

CGIAR Program on Forests, Trees and Agroforestry (FTA)

FTA Prioritization framework and guidelines

Approved by the Independent Steering Committee of FTA

14 November 2017

I) Problem statement

This note aims at framing the prioritization amongst research activities funded by CGIAR W1+2 funds for the CGIAR Research program on Forests, Trees and Agroforestry (FTA). It defines a set of guidelines for prioritization, linked to research and development relevance, to quality of research, and -when 1+2 funding is asked- to the nature of the CGIAR W1+2 funds and the specific requirements that go with them.

These prioritization guidelines will be used to inform the direction of W1+2 research, as a way to align the preparation of the POWBs to a set of agreed priorities and to ensure the highest level of exigence in terms of quality of the research planned forward.

For the purpose of this exercise, a *priority is a coherent and focused set of works/activities (funded by bilateral projects or funded by W1+2) whose outputs aim at answering one or several key knowledge gap(s), and whose outcomes are directed to respond to a major development demand/challenge, building on the comparative advantage of FTA and its partners, and aiming at maximizing the effectiveness and impact of FTA.*

Flagships and Cross-cutting teams will be requested to submit Priorities notes. The objective is not to trigger unnecessary internal competition. At the contrary, the prioritization process and guidelines have for main objective to enable and structure an inclusive dialogue, and to improve the quality and alignment, ex-ante, of the FTA POWB to a set of priorities, as well as with in FTA for the preparation of the POWB, which will also give more opportunity to improve the research design, and to maximize cross-linkages within FTA.

Overall, the prioritization process aims to promote and select the highest quality and most impactful priorities and related set of activities (which will also imply an issue of balance across the overall FTA ToC) over time, for a priority use of W1+2 resources towards FTA's overall objectives (outputs in the sphere of control, outcomes in the sphere of influence, impact in the sphere of interest).

The present note is a starting point and is intended as a living document. It is hereby released as an internal draft advanced document, for the purpose to support the process of the elaboration of the 2018 program of work and budget of FTA (see the corresponding note on 2018 priorities and 2018 POWB preparation process).

Section II exposes how the prioritization guidelines have been determined, section III describes the guideline for assessing priority relevance, section IV summarizes the 8 guidelines for prioritization, the annexes gather supplementary information used to identify the priority areas.

II) Materials and methods

Investment in FTA research is decided according to the overall framework of quality of research for development (QoR4D) adopted at the CGIAR level.

This QoR4D framework has 4 dimensions: relevance, scientific credibility, legitimacy and effectiveness. The relevance dimension of QoR4D is the one linked to the identification of priority areas for FTA research (see section III). Relevance is the first, major guideline for FTA priority setting. The other QoR4D dimensions of scientific credibility and legitimacy, effectiveness will also be applied and form distinct, additional guidelines.

Three other guidelines linked to the specificity of W1+2 funding will also be used: contribution to IPGs, strategic value and programme building, and the requirements that comes with them.

A criterion/guideline on integration (across FTA, of disciplines, of stakeholders) has been added following the consultations and feedback received during two events FTA organized at IUFRO and CFS in September and October 2017. Integration across several dimensions (between topics, disciplines, upstream and downstream, and integrated in the way research is done with beneficiaries and stakeholder involved from the framing of questions to the design of research and solutions) is thus proposed as a guideline for prioritization in its own right. Integration is seen here as an element of quality of research, contributing to both the scientific credibility, legitimacy and effectiveness.

As decided in the ISC-FP leaders meeting in Rome end June 2017, the “relevance” guideline to identify priority areas are established following:

- a forward-looking review of the main trends, challenges and opportunities that bear on forests, trees and agroforestry, their role and potential towards ensuring food security and nutrition, addressing climate change and fostering sustainable development (see Annex A).
- a review of the associated knowledge and research gaps as identified in relevant major international scientific assessments and foresight studies, including those identified in the FTA proposal (see Annex B).
- a review of the demands and priorities of countries and stakeholders, as expressed in key international documents, including development gaps. (see Annex C).

The above reviews build upon major sources in the international literature, major international texts, as well as on the results of two face-to-face international consultations of scientists and stakeholders that took place for that purpose in the second semester of 2017:

- a sub-plenary event on “Research for sustainable development: the case of forests, trees and agroforestry” co-organized by FTA and IUFRO at the 125th congress of IUFRO on 22nd September 2017 (see Annex D)
- a side-event to the 44th session of the UN Committee on World Food Security, co-organized with FAO, The Netherlands, SIANI, on “Forests, trees and agroforestry for food security and nutrition and the SDGs: research and partners, towards a joint action agenda” (see Annex E).

III) Guidelines for assessing priority relevance in FTA

The overall purpose of FTA is to respond, in its areas of work, to the following overarching development objectives, which are aligned to both the CGIAR SLOs and the SDGs :

1. poverty reduction
2. food security and nutrition
3. addressing climate change and more largely environmental sustainability
4. contributions to meeting the sustainable development goals.

In particular, FTA aims at inscribing itself as a mean of implementation of the SDGs and of the Climate Change and the Food security and nutrition agenda.

FTA’s overarching question of interest is: How can trees and their use by man and in nature in all their acceptations and forms (cf. HLPE fig 2, trees outside forests, agroforestry, forests, plantations, etc.. and including the value chains created by their uses), within landscapes, fully contribute to sustainable development in its various dimensions (economic, social, environmental) and at different scales, what can people do to enhance these roles, and how can they be supported for that?

The reviews have led to the identification of major trends affecting forests, trees and agroforestry and of the following four dimensions of the FTA priority framework.

1) Key research and knowledge gap areas (see Annex B for details)

1. Contributions of FTA systems to Food Security and Nutrition
2. Land use and land use changes, and their consequences on FSN and on CC
3. Role of forests and trees in water circulation
4. How to improve FTA systems
5. Impacts of CC and adaptation to it
6. Role of FTA systems for and impact of LUC on ecosystem services
7. How to improve landscape management and forest and land restoration, to manage synergies and tradeoffs for ecosystem services, tree genetic resources, biodiversity and to underpin production
8. Building sustainable, efficient and inclusive value chains and business models
9. Responsible investments for sustainable production and consumption
10. Governance arrangements in value chains, in landscapes, and across sectors (including gender)

11. Cross-cutting research gaps

2) Key demand/priority areas (see Annex C for details):

- a. Improve food security nutrition and health: SDGs 2,3, CFS-Forestry, UNSPF-2
- b. Increase, diversify and stabilize rural household incomes and economies: SDGs, CFS-SH, UNSPF-2
- c. Contribute to productive and resilient agricultural landscapes: SDGs 15,6,4, CFS-SH, CFS-Forestry
- d. Preserve and sustainably manage biodiversity, ecosystems, environment: CBD, UNSPF-1, UNSPF-3, CFS-Forestry
- e. Contribute to climate change mitigation and adaptation: Paris Agreement, SDG 13, CFS-CC, UNSPF-1
- f. Contribute to sustainable value chains and sustainable production and consumption, including renewable energy and materials: SDGs 7, 12, 13
- g. Improve gender equality and social inclusion: SDG 5, CFS-Forestry, CFS-SH

3) The contribution to FTA Theory of Change (ToC) = importance of the work with respect to FTA's ToC and potential, catalytic importance of impact (of addressing the research gap or providing the solution), as per the impact pathways of FTA (critical points, and/or breadth of the question/issue, now or in the future).

4) The identification of FTA's comparative advantage (mission, role, internal competencies, available data). The FTA full revised proposal (2016) including the resubmitted FTA FP2 (2017) serve as reference.

- All in all, with these FTA prioritization guidelines, those ex-ante proposals for work will be inserted into the POWB if they answer key research questions, that are central to address demands of stakeholders, that are critically positioned in FTA's ToC, and building upon FTA's comparative advantage, and that lead to integration (across FTA, of disciplines, of stakeholders).

IV) Prioritization Guidelines

Summing up, the 8 guidelines for prioritization are the following

1. **Relevance:** The proposal clearly demonstrates the relevance of the work measured as to what extent it fits into the following framework.

GUIDELINES FOR ASSESSING PRIORITY RELEVANCE

1) Main research gap addressed

The proposal addresses one/several key research gap category(ies)
Description of the key research questions (Annex B).

2) Development demand /priority addressed

The proposal addresses one or several key main categories of development demand / priority.

The proposal targets a specific recommendation or goal to which the research will make a contribution (see Annex C).

3) Contribution to FTA ToC

The proposal contributes to FTA ToC in a catalytic way.

4) FTA's comparative advantage

FTA has a comparative advantage in undertaking the proposal: alignment to FTA's missions and roles, existence of internal competencies, available data, building on previous works etc.

2. **Scientific credibility:** The proposed work clearly explains the scientific rationale, research question(s) and methods, giving confidence that research findings will be novel, robust and scientifically trustworthy.
3. **Legitimacy:** The proposed work clearly explains how the work will take account of and reflect stakeholders' perspectives and values. Research is done in contact with beneficiaries and stakeholders are involved from the framing of questions to the design of research and solutions.
4. **Potential Effectiveness:** The proposed work demonstrates that the work is deliberately and convincingly positioned to contribute to significant outcomes, with high potential to contribute to development objectives and impact.
5. **Contribution to IPG:** The proposed work has high potential to develop methods and/or new knowledge that will have international public goods value.
6. **Strategic value:** The proposed work has high potential to add value at the FTA Program-level and will use W1+2 funds to strategically orient, build-on and leverage bilateral funding to help realize the FTA ToC.
7. **Program growth:** The proposed work has high potential to contribute to the growth of FTA through developing and strengthening partnerships, generating additional development opportunities and attracting and leveraging new resources.
8. **Vertical, horizontal and/or temporal Integration.** The proposed work (i) feeds or has potential to feed into other flagships and research areas and for bringing coherence in methodological approaches, such as enabling the creation of extrapolation domains; and/or

(ii) promotes continuity of action along the research to development continuum in FTA's impact pathways; and/or (iii) *contains* programmatic learning, extends projects' scientific and development relevance beyond their completion.

