's priorities and programmes and as required by the relevant conventions and inter-governmental processes. Innovative cooperation mechanisms, such as the Joint Centres with the World Health Organization (WHO) and the International Atomic Energy Agency (IAEA), will be strengthened.⁴²
50. Innovative funding and financing. Innovative funding and financing – for example through public-private partnerships – is needed to ensure that LMICs do not fall behind on harnessing science and innovation, further exacerbating existing divides.⁴³ FAO will support, facilitate, de-risk and leverage investments at scale and ensure that the quality of funding and financing responds to investment needs, including being inclusive and providing long-term benefits for the poor. FAO's updated Due Diligence Framework for Risk Assessment and Management for Engagements (FRAME) with non-state actors will be followed to avoid any potential conflicts of interest.⁴⁴
51. FAO will strengthen the cooperation in the area of science, research, technology and innovation, including traditional knowledge, to bring sustainable practices to everyone, including through the voluntary sharing of knowledge and practices, research and technology transfer on mutually agreed terms and improve equitable access to research results and technologies on mutually agreed terms at the national, regional and international levels, such as through South-South and Triangular Cooperation and improve access to investments and financial resources.
52. FAO has many opportunities, especially as an implementing agency of the Green Climate Fund (GCF)⁴⁵ and the Global Environment Facility (GEF)⁴⁶, to link technical interventions at

39 For example, The FAO-UNIDO Accelerator for Agriculture and Agro-industry Development and Innovation (3ADI+) programme aims to facilitate the development of inclusive and sustainable agrifood systems that effectively link smallholders and larger farmers to processing, value addition and end-markets supplying higher-value, nutritious and differentiated food, fiber, feed and fuel products to consumers.

40 For example, FAO has partnered with the IFAD, WFP and others, with support from the European Union, to establish the Joint Programme on Gender Transformative Approaches for Food Security, Improved Nutrition and Sustainable Agriculture.

41 The UN Technology Facilitation Mechanisms includes the following components: the UN Inter-Agency Task Team on Science, Technology and Innovation, the Multi-Stakeholder Forum on Science, Technology and Innovation for SDGs, and the Online Platform - 2030 Connect.

42 The Joint FAO/WHO Centre (Codex Food Standards and Zoonotic Diseases) and the Joint FAO/IAEA Centre (Nuclear Techniques in Food and Agriculture).

43 For example, FAO launched the AgrIntel initiative with the European Union (EU) in 2018 to support efforts to crowd in private investment for small and medium Enterprises.

44 FAO Strategy on Private Sector Engagement – Updates and Implementation Status. Report No. PC 132/2. 2021, Rome. <https://www.fao.org/3/ng775e/ng775e.pdf>

45 Since becoming partners in 2016, FAO and GCF have been scaling up climate investments in high-impact projects that make the agriculture, forestry and fisheries sectors more efficient, inclusive, sustainable and resilient to climate change with a portfolio of USD 934.5 million.

46 The FAO-GEF program serves as a key vehicle and catalyst to help FAO achieve its strategic priorities. Since 2006, FAO has helped over 130 countries access more than USD 1.2 billion in GEF funding to deliver tremendous results at the intersection between agrifood systems and the environment.

the country level with normative guidance at the global, regional and national levels in a continuous loop of implementation, learning and guidance.

IX. ACCOUNTABILITY FRAMEWORK

53. The Strategy is a tool to accelerate implementation of the FAO Strategic Framework 2022–31, which contributes to the 2030 Agenda on Sustainable Development. It will be operationalized through an Action Plan that is developed following endorsement of the Strategy, and that will emphasize a broad approach to all types of innovations and all scientific disciplines. Monitoring will be fully aligned with the causal results chains and SDG targets established in the FAO Strategic Framework 2022–31, reflecting all three dimensions of sustainability.
54. The technology and innovation accelerators will be monitored through the relevant key performance indicators (KPIs), and activities under the PPAs will be measured through the most relevant SDG indicators.⁴⁷
55. Reporting on the Strategy will take place in line with the established corporate reporting processes, including through the Mid-Term Review and Programme Implementation Report. Mechanisms will be identified to make adjustments based on findings from regular evaluations, monitoring and reporting to enable continuous learning and improvement. Effective knowledge management will play a key role in ensuring that lessons are learned to inform future improvements of FAO's use of science and innovation.
56. The Council will discuss a mid-term review five years after the adoption of the Strategy. The Strategy may be periodically updated, at Members' request, to reflect important developments.

