



**Subsidiary Body for Scientific and
Technological Advice**

Fifty-second to fifty-fifth session

Item 8 of the provisional agenda

Koronivia joint work on agriculture

**Subsidiary Body for Implementation
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**Sustainable land and water management, including
integrated watershed management strategies, to ensure food
security**

Workshop report by the secretariat

Summary

The first part of the intersessional workshop on element (a), sustainable land and water management, including integrated watershed management strategies, to ensure food security, was held virtually in conjunction with the May–June 2021 Climate Change Conference – sessions of the subsidiary bodies. Experts from Parties, international organizations, the private sector, research organizations, civil society and constituted bodies under the Convention as well as farmers presented experience and challenges and barriers in relation to the implementation of sustainable land and water management in agricultural practices, and engaged in an in-depth discussion on the potential, co-benefits and synergies, with multiple objectives like adaptation to, and the mitigation of, climate change, and ensuring worldwide food security. The workshop provided an opportunity to discuss options for increasing synergy and collaboration among stakeholders, while highlighting that farmers must be at the centre of all discussions and decision-making on climate change, agriculture, land and water management, and food security.



Abbreviations and acronyms

AF	Adaptation Fund
CFS	Committee on World Food Security
COP	Conference of the Parties
COVID-19	coronavirus disease 2019
CTCN	Climate Technology Centre and Network
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
GCF	Green Climate Fund
GEF	Global Environment Facility
IPCC	Intergovernmental Panel on Climate Change
KCI	Katowice Committee of Experts on the Impacts of the Implementation of Response Measures
KJWA	Koronivia joint work on agriculture
LEG	Least Developed Countries Expert Group
NAP	national adaptation plan
NDC	nationally determined contribution
NGO	non-governmental organization
SB	sessions of the subsidiary bodies
SBI	Subsidiary Body for Implementation
SBSTA	Subsidiary Body for Scientific and Technological Advice
SDG	Sustainable Development Goal
UNCCD	United Nations Convention to Combat Desertification

I. Introduction

A. Mandate

1. The COP requested the SBI and the SBSTA to jointly address issues related to agriculture, including through workshops and expert meetings, working with constituted bodies under the Convention and taking into consideration the vulnerabilities of agriculture to climate change and approaches to addressing food security.¹

2. Parties set out a road map of work under the KJWA. This is contained in annex I to documents FCCC/SBI/2018/9 and FCCC/SBSTA/2018/4, and includes six workshops that were to be held sequentially before COP 26. The SBSTA and the SBI requested the secretariat to organize these workshops in conjunction with specified sessions and encouraged admitted observers to participate in the workshops. The six workshops have been completed. Further information on each workshop is available on the UNFCCC website.

3. At SB 50, the SBI and the SBSTA requested the secretariat to organize an intersessional workshop in addition to the workshops mandated in the Koronivia road map to contribute to delivering the outcomes of the KJWA, taking into consideration the vulnerabilities of agriculture to climate change and approaches to addressing food security. The SBI and the SBSTA also requested the secretariat to prepare a report on the workshop for their consideration at SB 53. They further requested the secretariat to invite representatives of the constituted bodies to contribute to the work and attend the workshops.² They requested the secretariat to take into account the following elements when organizing the intersessional workshop:

(a) Sustainable land and water management, including integrated watershed management strategies, to ensure food security;

(b) Strategies and modalities to scale up implementation of best practices, innovations and technologies that increase resilience and sustainable production in agricultural systems according to national circumstances.

4. The intersessional workshop was planned to take place in Bonn from 3 to 5 March 2020 but had to be postponed owing to the COVID-19 pandemic. The workshop was subsequently organized in two parts. The first part, on element (a), was organized virtually in conjunction with the first part of the 2021 session of the subsidiary bodies. The second part, on element (b), will be organized before COP 26 (dates to be confirmed).

B. Possible action by the Subsidiary Body for Implementation and the Subsidiary Body for Scientific and Technological Advice

5. The SBI and the SBSTA may wish to consider this report at the second part of the 2021 session of the subsidiary bodies (SB 52–55) when reviewing the KJWA and preparing a report to COP 26 on the progress and outcomes of the work, including on potential future topics.³

II. Proceedings

6. The workshop referred to in paragraph 4 above was organized by the secretariat and held virtually in conjunction with the first part of the 2021 session of the subsidiary bodies, which took place from 31 May to 17 June 2021. It was open to all Parties and observers attending the session.

¹ Decision 4/CP.23, para. 1.