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Annex A

A forward-looking review of the main trends, challenges and opportunities that bear on forests, trees and agroforestry, their role and potential towards ensuring food security and nutrition, addressing climate change and fostering sustainable development

The following documents were used for the identification of *the main trends challenges and opportunities that bear on forests, trees and agroforestry, their role and potential towards ensuring food security and nutrition, addressing climate change and fostering sustainable development*:

- the latest FAO (2017) document on trends and challenges for the future of food and agriculture document¹
- the latest Global Forest Resources Assessment (FAO, 2015)
- the Millennium Ecosystem assessment (MEA, 2005)²
- the foresight exercises from the CGIAR, led by IFPRI (2017)³
- the High-Level Panel of Experts on Food Security and Nutrition (HLPE, 2017) report to the UN Committee on World Food Security, on Sustainable forestry for Food Security and Nutrition (2017)⁴
- the two notes (2014, 2017)⁵ on critical and emerging issue for food security and nutrition of the HLPE.
- the latest reports from the High-level Political Forum on Sustainable Development⁶
- the latest outcomes of the UNFCCC (Paris Agreement, 2015)⁷ and non-paper on discussion on agriculture (2016)⁸ and the discussions on land-use, land-use change and forestry related mechanisms⁹
- the latest outcomes of the IPBES (especially on pollinators, 2017¹⁰) and of the CBD.
- The UN strategic plan on Forests 2017-2030¹¹.

¹ <http://www.fao.org/3/a-i6583e.pdf>

² <http://www.millenniumassessment.org/en/index.html>

³ <http://www.ifpri.org/publication/foresight-modeling-agricultural-research>

⁴ <http://www.fao.org/cfs/cfs-hlpe/news-archive/detail/en/c/897368/>

⁵ <http://www.fao.org/cfs/cfs-hlpe/critical-and-emerging-issues/en/>

⁶ <https://sustainabledevelopment.un.org/hlpf>

⁷ http://unfccc.int/meetings/paris_nov_2015/items/9445.php

⁸ http://unfccc.int/land_use_and_climate_change/agriculture/items/8793.php

⁹ http://unfccc.int/land_use_and_climate_change/lulucf/items/1084.php

¹⁰ http://www.ipbes.net/sites/default/files/downloads/pdf/pollination_chapters_final.pdf

¹¹ http://www.un.org/esa/forests/wp-content/uploads/2016/12/UNSPF_AdvUnedited.pdf

1) Deforestation and changes in forest cover, in forest distribution, composition and management

Many drivers of deforestation lie outside the forest sector and are rooted in wider social and economic issues, including challenges related to reducing poverty, urban development and policies that favor land uses which produce higher and more rapid financial returns, such as agriculture, energy, mining and transportation.

In 2015, almost 4 billion ha worldwide (30.6 percent of the world's land area) were covered by forests. Despite relatively high rates of ongoing deforestation, particularly in the tropics, the global net forest loss has slowed over the past two decades. The FRA 2015 (FAO, 2015) has also provided for the first time global figures on forest degradation based on partial canopy cover loss (PCCL)¹² and estimated that, in the tropics, the area subject to PCCL is 6.5 times the area deforested since 1990.

Changes in forest and tree cover has considerable impacts on forests' role and potential towards ensuring food security and nutrition, addressing climate change and fostering sustainable development at different spatial and temporal scales.

Deforestation and forest degradation threaten income, livelihoods and ways of life of forest-dependent populations, and compromise the provision of ecosystem services that are essential to FSN and sustainable development in the long term. Deforestation for agricultural expansion is sometimes considered to offer greater opportunities for welfare improvement. However, those immediate benefits can result in depletion of natural resources, simplified diets and compromised livelihoods and ways of life in the long term. Finally, deforestation and forest degradation, leading to habitat fragmentation, can also impact human health by increasing the risk of transmission of pests and diseases.

Deforestation and forest degradation can threaten some of the contributions of forests to FSN, particularly when such contributions are less visible or concern marginalized and most vulnerable groups.

In the highly-globalized world that forested landscapes are a part of, women are increasingly migrants, left behind, and/or both. These are likely to have different and contrasting consequences for women's empowerment, work burden and social capital. (FTA proposal, p23)

The trends and challenges call for a better understanding of the drivers of change, and of the dynamics at play in evolving landscapes such as secondary forests, landscape mosaics, agroforestry systems and their impact for FSN and sustainable development, and for a better support for the forest restoration of areas that qualify as other wooded land.

2) Increase of plantations

The overall decrease in total forest area is the result of contrasted trends across forest types and across regions. Between 1990 and 2015, most regions showed a steady decrease in natural forest area, including primary and secondary forests, and a sharp increase in planted forests. The loss of primary forests is of particular concern as they are irreplaceable reserves of

¹² Defined as the loss of more than 20 percent of tree cover between 2000 and 2012.

biodiversity (Gibson et al., 2011). Planted forests are increasingly important, not only in terms of area, increasing from 4 to 7 percent between 1990 and 2015, but also in terms of production, with 46.3 percent of industrial roundwood coming from planted forests in 2012 (Payn et al., 2015). Planted forests are also a way to restore degraded land and to provide ecosystem services such as reduced erosion and protection from floods. Considering the increasing demand for wood, planted forests could help to reduce the pressure on natural forests (Sloan and Sayer, 2015).

Changes in forest cover, forest types and uses are driven by the interaction of numerous factors, at local and global levels: growing demand for food, feed, wood and energy, driven by population and income growth; and increased importance given to the protection of biodiversity, to carbon stocks, water and soil protection. They also depend on the governance systems that address and manage these demands.

3) Agrobiodiversity erosion

Intensification of agriculture is associated with considerable losses of agrobiodiversity, at variety, species and landscape levels. This last one drives the loss of wild agrobiodiversity that plays a considerable role, even if not totally understood, in agricultural production. The best studied example is pollinators. Their abundance, diversity and health as well as the provision of pollination are threatened. Reversing the simplification of agricultural landscapes offers key strategic responses to risks associated with pollinator decline (IPBES, 2016).

More generally there is increasing awareness that agroecosystems and other natural ecosystems should not be considered as “separated” (Poppy et al., 2014), rather, in planning agroecosystems, land managers should consider the way in which services can flow between the agroecosystem and surrounding ecosystems.

Conversion of natural habitats, such as forests and wetlands, into farmland has been a leading cause of loss of global biodiversity (Green et al., 2005). Furthermore, mono-cropping agriculture and increased landscape homogeneity due to regional and farm-level specialization, loss of marginal and uncropped habitat patches, have resulted in dramatic declines of many species using farmland habitat. (Robinson and Sutherland, 2002; Benton et al., 2003; Wilson et al., 2009). (#7)

There is increasing recognition of the potential of farming systems that better use ecosystem functions to sustainably increase production (sustainable intensification, agroecology,...) and of the key role that trees play at landscape and field levels in that respect (IAASTD, 2009; FAO, 2011).

4) Increase in demand for food, feed, wood and bioenergy

Given the global population and economic growth, the increase in demand for food, feed, wood and bioenergy is expected to continue in the future. According to FAO, global food demand will increase by 50% between 2007 and 2050, with associated pressures on land resources. Wood demand is expected to double by 2030 in developing countries (WWF/IIASA, 2012). Between 2013 and 2020, demand of bioenergy for electricity is expected to increase by 50% and for heating by 25% (IEA, 2016).

Growing influence of some consumption trends in favor of more “natural”, sustainable products can create new markets both for wood products (building, furniture...) and for NWFPs, particularly for foods that can also qualify as so called “superfoods”, rich in micronutrients.

5) Sustainable value chains and responsible investments

There is an increasing interest of various categories of stakeholders towards sustainable value chains, at different scales. Enhancing the sustainability and inclusiveness of global timber, tree-crop and agriculture value chains increasingly requires more complex governance arrangements involving governments, civil society and the private sector across both consumer and producer countries (FTA Proposal, p107). There is increasing interest in market-based instruments to recognize and valorize the different contributions of forests, especially related to environmental issues. Examples include carbon credits and other payments for environmental services, certification and green procurement. Forest certification plays an important role in assessing and monitoring the sustainable management of forests in an independent way.

6) Climate change impacts on forests and on livelihoods and agriculture at large

Negative impacts of climate change on forests and trees are already apparent in many places, even if it is often difficult to separate climate change from other stresses (FAO, 2016), with increasing tree mortality due to heat stress, drought stress and pest outbreaks (Allen *et al.*, 2010). Changes in fire regime, insect outbreaks and pathogen attacks are becoming increasingly apparent (Settele *et al.*, 2014).

At the same time forests and trees are playing an increasing role to ensure the resilience and food security of vulnerable populations, especially in times of crisis, whether due to the loss of a harvest or to conflicts.

Forests and trees need now to adapt to climate change as well as to contribute to the adaptation of farming systems, communities and landscapes, including coastal areas and urban landscapes.

7) Land Degradation

Land degradation fuels additional demand for land for agriculture, creating additional pressure on forests, but also opportunities for reforestation and afforestation. There is at the same time increased awareness of the role of forests to protect soil, water and biodiversity and to contribute to climate change mitigation.

8) Increased competition for land

These trends intensify the competition for land. They also intensify the competition between forest uses, for environmental preservation, for timber and wood production, and for food and other NWFPs, each of which impacts FSN.

Addressing the issue of competition for land while taking into account agricultural and forests demands on the one hand, environmental and climate concerns on the other hand, calls for tackling consistently the trade-offs at and between different scales, from local to global.

ANNEX B

A review of the associated knowledge and research gaps as identified in relevant major international scientific assessments and foresight studies, including those identified in the FTA proposal

Several scientific assessments have explicitly identified research gaps and/or research needs. Have been used here:

- the latest Global Forest Resources Assessment (FAO, 2015)
- the High-Level Panel of Experts on Food Security and Nutrition (HLPE, 2017) report to the UN Committee on World Food Security, on Sustainable forestry for Food Security and Nutrition (2017)
- The IUFRO report on Forests, trees and landscapes for food security and nutrition. IUFRO World Series, 33.
- The Fifth Assessment Report of the Intergovernmental Panel on Climate Change (2014), in particular chapters 3, 4, 5, 7, 9, 10 of working group II and chapter 3 of working group III.
- The State of the World's Forest Genetic Resources (FAO, 2014)

However, they are generally not exhaustive, with often a focus on data and quantitative analysis gaps. The FTA proposal also has identified a range of knowledge gaps, either gaps in fundamental knowledge or gaps in knowledge for implementation and up-scaling (know-how/do-how?), both type of knowledge needing to be paired in a program like FTA.