47 FAO. 2021. The Director General's Medium Term Plan 2022–25 and Programme of Work and Budget 2022–23. <https://www.fao.org/3/ne576en/ne576en.pdf>. The full results framework is available in document CL 168/3 Annex 1: Updated results framework 2022–25. <https://www.fao.org/3/nh231en/nh231en.pdf>

X. ANNEX: DESCRIPTION OF TERMS AS THEY ARE USED IN THIS DOCUMENT

The **agrifood system** covers 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. In the FAO Constitution, the term “agriculture” and its derivatives include fisheries, marine products, forestry and primary forestry products,⁴⁸ as well as livestock.⁴⁹

Innovation consists of doing something new and different whether solving an old problem in a new way, addressing a new problem with a proven solution, or bringing a new solution to a new problem.⁵⁰

Agricultural innovation is the process whereby individuals or organizations bring new or existing products, processes or ways of organization into use for the first time in a specific context in order to increase effectiveness, competitiveness, resilience to shocks or environmental sustainability and thereby contribute to food security and nutrition, economic development or sustainable natural resource management.⁵¹

In the context of agrifood systems, innovation is used as a verb (to innovate) referring to the process by which individuals, communities or organizations generate changes in the design, production or recycling of goods and services, as well as changes in the surrounding institutional environment, that are new to their context and foster transitions towards sustainable food systems for food security and nutrition. Innovation is also used as a noun to refer to the changes generated by this process. Innovation includes changes in practices, norms, markets and institutional arrangements, which may foster new networks of food production, processing, distribution and consumption that may challenge the status quo.⁵²

Interdisciplinary science refers to the specific combination of different fields and/or disciplines to frame research questions, to observe, analyse, and explain a problem. Interdisciplinary science aims at cross-fertilization and mutually enriching collaboration between different types of expertise, within and between disciplines. True interdisciplinary collaboration treats all participating disciplines on an equal footing and develops approaches which transcend established scientific fields. The further apart some disciplines are, the more challenging interdisciplinary science is. Empirically, a genuinely interdisciplinary collaboration between the natural sciences, the social sciences and the humanities is still more the exception than the norm today.⁵³

Science signifies the enterprise whereby humankind, acting individually or in small or large groups, makes an organized attempt, by means of the objective study of observed phenomena and its validation through sharing of findings and data and through peer review, to discover and master the chain of causalities, relations or interactions; brings together in a coordinated form subsystems of knowledge by means of systematic reflection and conceptualization; and, thereby furnishes itself with the opportunity of using, to its own advantage, understanding of the processes and phenomena occurring in nature and society.⁵⁴ As stated by the Committee on Economic, Social

48 FAO Constitution, Article I, paragraph 1. <https://www.fao.org/3/k8024e/k8024e.pdf>

49 FAO Constitution, Rule XXXII, paragraph 6.b). <https://www.fao.org/3/k8024e/k8024e.pdf>

50 UN Innovation Network. 2019. UN Innovation Toolkit.

51 FAO (2019) Proceedings of the International Symposium on Agricultural Innovation for Family Farmers - Unlocking the potential of agricultural innovation to achieve the Sustainable Development Goals. Ruane, J. (ed.). Rome.

52 HLPE. 2019. Agroecological and other innovative approaches for sustainable agriculture and food systems that enhance food security and nutrition. A report by the High Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security, Rome. <http://www.fao.org/3/ca5602en/ca5602en.pdf>

53 UNESCO. 2018. Guidelines on Sustainability Science in Research and Education.

54 UNESCO Conference, Recommendation on Science and Scientific Researchers, 2017 (paragraph 1.a.i)

and Cultural Rights, other systems of knowledge and ways of knowing coexist with science, including local, traditional and indigenous knowledge, and have an important role to play in the global scientific dialogue.⁵⁵

Sustainability Science is research and education that result in new knowledge, technology, innovation and holistic understanding which will allow societies to better address global and local sustainability challenges. Sustainability Science can include disciplinary, interdisciplinary and transdisciplinary science. Sustainability Science is a user-driven and user-inspired academic research process, building from integrated knowledge from various scientific and societal bodies of knowledge and from territories-based integrated experiences.⁵⁶

Technology for sustainable agrifood systems can be defined as the application of science and knowledge to develop techniques to deliver a product and/or service that enhances the sustainability of agrifood systems.⁵⁷

Transdisciplinary science is the methodology that addresses topics across and beyond disciplines, through a comprehensive and holistic framework. In this context, it engages disciplines and interdisciplinary research, but should also consider the collaboration between professional scientists and diverse non-academic stakeholders, either individuals or institutions, in order to benefit from and contribute to their understanding of a problem and their specific knowledge. Transdisciplinarity involves interaction at every step of a scientific endeavour.⁵⁸

55 Committee on Economic, Social and Cultural Rights, General comment No. 25 on science and economic, social and cultural rights in the International Covenant on Economic, Social and Cultural Rights, 2020 (paragraph 39)

56 UNESCO. 2018. Guidelines on Sustainability Science in Research and Education.

57 Adapted from A/74/238. Agriculture technology for sustainable development. Report of the Secretary-General. Seventy-fourth session

58 UNESCO. 2018. Guidelines on Sustainability Science in Research and Education.