² FCCC/SBI/2018/9, para. 42, and FCCC/SBSTA/2018/4, para. 64.

³ As mandated in decision 4/CP.23, para. 4.

7. The SBI Chair, Marianne Karlsen, delivered opening remarks on behalf of herself and the SBSTA Chair and detailed the mandate and objectives of the workshop. She invited Philip Blackwell (Ireland) and Milagros Sandoval (Peru) to co-facilitate the workshop.
8. The workshop was organized in six sessions:
 - (a) Focus session – sustainable land management to ensure food security;
 - (b) Focus session – sustainable water management, including integrated watershed management strategies, to ensure food security;
 - (c) Party presentations;
 - (d) Presentations by constituted bodies and financing entities;
 - (e) Expert presentations by observer constituencies;
 - (f) Plenary discussion.
9. Further information on the workshop, including the agenda, recordings, presentations and names of speakers, is available on the UNFCCC website.⁴

III. Summary of presentations

A. Keynote presentations

10. An IPCC author⁵ explained some of the guiding principles for sustainable land management and food security in the IPCC Special Report on Climate Change and Land.⁶ There is growing attention among policymakers, stakeholders and researchers on interventions that contribute at the same time to climate change mitigation, adaptation, food security, and the achievement of the SDGs. The IPCC Special Report identifies three options for sustainable land management interventions that have the highest impact on climate change mitigation, adaptation and food security: (1) increase food productivity, (2) increase soil organic carbon content and (3) agroforestry. Operationalizing the three options would result in reduced demand for land conversion, increases in above-ground and soil carbon, and increases in water-holding capacity, respectively. Proposed policies to make progress towards these objectives included securing land tenure; following rights-based decision-making processes; empowering women; using sustainability standards and certification programmes; creating and regulating markets; developing metrics to measure progress towards goals; investing in agricultural research, extension and technology transfer; building national agroforestry plans; and creating farmer-oriented incentives for sustainable practices.

11. An expert⁷ from FAO gave a keynote presentation highlighting the problems created by land degradation, which affects at least 2 billion ha worldwide, directly impacting 1.5 billion people. Land degradation is still increasing and negatively impacting rural poverty and food security. If no change occurs, future soil erosion could cause a total reduction in potential annual crop yield of 10 per cent by 2050. The expert presented three different approaches to this challenge. The first was land degradation neutrality, which seeks to ensure no net loss of healthy and productive cropland or grassland. The second approach to reverse land degradation was sustainable land and water management; the expert presented the framework used by FAO. The third approach presented was to use an integrated approach, for example a landscape approach, to better understand complex issues and how to resolve them from a multisectoral perspective, integrating natural, climate, economic and institutional perspectives.

⁴ <https://unfccc.int/event/koronivia-intersessional-workshop-part-1>.

⁵ Cynthia Rosenzweig.

⁶ IPCC. 2019. *IPCC Special Report on Climate Change, Desertification, Land Degradation, Sustainable Land Management, Food Security, and Greenhouse Gas Fluxes in Terrestrial Ecosystems*. PR Shukla, J Skea, E Calvo Buendia, et al. (eds.). Available at <https://www.ipcc.ch/report/srccl/>.

⁷ Sasha Koo-Oshima.

12. An expert⁸ from the UNCCD secretariat presented on land degradation neutrality response actions. The UNCCD defines land degradation neutrality as a state in which the amount and quality of land resources necessary to support ecosystem functions and services and enhance food security remain stable or increase within specified temporal and spatial scales and ecosystems. The poorest and most food-insecure people live in areas affected by land degradation, desertification and drought. Healthy land has a high capacity to store and filter water. Conversely, water scarcity and droughts can accelerate the processes of land degradation. To achieve land degradation neutrality, a long-term strategy is needed from both the demand and supply sides. The main actions taken under the UNCCD to contribute to this aim are supporting scientific and technological excellence, raising public awareness, developing standard settings for monitoring and assessment, and building advocacy and resource mobilization partnerships.

13. An expert⁹ from the United Nations University presented on freshwater impacts increased by climate change and on sustainable flood management regimes. Climate change alters the frequency and intensity of rainfall, floods and droughts, causing significant impacts on agriculture and food production. Although food shocks and stresses affect all people, women, indigenous populations, subsistence farmers, pastoralists and fishers are disproportionately affected. In regions where basic food production and hunger are significant concerns, addressing climate adaptation – especially through water-related impacts – is essential to reducing long- and short-term threats to food security. Improving institutional arrangements and river basin information systems can help to meet these challenges. The expert also highlighted that disrupting flow regimes in river systems produces degradation of hydrological ecosystems, loss of livelihoods and biodiversity, and food insecurity.