From a review of the sections explicitly dedicated to research gaps and needs in recent assessments of relevance for FTA, the following areas can be identified. For simplification, the references of each of the gaps are provided in the excel file. Intentionally, these are reproduced verbatim from the source.

1) Contributions of FTA systems to Food Security and Nutrition

1. Assessment of FTA contributions to FSN, by gender, especially forest dependent people.
2. Extent of the various forest and tree-based systems, number of people depending on them and impacts on their diets.
3. Food values of forest mosaics from shifting cultivation systems
4. Better quantification of benefits of communities from different tree productions
5. How does landscape diversity contribute to human well-being and healthy diets?

6. Use of wild foods and impacts of their harvest on long term availability.
7. Nutrient composition of wild foods
8. Understand effects of commercialization and/or plantation of NTFPs
9. Relationships between land tenure, access and FSN, in forests and tree based systems.
10. How can landscape-level interventions help pest management and which approaches are the most economically and socially sustainable?
11. Innovations to reduce health risks in woodfuel use.
12. How does landscape multi-functionality contribute to human well-being and healthy and diverse diets through the (local) availability of and access to improved tree food sources as well as wild foods (i.e. provisioning services part of the wider ecosystem services concept)?

2) Land use and land use changes, and their consequences on FSN and on CC

13. What land use systems are present where in the landscape and what are current patterns and intensities of change (tree cover, objectively observable aspects of forests, farms, other land uses) in space and time.
14. What are the current patterns and intensities of change in tree cover?
15. Can observed land use changes be understood ('why?') on the basis of drivers that operate at larger scales, demography and economic policies?
16. Dynamics and drivers of change of landscapes with trees, and impacts on FSN and SDGs.
17. Impacts of deforestation and forest degradation of FSN and nutritional status
18. Integrated research is needed on changes in land use and trade-offs between land uses under climate change, including non-agricultural land uses such as conservation and tourism.

19. Improved understanding of the mitigation potential, interplay, and costs as well as environmental and socio-economic consequences of land use-based mitigation options such as improved agricultural management, forest conservation, bioenergy production, and afforestation on the national, regional, and global scale.
20. The IPCC decided to prepare a special report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems. The report will be finalized in September 2019.

3) Role of forests and trees in water circulation

21. The role of forests and trees in water circulation
22. Impacts of climate change on the partitioning of precipitation into evapotranspiration and runoff.
23. IUFRO was tasked by the Collaborative Partnership on Forests (CPF) to carry out a global scientific assessment on the interlinkages between forests and water in the frame of the Global Forest Expert Panels initiative (GFEP).
24. How will water flows from forests be affected in a changing climate?

4) How to improve FTA systems

25. food tree domestication
26. Develop new tree commodities compatible with crops
27. Genetic selection for commodity crops cultivars that do well under shade; including by using wild relatives still found in shaded habitats.
28. Improve estimates of extent of agroforestry
29. Diverse suitable agroforestry systems
30. Mixed agroforestry systems combining tree commodities with important local foods
31. Assess complementarity and resilience of crops in agroforestry under cc

32. What is required in terms of an enabling environment to switch from unsustainable monocultures to more diverse and resilient production practices?
33. How can smallholder tree-crop commodity production systems be sustainably managed in the face of climate change, price volatility, declining yield and soil fertility following forest conversion, coupled with constraints on opening new forest areas, and those imposed by the dynamics of migration?
34. An emerging discourse suggests that what is needed is not a single path but many paths of sustainable intensification based on a wide variety of systems (from fallow rotation, agroforestry, mixed crop-livestock and crop aquaculture systems to minimum tillage and precision agriculture) that are appropriate to a large number of specific agroecological and socioeconomic contexts. It will be increasingly important to understand how science-based efforts can respond to real challenges and produce results useful to sustainable intensification that fit a diversity of circumstances.
35. What are the optimum levels of tree density and diversity in different contexts required to increase total productivity of smallholder livelihood systems while conferring resilience at farm and landscape scales? And how to promote it?
36. What combinations of forestry, agroforestry, grass cover, water-collecting systems and storage facilities, drought-resistant crops and water-saving technology are needed in arid and semi-arid areas to increase food production, and to what extent can they become cost-effective?
37. How can tree crops help to build critical livelihood assets (e.g. human, social, natural, physical and financial capital), and how do asset endowments and dynamics vary across and within households according to gender and age? How can access to and control over these assets by women and young people be improved?
38. What is the relationship between tree cover (density and diversity) and pasture and animal productivity and welfare in silvo-pastoral systems?
39. Where are there trade-offs and synergies in silvo-pastoral systems between production goals and the provision of other ecosystem services?
40. How best to develop multi-strata silvopastoral systems, live fences, windbreaks and fodder banks as key development options to sustain smallholder livelihoods based on pasture use?

41. What part can reclamation, restoration and rehabilitation of degraded land play in increasing global food production?
42. What are the best integrated cropping and mixed system options (including fallow rotations and other indigenous cropping systems for cereals, tubers and other staples, agroforestry, crop-livestock and crop-aquaculture systems) for different agroecological and socioeconomic situations, taking account of climate and market risk, farm household assets and farmers' circumstances?
43. Analysis of development practice reveals that current forest and agroforestry options available for smallholders, while benefitting some people, are: (i) not comprehensive in terms of the contexts they cover (leaving some people without appropriate options for improvement); (ii) are often promoted outside their appropriate contexts (revealing gaps in our understanding about matching options to context); and (iii) require an appropriate enabling environment, especially for marginalized people to benefit from them (and for perverse outcomes to be avoided).
44. How can we most efficiently, effectively and equitably co-develop design principles for matching options that improve the use of trees and forests by smallholders (comprising technologies, extension methods and market interventions, and policy and institutional instruments) to the fine-scale variation in the context of smallholder livelihood systems? This requires us to understand how contextual variables condition the suitability of options and to embed participatory action research within a systematic frame.
45. What type of extension arrangements will improve the uptake and gender responsiveness of forestry and agroforestry technologies and planting materials and create opportunities for women's empowerment?
46. What are appropriate, cost-effective domestication approaches for priority trees, and how can impacts in providing products and services be effectively assessed among possible domestication options, to maximize efficiency in bridging production gaps and in enhancing profitability?
47. How can domestication approaches be developed and implemented that fully consider the trade-offs involved across the intensification gradient (polycultures-monocultures), and support higher levels of species and genetic variation in production landscapes, to strengthen their resilience?

48. What are appropriate measures to put in place (e.g. the protection of intellectual property) to support the wider participation of smallholders and local communities in developing new and unique 'cultivars' of a wide range of tree species, that supports impact by out-scaling?
49. How do different approaches to forest management impact smallholder livelihoods at the forest margin?

5) Impacts of CC and adaptation to it

50. Better understanding of the effect of changes in climate parameters, rising CO₂ concentrations and N deposition on productivity and carbon stocks of different types of ecosystems, and the related consequences for land-based climate change mitigation potentials.
51. Globally standardized and homogenized data on soil as well as forest degradation and a better understanding of the effects of degradation on carbon balances and productivity.
52. How can we achieve effective land-based mitigation of climate change?
53. How can people and forests effectively adapt to climate change, and how can forest and trees best contribute to adaptation of livelihoods?
54. How can we sustainably produce bioenergy in developing countries?
55. How can we reliably assess the performance of policy and practice addressing these goals?
56. Valuation and costing of climate change impacts
57. More research is needed on vulnerability
58. Research is needed on practical adaptation options
59. What are the structural causes of gender differentiated impacts of climate change, and what factors strengthen the voice, influence and entitlements of marginalized groups resulting from adaptation and mitigation policies and interventions?

6) Role of FTA systems for and impact of LUC on ecosystem services

60. How resilient are tropical forests to logging disturbance?

61. What is the conservation value of managed natural forests?
62. What are the consequences of land use changes for ecosystem function and services?
63. What are the consequences of changes ('so what?' and 'who cares?') in quality, quantity and spatio-temporal configuration of forest and tree cover in landscapes for ecosystem functions that underpin the provision of usable goods and other ecosystem services (with specific attention to biodiversity and the full hydrological cycle e.g. effects on terrestrial recycling of rainfall, safe drinking water, water-sustainable agricultural intensification, and regulated water flows)
64. How are perceptions and preferences of ecosystem functions differentiated by gender, ambitions of young people and intergenerational aspects?
- 7) How to improve landscape management and forest and land restoration, to manage synergies and tradeoffs for ecosystem services, tree genetic resource, biodiversity and to underpin production**
65. A clear programme of work on managing landscapes and ecosystems for biodiversity conservation, agriculture, FSN should be central to development aid.
66. Links between valorization of ecosystem services, their integration in global commodity markets and impacts on local people rights and access.
67. How to tackle trade-offs between different stakeholders at landscape level
68. How far can research understand relationships between forest systems and other land uses at landscape level
69. What are the trade-off between benefits of forest management and resulting impact on environmental services (goods, carbon, biodiversity)?
70. Can payments for ecosystem services (e.g. carbon sequestration, green water credits, biodiversity enrichment) lead to adoption of recommended land-use and management practices by resource-poor farmers in developing countries?
71. What is the relationship between tree cover (density and diversity) and soil health and where are there trade-offs and synergies between production goals and the provision of other ecosystem services?
72. How to link local innovations to a supportive policy and institutional environment

73. Where would natural habitat restoration provide the greatest food and environmental benefits to society?
74. What are the most cost-effective indicators and methods to determine the extent, trends/threats and value (current and option, for productivity and resilience) of TGR in natural and restored forest, farm and other settings, to identify the location and intensity of threats to valuable TGR and support the development and implementation of appropriate safeguarding partnerships and activities?
75. What are the minimum requirements and optimal combinations of safeguarding approaches for TGR, considering synergies and trade-offs between them in specific contexts, including in particular geographic regions, production systems, landscapes, and policy environments, and considering different users' needs, to support sustainable resource management?
76. How can stakeholders be convinced and supported (e.g. through payments for ecosystem services) to develop, implement and monitor cost-effective conservation plans and strategies for safeguarding TGR in different contexts (forest, farm, etc.), taking into consideration conservation status, trends and threats for target species, and local knowledge and experience?
77. How can existing 'green economy' planning tools for land use for multiple ecosystem services be improved, adapted and adopted more widely?

8) Building sustainable, efficient and inclusive value chains and business models

78. Direct and indirect social and environmental impacts associated with different policy interventions for enhancing the sustainability of commodity supply?
79. Critical questions remain unanswered about the challenges and risks associated with enhancing the participation of resource-poor smallholders in value chains linked to high potential markets. Challenges and risks, benefits and costs associated with smallholders' integration into value chains with greater adoption of social and environmental standards?
80. Better knowledge is needed on how to build business options and fair partnerships that create opportunities for these local actors increasingly involved in global value chains.
81. What types of strategies, institutional arrangements, interventions and safeguards should be used to improve gender responsiveness of FTA value chains and business models? How can potential synergies be amplified – and trade-offs mitigated – between the gender

responsiveness and the environmental and economic sustainability of such business models?

82. How can barriers be removed to smallholders accessing markets for tree and forest products, allowing them to capture more of their value, especially for people who are socially or economically marginalized (including women and young people)?
83. How can smallholders profitably produce and market quality timber on a small scale?
84. While gender roles and relations often structure the extent and nature of women and men's engagement with FTA value chains, systematic sex- disaggregated data on male and female participation, activities and benefits is scarce. As various private initiatives are gaining traction, discussions about their potential gendered impacts is limited. There is a need for further research on how gender norms and relations structure women and men's engagement with FTA value chains in various contexts, as well as understanding what kind of institutional arrangements foster gender-inclusive participation.
85. Evidence and options to address the structural and institutional factors that constrain youth participation in tree and forest product value chains and non-farm entrepreneurial activities?
86. What are the most effective ways to characterize, evaluate and monitor ultimate success of the current tree-planting-material delivery systems to smallholders and other growers, including of the sources, pathways, actors (collectors, producers, traders, other distributors, NGOs, government agencies, etc.) and policies involved, in order to provide a baseline from which to make improvements?
87. What are the most cost-effective and equitable tree-planting-material multiplication and delivery systems for smallholders and other growers, to supply high-quality, site-appropriate material, taking into account: the required scale and reach; the appropriate division of costs and benefits among stakeholders; the need to provide complementary options to buffer production risks; and the existing policy environment?
88. What decision-support tools, policy measures and regulatory frameworks are required to allow growers to match and anticipate production requirements and restoration objectives with suitable, available tree-planting material, taking into consideration changes in climate, markets, social diversity, quality of natural regeneration and other important trends?
89. What political, institutional and social factors contribute to shape the adoption and implementation of public policies and private sustainability standards and commitments?

90. How do private standards and commitments, in their interaction with public policy at different scales, influence the effectiveness and adoption rates of sustainable practices in value chains?
91. What are the public, private or hybrid arrangements that have the most potential for enhancing the adoption of sustainability practices and social inclusivity in the value chain?
92. What production and management practices are needed to simultaneously increase sustainable supply and social inclusion and equity (gender, intergenerational)?

9) Responsible investments for sustainable production and consumption

93. Better understanding is needed on how to promote investments that safeguard the rights of marginalized groups such as women and indigenous people?
94. Better understanding is required on the potential of financial institutions and innovative financing mechanisms to support the adoption of sustainability practices while addressing the needs of investors and smallholders and SMEs.
95. There is a lack of knowledge on how best ESG integration in financing decisions can translate into the adoption of sustainability practices. Important questions remain about how to scale FSP adherence to ESG principles and how to enable FSPs to more effectively leverage their capacity to influence corporate policy and practice. Effectiveness of financial services providers (FSPs) to influence corporate policy and practice with positive impacts for smallholders and the natural resources base? ESG integration implications for smallholders and SMEs and the impacts from emerging innovative financing mechanisms need to be explored.

10) Governance arrangements in value chains, in landscapes, and across sectors (including gender)

96. Who are the actors and stakeholders of the landscape, in a historical-political perspective on (claimed) rights, an economic perspective on livelihoods and value chains and a cultural-social perspective on identity and aspirations?
97. Enhancing the sustainability and inclusiveness of global timber, tree-crop and agriculture value chains increasingly requires more complex governance arrangements involving

governments, civil society and the private sector across both consumer and producer countries.

98. An improved evidence base is needed on the complementarities between regulatory frameworks, system standards and corporate sector self-regulatory commitments that can reverse the conditions shaping inefficient, unsustainable and inequitable land use.
99. Major knowledge gaps still exist on the direct and indirect social and environmental impacts of different types of governance arrangements and the potential synergies within and between different types of VSS and public regulations at various scales. These impacts are greater in the forest and mosaic landscapes. Complementarities and conflicts within and between different types of voluntary standard systems (VSS) and public regulations across scales?
100. What are the effects of different sector policies in creating constraining or enabling environments for women's access to and control over forests, trees and other productive resources?
101. What types of institutional arrangements promote meaningful participation of men and women in decisions related to forest restoration and management? Under what conditions does such participation translate into more equitable benefit-sharing and sustainable NRM?
102. How can stakeholders of the (unintended) consequences of landscape change achieve leverage on the drivers of change, through a combination of rights-based approaches (incl. land use planning, tenurial reform), economic instruments (generic tax/subsidy, specific performance-based contracts) and motivational factors (addressing perceived 'fairness', 'environmental justice')?

11) Cross-cutting research gaps

103. Research is needed on the scalability options of different types of inclusive development interventions.
104. Contemporary social and environmental problems are complex and multi-dimensional, often cross scales, and usually involve many different stakeholders with differing and often conflicting interests and perspectives. Solving these problems will require combinations of new knowledge and innovation, action and engagement.

ANNEX C

A review of the demands and priorities of countries and stakeholders, as expressed in key agreements at international level, including development gaps

Given the overarching development objectives of the CGIAR we review here the main texts internationally agreed, as well as the main needs identified from the Nationally determined contributions (for climate change action).

Key latest international-level consensus agreement include : (i) the SDGs, (ii) the Paris Agreement on climate change, (iii) the recommendations from the UN Committee on World Food Security (CFS), especially on sustainable forestry for food security and nutrition, on investing in smallholder agriculture for food security and nutrition, and in climate change and food security, (iv) the United Nations strategic plan for forests 2017-2030 and (v) the Convention on Biological Diversity (Aichi targets).

The CFS recommendations adopted on 13 October 2017 are the most recent and most comprehensive expression of demand. In fact, since for instance ensuring food security and nutrition requires addressing other goals (including providing resilience in the face of climate change, ensuring ecosystem services and biodiversity are preserved and the regulation of global biogeochemical cycles, water, carbon etc.), it encompasses fundamentally the other demands, and can provide an ideal frame to sort out priority requests from a demand side, to the first order. These can be seconded by another set of CFS recommendations, which are very much linked to the development agenda, on investing in smallholder agriculture for food security and nutrition (2013). These CFS recommendations are all evidence-based: they derive from an inclusive process which is a prioritization process in itself, based on the recommendations of an underlying HLPE report, to which FTA and/or the CGIAR heavily contributed.

The 2017 recommendations on sustainable forestry are of particular interest and actuality, as several stakeholders, including donors and agencies in FAO, will inscribe their future POWB in alignment with the CFS recommendations. The agenda of 2018 Regional Forestry committees of FAO will tackle the issue of the implementation of the recommendations. Also the CFS members have requested the recommendations of CFS to be shared with relevant policy processes, such as the Committee on Agriculture (COAG) and the Committee on Forestry (COFO) of FAO, the UN High-Level Political Forum (HLPF), the UN Forum on Forests (UNFF) and the Convention on Biological Diversity (CBD).

For these reasons, it is proposed:

(i) to inscribe the 2018 prioritization exercise in the perspective of the CFS recommendations on sustainable forestry for Food security and nutrition (2017), as well as into those in investing in smallholder agriculture for food security and nutrition (2013).

(ii) to add specifically climate change adaptation and mitigation as a key area of demand, following the Paris agreement and the NDCs,

(iii) to consider the relevance to the SDGs (and the CGIAR SRF) as a must. However, the SDG do not provide a real prioritization between goals. But they are quite comprehensive and activities that are not relevant to the SDGs will be discarded.

In future years, other orientations could be pursued pending the evolution of the international agenda.

Summary:

A review of the following texts

- CFS recommendations on Forestry
- CFS recommendations on Smallholder investments
- CFS recommendations on Climate change
- Paris Agreement and its implementation
- UN strategic plan for forests' Goals 1 to 6
- Convention on biological diversity, and especially the Aichi targets
- The SDGs (as an overall frame)

Led to the identification of the following priority areas

- a. Improve food security, nutrition and health (SDGs 2,3, CFS-Forestry, UNSPF-2)
- b. Increase, diversify and stabilize rural household incomes and economies: SDGs, CFS-SH, UNSPF-2
- c. Contribute to productive and resilient agricultural landscapes: SDGs 15,6,4, CFS-SH, CFS-Forestry
- d. Preserve and sustainably manage biodiversity, ecosystems, environment : CBD, UNSPF-1, UNSPF-3, CFS-Forestry
- e. Contribute to climate change mitigation and adaptation : Paris Agreement, SDG 13, CFS-CC, UNSPF-1
- f. Contribute to sustainable value chains and sustainable production and consumption, including renewable energy and materials: SDGs 7, 12, 13
- g. Improve gender equality and social inclusion: SDG 5, CFS-Forestry, CFS-SH

1) CFS recommendations

RECOMMENDATIONS

The recommendations are primarily addressed to governments for public policies, but are also

addressed to all stakeholders with a role in achieving food security and nutrition. The recommendations are voluntary and non-binding and aim to complement and not restate related guidance previously provided in other CFS policy products and recommendations.