14. An expert¹⁰ from the Centre for Environment and Development for the Arab Region and Europe gave a keynote presentation on sustainable water management. Clean water and sanitation for all is one of the SDGs, but water is related to many other SDGs and especially to agriculture and food. Food security is threatened by water scarcity and transboundary water conflicts, but also by land degradation, increased population, climate change, food market volatility and political instability. Key measures to address sustainable water management are reducing food waste and improving the use of green water (rainwater that reaches the soil and plants directly, without any human intervention). International cooperation can be used to solve some water scarcity and food security problems. Improving the productivity of rain-fed agriculture has a large untapped potential to increase water efficiency in agriculture.

15. An expert¹¹ from the International Water Management Institute presented on landscape restoration for community and environmental resilience in Ethiopia. About 29 per cent of global land area is suffering land degradation – 25 per cent in the case of Ethiopia – which impairs livelihoods, biodiversity and the ability to combat climate change. Land degradation affects about 3.2 billion people globally, including 40 million people in Ethiopia. Since the 1970s, several national programmes have been implemented in Ethiopia to restore degraded landscapes with the aims of reducing land degradation, improving agricultural productivity and protecting or restoring ecosystem functions and diversity in landscapes. One practice is to apply grazing exclosures to cattle, which integrates income generation with landscape restoration. Landscape restoration also has proven positive impacts on the hydrological cycle and on efforts to increase access to water for multiple uses, making it possible to increase agricultural productivity, diversify the livelihoods of smallholder farmers and contribute to food-secure communities. Appropriate legal and policy frameworks can facilitate overcoming different challenges associated with water management, such as conflicts between natural and political boundaries, upstream and downstream communities, and providers and beneficiaries.

⁸ Xiaoxia Jia.

⁹ Zita Sebesvari.

¹⁰ Khaled Abu Zeid.

¹¹ Wolde Mekuria.

16. The Chair¹² of CFS gave a keynote presentation explaining the aims, mission and functioning of CFS, a global forum and platform with 138 country members and participants from diverse groups, institutions and stakeholders (governments, United Nations agencies, civil society, etc.) for exchanging views on food security and nutrition for all, sharing lessons and good practices, and reviewing progress following different interventions. CFS also has the High-level Panel of Experts on Food Security and Nutrition, which helps to collect high-level knowledge. Since 2011, it has produced various reports, including voluntary guidelines on the responsible governance of tenure of land, fisheries and forests; principles for responsible investment in agriculture and food systems; a framework for action for food security and nutrition in protracted crises; and voluntary guidelines on food systems and nutrition.

B. Country presentations

17. Representatives of six countries made presentations, in which they responded to the following questions:

(a) What are your country's national experiences with sustainable land and water management, including integrated watershed management strategies, to ensure food security? What opportunities and challenges does your country face in planning for and implementing sustainable land and water management?

(b) What kind of outcome of the KJWA could contribute to efforts to address the challenges identified?

18. A representative of the African Group presented on land and water management in Africa and the opportunities and challenges for future sustainable land and water management, which is a holistic approach to addressing ecological, sociocultural and economic aspects. While land and water are fundamental resources for livelihoods and food security in Africa, land degradation is a major problem that affects about 66 per cent of the productive land area in Africa and also affects water resources. Water is unevenly distributed geographically, with 40 per cent of the population living in arid and semi-arid areas. Different drivers of future water stress can lead to greater challenges in terms of resource sustainability and conflicts among diverse users. It is important to learn from successful experiences, for example the integration of agroforestry practices that led to the farmer-managed natural regeneration of 30 million ha in Niger. Some opportunities for future sustainable land and water management in Africa include improving agricultural productivity and increasing water withdrawals.

19. A representative of Argentina presented the country's experience with land and water management problems in the Chaco-Pampa plain region. Different drivers have promoted a large production of grain crops, contributing to Argentina being the world's fourth largest corn producer, third largest soybean producer and the largest exporter of soybean oil and meat. Nevertheless, the expansion of agriculture has resulted in large hydrological changes because the crops have lower rates of evapotranspiration than native vegetation, which has increased the level of the water table, creating problems such as more frequent floods, the development of new rivers, salinization and excess water problems. At the same time, some parts of the region are impacted by droughts. Some measures are being implemented to mitigate and adapt to the new scenario, including hydraulic solutions (e.g. tile drains, open ditches) and green solutions (e.g. perennial pastures, agroforestry, protecting native forests). The local government has also implemented different policies, including a forest law to protect native forest, with the aim of increasing evapotranspiration and reducing waterlogging.

20. A representative of Bhutan presented the experience of his country in managing land and water. The landscape in Bhutan is dominated by high mountains and steep slopes. Agriculture is dominated by subsistence mixed farming systems, with low use of inputs, and is largely rain-fed. The country has abundant water resources but lacks adequate infrastructure for their management. Bhutan's national food and nutrition security strategy is linked to the SDGs, the gross national happiness philosophy, and economic and environmental objectives. Bhutan has an ongoing low-emission development strategy for

¹² Thanawat Tiensin.

food security comprising three main streams: improving agricultural practices, switching from synthetic to organic fertilizers and increasing biomass through greater perennial crop and fodder production. The representative suggested that the KJWA should contribute to technology and knowledge transfer (information-sharing, capacity-building), the production of field and satellite-based data, easier access to global and regional funds and the enhancement of international cooperation and financial investment in sustainable land and water management.

21. A representative of the EU presented different approaches used by the EU for addressing problems with nutrient loading and water abstraction for irrigation. First, the EU has a set of diverse legal acts concerning land and water management. Second, the EU is implementing different policies and measures, such as the transfer of knowledge and information, advisory services, investments in physical assets, investments in forest areas and other agriculture, environment and climate measures, support for organic farming, and nature protection policies. Third, the EU is evaluating the impacts on water of its agricultural policies to inform improvements in future policies. And fourth, the Knowledge Hub on Water and Agriculture includes contributions from EU services, international organizations, EU research projects, and so on.

22. A representative of Fiji presented the experience of the country with sustainable land and water management to ensure food security. Fiji has a population of close to 1 million people and is composed of more than 300 islands. Its main economic drivers are tourism and agriculture. Now, with COVID-19 nullifying tourism, the nation is focusing on increasing the productivity of primary industries. Problems in Fiji that threaten food security are freshwater and coastal ecosystems polluted by chemicals and pesticides, which impacts the tourism and fishing industries, and soil and nutrient erosion, which reduces agricultural productivity. Fiji has a climate change law and a land-use law that have been developed and operationalized. The Ministry of Agriculture, in collaboration with NGOs, has developed field schools and demonstration sites. Some of the practices promoted are using organic fertilizers and compost to increase soil organic matter and soil water-holding capacity, the protection of riverbanks using natural solutions, vulnerability assessments and adaptation to climate change. Fiji considers that in the future the KJWA should continue to address the vulnerability of agriculture to climate change and start to focus on implementation of climate action in the agriculture sector.

23. A representative of New Zealand explained the country's approach to water management. New Zealand is a net food exporter, and agriculture is an important economic activity for the country, which is water-rich. New Zealand's overarching framework is guided by indigenous knowledge and the view that there exists a deep relationship of respect and reciprocity with the natural world. The country has a freshwater normative package with a hierarchy of obligations and priorities, and regional policies and plans. For example, rules fix stock exclusion regulations, the obligation to measure and report water takes, and mandatory and enforceable freshwater plans at the farm level. Freshwater farm plans are based on concrete actions and are audited by local authorities, which can also provide advice. New Zealand considers the KJWA to be important for the future exchange of information between Parties, in contributing to policy implementation at the regional and national level, including both monitoring and auditing, and in facilitating access to finance to support agriculture.

C. Presentations on work undertaken by constituted bodies and financing entities

24. Eight experts presented on the work of their respective bodies or organizations, guided by the following questions:

(a) What are your body or organization's experiences with sustainable land and water management, including with integrated watershed management strategies, to ensure food security? What are the opportunities and challenges for your body or organization in this area?

(b) What kind of outcome of the KJWA could contribute to addressing the challenges identified?

25. A representative of the CTCN presented four examples of projects implemented by the CTCN that are centred on enhancing capacities and assisting in the planning and formulation of activities related to a variety of topics, such as climate-resilient agricultural technologies, flood risk mitigation, and waste management and energy capture technologies. Currently, the CTCN perceives two main challenges in agriculture, especially in developing countries: (1) a lack of access to and knowledge of agrometeorological information and agricultural technologies and (2) value chain inefficiencies, which require a holistic perspective on agricultural value chains and close coordination between different actors, including the public sector. The representative highlighted two technological opportunities to respond to these challenges: (1) digital technologies, which allow better planning, improved decision-making, the large-scale dissemination of real-time information, better communication and many other benefits, and (2) post-harvest actions, which allow minimal post-harvest losses (e.g. in storage and transportation).