I. ACKNOWLEDGE THE IMPORTANCE OF, RAISE AWARENESS ON, AND ENCOURAGE STRENGTHENING OF THE ROLE OF FORESTS AND TREES TO THE FOUR DIMENSIONS OF FSN

- a) Recognize the need to strengthen the contribution of forests and trees, within landscape mosaics, in the provision of fundamental ecosystem services to support agricultural production and restore land productivity;
- b) Recognize and respect appropriate traditional practices and the key contribution of indigenous peoples and local communities and smallholders when managing sustainably and in an integrated manner land, forests and trees while achieving FSN; c) Recognize the vital role of forestry for livelihoods and sustainable development around the world.

II. DIRECT AND INDIRECT CONTRIBUTIONS OF FORESTS AND TREES TO FSN

DEVELOP AND USE POLICY-RELEVANT KNOWLEDGE AND DATA ON THE

- a) Take measures to inform and train FSN policy makers and practitioners about the importance of sustainable forest and trees management for FSN using participatory methodologies to generate knowledge about the contributions of forests and trees to FSN, at different spatial and temporal scales recognizing indigenous peoples and local communities and smallholders as holders of traditional knowledge;
- b) Build the necessary capacities, and provide professional training and organizational changes needed for participatory research, better data collection and extension services; c) Design metrics and collect data that are disaggregated by gender, age, and other social parameters; d) Improve trans-sectorial, systemic data collection in FSN and forestry monitoring systems, on the use of wild foods (animals, plants, mushrooms) and forest products, including for nutritional content, dietary quality and diversity, poverty alleviation, health and medicinal purposes, as well as harvest impacts; e) Perform more research on the contribution of Neglected and Underutilized Species (NUS) to FSN and on relations between trees and agricultural productions in agroforestry systems, as well as knowledge on insufficiently explored diversity of forest genetic resources likely to meet human FSN needs.

III. DEVELOP, IMPLEMENT AND MONITOR POLICIES FOR INTEGRATED AGRICULTURE AND FOREST MANAGEMENT FOR IMPROVED AND SUSTAINABLE FSN

States to:

- a) Promote an integrated approach including the nexus among forestry, agriculture, water and FSN to strengthen policy coherence across sectors and at different scales, by reinforcing cross-sectoral coordination through a participatory and inclusive process; b) Provide the institutional and financial requirements and policy support to integrate resilience-enhancing dimensions of forests and trees into agricultural and food security and nutrition policies and programs;
- c) Respect, protect and fulfill the rights of women in the forestry and agricultural sectors and tackle gender disparities which negatively impact FSN; d) Develop and promote participatory forest and trees policies and management planning and measures that enhance access to nutritionally important forest food products for indigenous peoples and local communities and smallholders;
- e) Promote forest conservation, regeneration of native forests and restoration of degraded forests, where appropriate, as well as the development of agroforestry systems; f) Provide incentives for the

provision of forest-based ecosystem services that benefit sustainable agriculture and FSN.

All stakeholders to:

g) Increase investment in research to establish, promote and upscale good practices in agriculture, forestry and agroforestry systems within integrated landscape mosaics; h) Promote integrated planning and local adaptive management of landscapes, including community systems, acknowledging the multiple functions and uses of forests and trees that contribute to enhance resilience of landscapes, communities and livelihoods;

i) Promote a nutrition-sensitive approach to integrate the multiple goals of FSN, sustainable forest management, land use, and biodiversity conservation; j) Encourage appropriate technical support, extension services and training to stakeholders, particularly vulnerable groups;

k) Increase the coherence between agricultural productivity and forest conservation to lessen the pressure put on forests; l) Mainstream gender equality and women's empowerment throughout forestry institutions, policy and programmes to promote women's leadership and access to and control over forest resources and income opportunities for achieving FSN;

m) Promote and integrate low-carbon, renewable energy schemes for FSN in sustainable forest management plans including on a small scale supported by the indigenous peoples and local communities and smallholders to achieve multiple benefits such as adequate access to fuel for food preparation; and invest in social and technical innovations in particular to minimize health risks associated with the use of woodfuel;

n) Increase responsible public and private investments to support community-driven, forest-based enterprises for sustainable livelihoods.

IV. PROMOTE THE IMPLEMENTATION OF THE VOLUNTARY GUIDELINES ON THE PROGRESSIVE REALIZATION OF THE RIGHT TO ADEQUATE FOOD IN THE CONTEXT OF NATIONAL FOOD SECURITY AND THE VOLUNTARY GUIDELINES ON THE RESPONSIBLE GOVERNANCE OF TENURE OF LAND, FISHERIES, AND FORESTS IN THE CONTEXT OF NATIONAL FOOD SECURITY (VGGT)

a) Promote forests, trees and farmlands-related policies, legislation and programmes based on the VGGT, that respect and secure the legitimate tenure rights of indigenous peoples and local communities and smallholders and the Free, Prior and Informed Consent of indigenous peoples; b) Collaboratively develop VGGT-based initiatives with indigenous peoples and local communities and smallholders to enhance the productivity and resilience of forests and tree-based systems, and incorporate these initiatives into policies, programmes and practices; c) Facilitate access and sustainable use of forest and trees resources as well as access to markets⁶ for indigenous peoples and local communities and smallholders for the progressive realization of their right to adequate food in the context of national food security, national laws and legitimate tenure and resource use rights; d) Apply the Principles for Responsible Investment in Agriculture and Food Systems (RAI) to all types and sizes of agricultural investments including fisheries, forests and livestock for enhancing food security and nutrition.

1-b) Investing in Smallholder Agriculture for Food security and nutrition

1. Enable national policies, governance and their evidence base

- a. Build or further develop a country-owned vision for smallholder agriculture, in the context of broad-based national, and agricultural development, that positions smallholder agriculture firmly within integrated policies and strategies, that includes connecting smallholders to markets, that is articulated together with all national stakeholders, especially smallholder farmers, of whom women represent a majority in many countries, their organizations and their representatives, in the context of sustainable development and transparent rights-based processes and guidelines.
- b. Guided by this vision and the Voluntary Guidelines on the Progressive Realization of the Right to Adequate Food in the Context of National Food Security, consider revisiting agricultural, urban and rural sector policies, strategies and budgets, with particular attention to enabling smallholder access - especially for women - to productive assets, local, national and regional markets, appropriate training, research, technology and farm support services.
- c. Support the review, financing and implementation of smallholder inclusive, gender-sensitive, multi-sectoral, policies and strategies linked to sustainable agricultural development, with a particular supporting role by international development partners and especially IFAD, FAO and WFP, the World Bank, bilateral funding agencies and regional development banks.
- d. Mainstream gender equality and women's empowerment within the country-led vision and strategy for agricultural development. In addition, encourage gender specific support services in view 6 CFS 2013/40 REPORT of the critical role of women and to address the specific needs and constraints faced by both women and men smallholder farmers.
- e. Address constraints to engaging young women and men in smallholder agriculture, as well as in related non-farm rural sectors, through targeted policy interventions. These include strengthening and ensuring equal access to education and training systems.
- f. Explore geographically inclusive territorial development as an approach to effectively coordinate cross-sectoral public and private investments, in particular in smallholder agriculture as well as in the non-farm economy.
- g. Improve governance for agriculture and rural development through a coordinated multisectoral approach, with particular focus on smallholder agriculture, ensuring adequate participation of all relevant organizations, especially those representing smallholder farmers. This involves developing context-specific solutions for smallholder-sensitive public and private investments. Consider experiences such as the Comprehensive African Agricultural Development Programme (CAADP), the Global Agriculture and Food Security Programme (GAFSP) and others.

- h. Build inclusive participatory processes that engage smallholders, women, youth, private sector, and other relevant organizations. Promote legal recognition and respect of the rights of smallholder farmers - including the right to organize democratically and to have voice in policy debates, with gender- and age-balanced representation - and the need for farmers' organizations to be strengthened to achieve this.
- i. Improve information management (the collection, transparency, communication and access to data, including sex-disaggregated data). Step-up evidence-based analyses to document the state of smallholder agriculture; its diverse typologies, its incentives and constraints, its evolution and its contributions to various outcomes in particular to food security and nutrition. Promote access to assets, public goods, social services, research and extension and technology Access to assets

2) Promote access to assets, public goods, social services, research and extension and technology

Access to assets

- a. Note farmers' and breeders' contribution to conserving and developing plant genetic resources for food and agriculture. Promote smallholders'- particularly women farmers'- ability to access, breed, produce, conserve, purchase, exchange, sell and use the seeds they need, including local, indigenous and modern varieties. Strengthen information and knowledge sharing related to practical on-farm implementation and foster local innovation. Support in situ and ex situ conservation and development of agricultural biodiversity by smallholders together with research and extension systems, in line with sustainable agricultural development and good practices, including through agro-ecological approaches and sustainable intensification. All the above-mentioned measures of this paragraph have to be in accordance with applicable national and international law.
- b. Strongly promote responsible governance of land and natural resources with emphasis on securing access and tenure for smallholders, particularly women, in accordance with the Voluntary Guidelines on Responsible Governance of Tenure of Land, Fisheries and Forests in the Context of National Food Security as well as other country-led measures with similar objectives. Solutions need to be country and context specific and consistent with existing obligations under national and international law. A related need is to strengthen local institutions dealing with regulation of such access and use of natural resources, particularly by smallholders and women.

3) Access to public goods, social services, research, extension and technology

- a. Prioritize public investment and encourage private investment, specifically in support of smallholders' own investments, in, among others; water management, sustainable management of genetic resources for food and agriculture, soil conservation, forests, transport and infrastructure such as feeder roads, energy, post-harvest handling infrastructure, rural electrification and telecommunication grids.

- b. Provide gender-sensitive public investment, and encourage private investments, in health-care, child care, nutrition, education and capacity development, social protection, water and sanitation, to enhance food security and nutrition, and reduce smallholder poverty.
- c. Strengthen participatory research, extension and farming service systems, particularly those that respond to the specific needs of smallholders and women farmers, to increase their productivity, diversify their production, and enhance its nutritional value and build their resilience, including with respect to climate change, according to the tenets of sustainable development. The approach is ideally that of combining farmers' and indigenous people's traditional knowledge with the findings of scientific research, as appropriate.
- d. Take into consideration the specific constraints of smallholders in relation to sanitary and phyto-sanitary regulations and enable their access to the programs and supplies needed for compliance.

4) Enable investment, access to markets, productive services and resources

- a. Promote investment of and for smallholders. Improve policies, markets and institutions to foster economic opportunities for smallholders. Mitigate excessive price volatility and nontransferable smallholder risks using public policy instruments in accordance with international commitments. Develop and/or improve value chains and enable smallholders to be full participants in the value chains of their choice. Ensure legal and fair business practices amongst all parties and increase the negotiating capacity of smallholders. This calls for continued development of policy measures and technical guidelines and tools, including for contract farming and public-private partnerships, in consultation with smallholder organizations, the expertise of relevant UN organizations and other centres of expertise.
- b. Access to markets. Support, in accordance with international commitments, the development of, and access to, markets, distribution and marketing systems and mechanisms that are remunerative for smallholders and rural economies. Recognize the importance of non-monetary exchanges of products and services, the importance of local food systems for smallholders including their potential for supplying school and institutional feeding programmes. Create appropriate linkages and engage smallholder farmers, men and women, along value-chains, especially in local, national and regional markets. Enable and stimulate cooperation between smallholders, for instance, via cooperatives or other approaches for market organization that benefit smallholders in accordance with international commitments.
- c. Financial services. Improve regulatory conditions and financial infrastructure to strengthen smallholder access to a full range of financial services adapted to their needs, with attention to the particular challenges faced by women and youth in this regard. Relevant financial services include safe deposits, monetary transactions and remittances, mobile financial services, sustainable micro, short and long-term credit,

public insurance schemes (including indexed insurance), commodity exchange and warehouse receipt systems. Reduce financial risks, lower transaction costs and facilitate long-term investments, – such as for field operations equipment, food processing and other value adding activities on smallholder farms. As appropriate, relax liquidity constraints on working capital expenditures (e.g. fertilizers, seeds) as well as on medium- and long-term investments while avoid worsening smallholder farmers’ debt burden. Support such measures by appropriately designed, well targeted fiscal measures. All the above-mentioned measures of this paragraph should be implemented in accordance with international commitments.

- d. Investing beyond the farm. Promote public investment and encourage private investment to develop a decentralized, rural, non-farm economy to support smallholders’ access to alternative sources of income, thereby further consolidating the farming economy and contributing to improved food security and nutrition. This encompasses investment in capacity building and entrepreneurship development, where appropriate and particularly targeting young women and men, for employment in a modernized agriculture as well as in other related activities and labour markets. It also requires promoting investment for new business development

1-c) Food security and climate change

Taking into account the urgent need for actions to address the effects of climate change on food security as well as the root causes of food insecurity in a manner coherent with the progressive realization of the right to food in the context of national food security, the Committee invited Member States (MS), International Organizations (IO) and other CFS stakeholders, as appropriate, and recognizing the role of the UNFCCC:

a) to integrate climate change concerns in food security policies and programmes and to increase resilience of vulnerable groups and food systems to climate change, emphasizing adaptation to climate change as a major concern and objective for all farmers and food producers, especially small-scale producers, including through:

- i. increasing public and private investment and international cooperation for enhancing food security in the face of climate change threats, in particular for adaptation to the adverse effects of climate change, sustainable use of natural resources, water management and soil conservation;
- ii. developing national and local capacities to deal with food security-related climate change challenges, including improving extension services, and making available and accessible, weather and climate forecasting and risk management tools, in support of farmers' and small-scale food producers' networks and organizations (MS, IO);
- iii. conducting assessments of risks, vulnerability and capacities, giving due consideration to gender and nutrition-sensitive perspectives, and improving and implementing early warning systems, especially in a coordinated manner (MS, IO);
- iv. developing integrated land-use policies for food security and adaptation to climate change and, where appropriate, contributing to climate change mitigation considering the "Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests in the Context of National Food Security" in accordance with nationally defined priorities; (MS);
- v. integrating climate change adaptation and disaster risk management in food security policies and programmes (MS, IO);
- vi. implementing relevant initiatives, such as for example FAO-Adapt, as appropriate, to strengthen support to countries' efforts toward climate change adaptation (IO).

b) to create conditions to facilitate access to genetic resources for food and agriculture and the fair and equitable sharing of the benefits arising from their use for example by:

- i. recognizing the importance of the International Treaty on Plant Genetic Resources for Food and Agriculture and of the Nagoya Protocol adopted by the 10th Conference of Parties (COP) of the Convention on Biological Diversity (CBD);
- ii. inviting the FAO Commission on Genetic Resources for Food and Agriculture to continue and strengthen its work on climate change and genetic resources including conservation and use of genetic resources for adaptation to climate change (MS);

c) to develop agricultural strategies that take into account: (i) the need to respond to climate change and to safeguard food security; (ii) the diversity of agricultural conditions and systems; and (iii) the countries' and regions' specific levels of development, needs, contexts and priorities, including by:

- i. taking into account gender-sensitive and participatory approaches that enable both men and women to gain equitable access to land use, information, and resources when addressing food security in the context of climate change;
- ii. encouraging farmers in adopting good practices, including, inter alia, farming and grazing practices to prevent land degradation and loss of soil carbon, increasing the efficiency of nitrogen use, improving livestock productivity and the use of manure, improving water management, and increasing the use of agro-forestry;
- iii. providing multi-stakeholder country-led assessments and research for agricultural development strategies to face the adverse effects of climate change, taking into account differences between agricultural systems, farming practices, and regional, national and local conditions;
- iv. promoting efficiencies in the food chain and the reduction of post-harvest losses and food waste in a sustainable manner (MS, in partnership with private sector and civil society).

d) to enhance research, including farmer-led research, and improve information collection and sharing by:

- i. increasing international cooperation and public and private investment for research, on climate change adaptation and mitigation in order to favour alignment with sustainable development and food security and nutrition including the adaptation needs of smallscale producers;
- ii. fostering exchanges of information among research programs on climate change and food security (MS, IO);

e) to facilitate, as appropriate, participation of all stakeholders in food security policies and programmes to address climate change recognizing the contribution of all farmers and food producers, especially small-scale producers, to food security, by:

- a. encouraging multi-stakeholder fora at local, national and regional levels to promote broad participation of local communities and the most vulnerable groups, as well as the private sector, in decision-making processes;
- b. supporting CSOs, notably those representing the most hunger-affected populations, small-scale producers' organizations, and women farmers' organizations, to participate in decision making and the implementation of food security policies and programmes to address climate change.

2) Paris Agreement on Climate change

1) Relevance to Article 5 of the Paris Agreement (mainly dedicated to forests)

Article 5

(1) Parties should take action to conserve and enhance, as appropriate, sinks and reservoirs of greenhouse gases as referred to in Article 4, paragraph 1(d), of the Convention, including forests.

(2) Parties are encouraged to take action to implement and support, including through results based payments, the existing framework as set out in related guidance and decisions already agreed under the Convention for: policy approaches and positive incentives for activities relating to reducing emissions from deforestation and forest degradation, and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries; and alternative policy approaches, such as joint mitigation and adaptation approaches for the integral and sustainable management of forests, while reaffirming the importance of incentivizing, as appropriate, non-carbon benefits associated with such approaches.

2) contribution to the implementation of the NDCs (national level) while providing IPGs

More than 85 percent of developing countries refer to agriculture and/or Land Use, Land-Use Change and Forestry (LULUCF) in their mitigation contributions. Among developing countries that specified adaptation commitments or actions in their INDCs, more than 90 percent refer to the agricultural sectors in this context. Many countries also identified the potential for the agricultural sectors to deliver adaptation-mitigation synergies, as well as economic, environmental and social co-benefits.

With regard to technology transfer in the agricultural sectors, some countries outlined the need for technologies to support policy planning, as well as measurement, reporting and verification (MRV). Examples include geographic information systems and remote sensing support, as well as technologies to develop and maintain forest inventories. Some countries referred to technologies needed to support concrete climate action in the agricultural sectors, such as more efficient bioenergy technologies. Some countries referred to their intention to build resilience through ecosystem-based adaptation and the conservation of genetic resources and diversity.

Some countries also highlighted their capacity needs in the agricultural sectors, including best practices for implementing sustainable forest management, as well as support related to afforestation and reforestation activities. Some countries requested training on how to calculate GHG emissions and removals from the agricultural sectors. Additionally, some countries mentioned the need to develop policies and/or establish institutions (for example in relation to REDD+).

Efforts to combat deforestation through integrated land-use management requires ministries responsible for crops, livestock and forests to collectively pursue approaches that sustainably intensify production on existing land.

Agro-forestry practices can increase the resilience of agricultural production and livelihoods while enhancing carbon sequestration

The desire to seize adaptation-mitigation synergies is explicitly mentioned in about one-third of all INDCs. Many of these countries referred specifically to the agricultural sectors in this context. It is therefore important that cost-benefit analysis account for both adaptation and mitigation benefits when prioritizing policy measures in the agricultural sectors.

Agricultural sector policy decisions that aim to achieve NDC mitigation targets should be informed by rigorous analysis of existing GHG emissions sources and sinks, good knowledge of land use, forest inventories, and the subsequent identification and prioritization of mitigation options.

Source : The agricultural sectors in nationally determined contributions (NDCs), Priority areas for international support FAO, 2016.

3) The United Nations' strategic plan for forests 2017-2030

Global Forest Goal 1

Reverse the loss of forest cover worldwide through SFM, including protection, restoration, afforestation and reforestation, and increase efforts to prevent forest degradation and contribute to the global effort of addressing climate change.

1.1 Forest area is increased by 3% worldwide.

1.2 The world's forest carbon stocks are maintained or enhanced.

1.3 By 2020, promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests and substantially increase afforestation and reforestation globally

1.4 The resilience and adaptive capacity of all types of forests to natural disasters and the impacts of climate change is significantly strengthened worldwide.

Goal 1 and its targets support and contribute to the achievement of, among others, Sustainable Development Goal targets 6.6, 12.2, 13.1, 13.3, 14.2, 15.1, 15.2, 15.3, 15.4 and 15.8, as well as Aichi Biodiversity Targets 5, 7, 9, 11, 14 and 15.

Global Forest Goal 2

Enhance forest-based economic, social and environmental benefits, including by improving the livelihoods of forest dependent people.

2.1 Extreme poverty for all forest dependent people is eradicated.

2.2 Increase the access of small-scale forest enterprises, in particular in developing countries, to financial services, including affordable credit, and their integration into value chains and markets.

2.3 The contribution of forests and trees to food security is significantly increased.

2.4 The contribution of forest industry, other forest-based enterprises and forest ecosystem services to social, economic and environmental development, among others, is significantly increased.

2.5 The contribution of all types of forests to biodiversity conservation and climate change mitigation and adaptation is enhanced, taking into account the mandates and ongoing work of relevant conventions and instruments.

Goal 2 and its targets support and contribute to the achievement of, among others, Sustainable Development Goal targets 1.1, 1.4, 2.4, 4.4, 5.a, 6.6, 8.3, 9.3, 12.2, 12.5, 15.6 and 15.c, as well as Aichi Biodiversity Targets 4, 14 and 18.

Global Forest Goal 3

Increase significantly the area of protected forests worldwide and other areas of sustainably managed forests, as well as the proportion of forest products from sustainably managed forests.

3.1 The area of forests worldwide designated as protected areas or conserved through other effective area based conservation measures is significantly increased.

- 3.2 The area of forests under long-term forest management plans is significantly increased.
- 3.3 The proportion of forest products from sustainably managed forests is significantly increased.

Goal 3 and its targets support and contribute to the achievement of, among others, Sustainable Development Goal targets 7.2, 12.2, 12.6, 12.7, 14.2, 14.5, 15.2 and 15.4, as well as Aichi Biodiversity Targets 7, 11, 12 and 16.

Global Forest Goal 4

Mobilize significantly increased, new and additional financial resources from all sources for the implementation of SFM and strengthen scientific and technical cooperation and partnerships.

4.1 Mobilize significant resources from all sources and at all levels to finance sustainable forest management and provide adequate incentives to developing countries to advance such management, including for conservation and reforestation.

4.2 Forest-related financing from all sources at all levels, including public (national, bilateral, multilateral and triangular), private and philanthropic financing is significantly increased.

4.3 North-South, South-South, North-North and triangular cooperation and public-private partnerships on science, technology and innovation in the forest sector are significantly enhanced and increased.

4.4 The number of countries which have developed and implemented forest financing strategies and have access to financing from all sources is significantly increased.

4.5 The collection, availability and accessibility of forest-related information is improved through, for example, multi-disciplinary scientific assessments.

Goal 4 and its targets support and contribute to the achievement of, among others, Sustainable Development Goal

targets 12.a, 15.7, 15.a, 15.b, 17.1, 17.2, 17.3, 17.6, 17.7, 17.16, 17.17, 17.18 and 17.19, as well as Aichi Biodiversity Target 19.

Global Forest Goal 5

Promote governance frameworks to implement SFM, including through the UN Forest Instrument, and enhance the contribution of forests to the 2030 Agenda.

5.1 Number of countries which have integrated forests into their national sustainable development plans and/or poverty reduction strategies is significantly increased.

5.2 Forest law enforcement and governance are enhanced, including through significantly strengthening national and subnational forest authorities, and illegal logging and associated trade is significantly reduced worldwide.

5.3 National and subnational forest-related policies and programs are coherent, coordinated and complementary across ministries, departments and authorities, consistent with national laws, and engage relevant stakeholders, local communities and indigenous peoples, fully recognizing the UN Declaration on the Rights of Indigenous Peoples.

5.4 Forest-related issues and the forest sector are fully integrated into decision-making processes of land use planning and development.

Goal 5 and its targets support and contribute to the achievement, among others, of Sustainable Development Goal targets 1.4, 2.4, 5.a, 15.c, 15.9, 16.3, 16.5, 16.6, 16.7, 16.10 and 17.14, as well as Aichi Biodiversity Targets 2 and 3.

Global Forest Goal 6

Enhance cooperation, coordination, coherence and synergies on forest-related issues at all levels, including within the UN System and across CPF member organizations, as well as across sectors and relevant stakeholders.

6.1 Forest-related programmes within the UN system are coherent and complementary and integrate the Global Forest Goals and targets where appropriate.

6.2 Forest-related programmes across CPF member organizations are coherent and complementary and together encompass the multiple contributions of forests and the forest sector to the 2030 Agenda for Sustainable Development.

6.3 Cross-sectoral coordination and cooperation to promote SFM and halt deforestation and forest degradation is significantly enhanced at all levels.

6.4 A greater common understanding of the concept of SFM is achieved and an associated set of indicators is identified.

6.5 The input and involvement of major groups and other relevant stakeholders in the implementation of the UNSPF and in the work of work of the Forum, including intersessional work, is strengthened.

Goal 6 and its targets support and contribute to the achievement of, among others, Sustainable Development Goal target 17.14.

4) The Convention on Biological Diversity's Aichi Targets

Strategic Goal A: Address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society



Target 1

By 2020, at the latest, people are aware of the values of biodiversity and the steps they can take to conserve and use it sustainably.



Target 2

By 2020, at the latest, biodiversity values have been integrated into national and local development and poverty reduction strategies and planning processes and are being incorporated into national accounting, as appropriate, and reporting systems.



Target 3

By 2020, at the latest, incentives, including subsidies, harmful to biodiversity are eliminated, phased out or reformed in order to minimize or avoid negative impacts, and positive incentives for the conservation and sustainable use of biodiversity are developed and applied, consistent and in harmony with the Convention and other relevant international obligations, taking into account national socio economic conditions.



Target 4

By 2020, at the latest, Governments, business and stakeholders at all levels have taken steps to achieve or have implemented plans for sustainable production and consumption and have kept the impacts of use of natural resources well within safe ecological limits.

Strategic Goal B: Reduce the direct pressures on biodiversity and promote sustainable use



Target 5

By 2020, the rate of loss of all natural habitats, including forests, is at least halved and where feasible brought close to zero, and degradation and fragmentation is significantly reduced.



Target 6

By 2020 all fish and invertebrate stocks and aquatic plants are managed and harvested sustainably, legally and applying ecosystem based approaches, so that overfishing is avoided, recovery plans and measures are in place for all depleted species, fisheries have no significant adverse impacts on threatened species and vulnerable ecosystems and the impacts of fisheries on stocks, species and ecosystems are within safe ecological limits.



Target 7

By 2020 areas under agriculture, aquaculture and forestry are managed sustainably, ensuring conservation of biodiversity.

**Target 8**

By 2020, pollution, including from excess nutrients, has been brought to levels that are not detrimental to ecosystem function and biodiversity.

**Target 9**

By 2020, invasive alien species and pathways are identified and prioritized, priority species are controlled or eradicated, and measures are in place to manage pathways to prevent their introduction and establishment.

**Target 10**

By 2015, the multiple anthropogenic pressures on coral reefs, and other vulnerable ecosystems impacted by climate change or ocean acidification are minimized, so as to maintain their integrity and functioning.

Strategic Goal C: To improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity**Target 11**

By 2020, at least 17 per cent of terrestrial and inland water, and 10 per cent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscapes and seascapes.

**Target 12**

By 2020 the extinction of known threatened species has been prevented and their conservation status, particularly of those most in decline, has been improved and sustained.

**Target 13**

By 2020, the genetic diversity of cultivated plants and farmed and domesticated animals and of wild relatives, including other socio-economically as well as culturally valuable species, is maintained, and strategies have been developed and implemented for minimizing genetic erosion and safeguarding their genetic diversity.

Strategic Goal D: Enhance the benefits to all from biodiversity and ecosystem services**Target 14**

By 2020, ecosystems that provide essential services, including services related to water, and contribute to health, livelihoods and well-being, are restored and safeguarded, taking into account the needs of women, indigenous and local communities, and the poor and vulnerable.

**Target 15**

By 2020, ecosystem resilience and the contribution of biodiversity to carbon stocks has been enhanced, through conservation and restoration, including restoration of at least 15 per cent of degraded ecosystems, thereby contributing to climate change mitigation and adaptation and to combating desertification.

**Target 16**

By 2015, the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization is in force and operational, consistent with national legislation.

Strategic Goal E: Enhance implementation through participatory planning, knowledge management and capacity building**Target 17**

By 2015 each Party has developed, adopted as a policy instrument, and has commenced implementing an effective, participatory and updated national biodiversity strategy and action plan.

**Target 18**

By 2020, the traditional knowledge, innovations and practices of indigenous and local communities relevant for the conservation and sustainable use of biodiversity, and their customary use of biological resources, are respected, subject to national legislation and relevant international obligations, and fully integrated and reflected in the implementation of the Convention with the full and effective participation of indigenous and local communities, at all relevant levels.

**Target 19**

By 2020, knowledge, the science base and technologies relating to biodiversity, its values, functioning, status and trends, and the consequences of its loss, are improved, widely shared and transferred, and applied.

**Target 20**

By 2020, at the latest, the mobilization of financial resources for effectively implementing the Strategic Plan for Biodiversity 2011-2020 from all sources, and in accordance with the consolidated and agreed process in the Strategy for Resource Mobilization, should increase substantially from the current levels. This target will be subject to changes contingent to resource needs assessments to be developed and reported by Parties.

6) Sustainable Development Goals

Goal 1. End poverty in all its forms everywhere

Goal 2. End hunger, achieve food security and improved nutrition and promote sustainable agriculture

Goal 3. Ensure healthy lives and promote well-being for all at all ages

Goal 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all

Goal 5. Achieve gender equality and empower all women and girls

Goal 6. Ensure availability and sustainable management of water and sanitation for all

Goal 7. Ensure access to affordable, reliable, sustainable and modern energy for all

Goal 8. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all

Goal 9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation

Goal 10. Reduce inequality within and among countries

Goal 11. Make cities and human settlements inclusive, safe, resilient and sustainable

Goal 12. Ensure sustainable consumption and production patterns

Goal 13. Take urgent action to combat climate change and its impacts

Goal 14. Conserve and sustainably use the oceans, seas and marine resources for sustainable development

Goal 15. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss

Goal 16. Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels

Goal 17. Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development

Annex D Key messages of the FTA-IUFRO sub-plenary event at IUFRO 2017 Congress on “research for sustainable development: forests, trees and agroforestry”.

Questions asked.

- What do we need to know, key research gaps in FTA for sustainable development?
- How we should do research with development partners? How do we integrate development and research to achieve impact?

Key messages

1. **Need for system’s thinking** to give insight into sustainable development and how to reach the SDGs. The concept of sustainability is fragmented, this needs to go beyond disciplinary research.
2. Systems aren’t linear – they are affected by shocks and changes. Need to complement the fixation on growth by a **focus on resilience**. When talking about SDGs we need to acknowledge the shocks and up and downs.
3. Sustainable forestry and agroforestry need **local context relevance**. In the 80s when the concept of agro-forestry was introduced, it didn’t make good use of local varieties knowledge and species. Need to look at the sustainability and what combinations will work.
4. **How do we upscale agroforestry?** More research is needed on how we enable investments in upfront system costs. From the agronomic side we have limited modeling data on trees in crops. Need to look at Institutional backing for agroforestry.
5. **Need to look at business models:** Fragmentation and weak organization of small holders – hard to reach economies of scale. Access to credit, land security, access to technology. Barriers to production and selling.
6. **Gender and youth inequality** – gap between men and women’s rights to land and access to resources from land and forest resources. They are also under represented in local decision-making processes.
7. **What affordable systems to produce information.** Technology is there to produce a lot of information but the systems for doing this in an affordable way are still missing. There is no demand for data and information so financing these systems are not a priority. Develop more affordable tools and distributed monitoring systems will be important
8. The overarching question is **how do we integrate the different objectives of sustainability into the research** questions we are asking. And into the research design and implementation. We need to **integrate disciplines, scales and issues**.
9. Integration as an overarching guide for prioritization. This integration has implications for how we do research, with what partners and for the benefit of

whom. Need to prioritize **transdisciplinary approaches**, link research to communities, and with private sector actors.

10. **Integrate research in development practice.** They should never have been separated. Research should be embedded and driven by context, which changes over time. On-going collection and management of data to enable adaptive management are needed and should be linked to research. Feedback of lessons learned is important, with focus on relevance and saliency, as science is not informed sufficiently by challenges on the ground.

Annex E Key messages of the FTA-FAO-NL-SIANI side event at CFS 44 on “Forests, trees and agroforestry for food security, nutrition and the SDGs: Research and partners, toward a joint action agenda”

Question asked:

What are the priorities for stakeholders along the research to development continuum, from the generation of technical, policy and governance solutions to scaling up according to contexts?

Answers / Key issues raised:

1. **Responsible investments in value chains.** Fundamental role of private sector. Need to know how to accompany and incentivize responsible business models. How to ensure that investments are done in a sustainable way? Need reviews and guidelines on ways to make business, different models of inclusive business.
2. **Quantify the constraints to integrating trees into farms and in landscapes:** lack of information on successful examples, on new techniques (including cost-benefits), seeds, sourcing. How to overcome difficulties to invest without reserves. What incentive schemes? What value chains adapted to local contexts?
3. **Social inclusiveness and gender,** facilitate women’s participation and empowerment for women’s role in rural development and FSN.
4. Need to invest on **underutilized nutritious food crops.**
5. Plantations are on the spot. However, these are needed to ensure the growing supply of wood and other products. **What constitutes sustainable plantations?**
6. **Need for integration.** Most drivers of change (such as for land-use change) are outside forests. To devise solutions, need to integrate agriculture and forestry together.
7. Knowledge and development gap: Key challenge is **how to make research results available and usable,** especially for small scale farms. How to use knowledge?
8. To implement the CFS agenda, **countries will need support, data, knowledge and innovative governance solutions, policies,** with the involvement of all partners. FAO disseminates knowledge and technical support. It depends on research.

References

- Allen, C.D., Macalady, A.K., Chenchouni, H., Bachelet, D., McDowell, N., Vennetier, M., Kitzberger, T., Rigling, A., Breshears, D.D., Hogg, E.H., Gonzalez, P., Fensham, R., Zhang, Z., Castro, J., Demidova, N., Lim, J.H., Allard, G., Running, S.W., Semerci, A. & Cobb, N. 2010. A global overview of drought and heat-induced tree mortality reveals emerging climate change risks for forests. *Forest Ecology and Management*, 259(4): 660–684.
- Benton, T.G., Vickery, J.A., Wilson, J.D., 2003. Farmland biodiversity: is habitat heterogeneity the key? *Trends Ecol. Evol.* 18, 182-188.
- Commission on Genetic Resources for Food and Agriculture, 2014. *The State of the World's Forest Genetic Resources*, FAO.
- FAO, 2011. *Save and Grow. A policymaker's guide to the sustainable intensification of smallholder crop production*. Rome.
- FAO. 2015. *Global Forest Resources Assessment 2015. How are the world's forests changing? Second edition*. Rome.
- FAO. 2016. *Climate change and food security: risks and responses*, Rome (<http://www.fao.org/3/a-i5188e.pdf>).
- FAO. 2016. *The agricultural sectors in nationally determined contributions (NDCs), Priority areas for international support* Rome.
- FAO. 2017. *The future of food and agriculture – Trends and challenges*. Rome.
- Gibson, T.M. Lee, L.P. Koh, B.W. Brook, T.A. Gardner, J. Barlow, C.A. Peres, C.J. Bradshaw, W.F. Laurance, T.E. & Lovejoy, N.S. 2011. Sodhi primary forests are irreplaceable for sustaining tropical biodiversity. *Nature*, 478 (7369): 378–381.
- Green, R. E, Cornell S. J., Scharlemann, J. P. W, Balmford. A. 2005. Farming and the Fate of Wild Nature. *Science*, Vol. 307, Issue 5709, pp. 550-555. DOI: 10.1126/science.1106049
- Robinson, R. A. & Sutherland, W. J. 2002. Post-war changes in arable farming and biodiversity in Great Britain. *Journal of Applied Ecology*. 39
- HLPE. 2014. *Note on Critical and Emerging Issues for Food Security and Nutrition. A note by the High Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security*, Rome.

HLPE. 2017. 2nd Note on Critical and Emerging Issues for Food Security and Nutrition. A note by the High Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security, Rome.

IAASTD (International Assessment of Agricultural Knowledge, Science and Technology for Development). 2009. Agriculture at a crossroads: global report. B.D. MacIntyre, H.R. Herren, J. Wakhungu, R.T. Watson, eds. Washington, DC, Island Press

IPBES (2016). The assessment report of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services on pollinators, pollination and food production. S.G. Potts, V. L. Imperatriz-Fonseca, and H. T. Ngo, (eds). Secretariat of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, Bonn, Germany. 552 pages.

IEA (International Energy Agency), 2016. Key renewables trends. Excerpt from : Renewables information. Paris.

Payn, T., Carnus, J-M., Smith, P., Kimberley, M., Kollert, W., Liu, S., Orazio, C. Rodriguez, L. Silva., L. & Wingfield, M. 2015. Changes in planted forests and future global implications. *Forest Ecology and Management*, 352: 57–67

Poppy M. , P. C. Jepson P. C. , Pickett J. A., Birkett M. A. Achieving food and environmental security: new approaches to close the gap. *Philosophical transactions of the Royal Society*, 2014.

Rosegrant, Mark W.; Sulser, Timothy B.; Mason-D’Croz, Daniel; Cenacchi, Nicola; Nin-Pratt, Alejandro; Dunston, Shahnila; Zhu, Tingju; Ringler, Claudia; Wiebe, Keith D.; Robinson, Sherman; Willenbockel, Dirk; Xie, Hua; Kwon, Ho-Young; Johnson, Timothy; Thomas, Timothy S.; Wimmer, Florian; Schaldach, Rüdiger; Nelson, Gerald C.; and Willaarts, Barbara 2017. Quantitative foresight modeling to inform the CGIAR research portfolio. Project Report for USAID. Washington, D.C.: International Food Policy Research Institute (IFPRI).

Settele, J., Scholes, R., Betts, R., Bunn, S., Leadley, P., Nepstad, D., Overpeck, J.T. & Taboada, M.A. 2014. Terrestrial and inland water systems. In C.B. Field, V.R. Barros, D.J. Dokken, K.J. Mach, M.D. Mastrandrea, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel, A.N. Levy, S. MacCracken, P.R. Mastrandrea & L.L. White, eds. *Climate change 2014: impacts, adaptation, and vulnerability. Part A: global and sectoral aspects*, pp. 271–359. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge, UK, and New York, USA, Cambridge University Press.

Sloan S. & Sayer, J. 2015. Forest Resources Assessment of 2015 shows positive global trends but forest loss and degradation persist in poor tropical countries. *Forest Ecology and Management*, 352: 134–145

UNFCCC. 2015. Paris Agreement.

United Nations. 2017. United Nations strategic plan for forests, 2017-2030

United Nations. 2017. Ministerial declaration of the 2017 high-level political forum on sustainable development, convened under the auspices of the Economic and Social Council, on the theme “Eradicating poverty and promoting prosperity in a changing world” E/2017/L.29–E/HLPF/2017/L.2.

Vira, B., Wildburger, C. & Mansourian, S., eds. 2015. Forests, trees and landscapes for food security and nutrition. IUFRO World Series, 33.

Wilson JD, Evans AD, Grice PV. Bird conservation and agriculture. Cambridge, U.K: Cambridge Univ. Press; 2009.

WWF/IIASA. 2012. Living Forests Report. Gland, Switzerland, WWF and IIASA.