26. Two representatives of the Facilitative Working Group of the Local Communities and Indigenous Peoples Platform presented indigenous peoples' holistic perspective on agriculture and food sovereignty. They emphasized the importance of a rights-based approach that builds on existing agreements, such as the 2002 Declaration of Atitlán, the 2007 United Nations Declaration on the Rights of Indigenous Peoples, which sets minimum standards for the survival, dignity and well-being of indigenous peoples, and the Paris Agreement, in which indigenous rights are recognized. The representatives highlighted that indigenous peoples need rights to land, water and other resources, and to maintain and transmit traditional knowledge and scientific practices. They also need a variety of crops whose traditional integrity has been preserved and that are not genetically modified, which they plant according to their traditional knowledge of weather prediction. Without the vitality of biodiversity and ecosystems, indigenous peoples would be unable to maintain food security; therefore, a temperature increase of 2 °C would put them at risk of losing land and cultural and natural heritage and disrupt cultural practices embedded in their livelihoods.

27. A representative of the KCI explained that its work focuses mainly on the social and economic impacts of the implementation of climate change policies and measures, including adaptation policies. The work of the KCI has four main areas: evaluating economic diversification; evaluating just transitions of the workforce and how they affect decent work and quality jobs; assessing the impacts of response measures; and establishing tools to develop the other three areas. At the 4th meeting of the KCI, experts and practitioners provided inputs on tools and methodologies for modelling and assessing the impacts of the implementation of response measures, with many inputs related to agriculture.

28. The LEG is mandated by the COP to provide technical guidance and support for the formulation and implementation of NAPs. The representative of the LEG presented on the current state of the formulation of NAPs by developing countries. Agriculture, land, water and food security are priority areas in adaptation, especially for the least developed countries in their NDCs, NAPs, national adaptation programmes of action and national communications, and in adaptation projects and programmes under the GCF and the Least Developed Countries Fund portfolio. The representative said that the key question for the LEG is how to integrate agriculture, food security, and land and water management into NAPs. In reply to this question, the LEG has produced technical guidelines for the NAP process, which provide recommendations to develop country-driven processes that include national goals, the SDGs and goals from other frameworks, such as the Sendai Framework for Disaster Risk Reduction 2015–2030. The representative also noted the need to develop innovative tools, techniques, skills and capacities to include these topics in NAPs in an integrated way.

29. A representative of the World Bank highlighted the critical need to move urgently towards productive and recarbonized landscapes for climate-resilient circular economies and presented an example of the benefits of good management of rice cultivation, which has a high potential for mitigation and improving water management while increasing farmers' incomes. The representative highlighted World Bank activities such as providing support for individual projects to promote sustainable agricultural practices, building partnerships with other institutions pursuing similar objectives, and leveraging blended finance to promote private participation and obtain targeted results on a large scale. He suggested that in the

future the KJWA could catalyse the acceleration of adoption of sustainable land and water management practices; providing support to countries in addressing technical, capacity and priority-setting bottlenecks in the assessment and monitoring of sustainable land management; highlighting opportunities to incentivize and reward actors; providing a platform to discuss how to scale up sustainable land and water management approaches; developing intervention guidelines and models that work for smallholder farmers; developing the required aligned and integrated policy frameworks; and assisting countries to translate policies into action plans at the regional and national level.

30. The AF works on sustainable land and water management, specifically through projects on food security, water resources management, agriculture, ecosystem-based adaptation and rural development. The AF also works on promoting an enabling environment. The representative presented three AF projects: one in Egypt aimed at improving the capacity of farmers to adapt to climate-induced food insecurity; a community adaptation project in Indonesia for managing agroforestry-based food crops with intercropping techniques to improve agricultural productivity and increase forest cover; and a regional project involving Colombia and Ecuador to build adaptive capacity through food and nutrition security and peacebuilding. The AF aims to create pilot projects so that governments can scale them up. The AF also has a scale-up programme, but its capacity is limited. The KJWA could help to increase resources for disseminating available solutions and best practices for sustainable land and water management and for improving food security, for example by increasing lesson-sharing.

31. The GEF considers it critical to apply integrated approaches at the landscape and watershed level in order to achieve synergies between environmental benefits, with the objective of producing a large-scale systems transformation towards sustainability. The GEF has increased its portfolio with regard to agriculture and food issues, has devoted more resources to the land degradation focal area in recent investment cycles and has focused more on value chains. The GEF representative highlighted two key issues to consider in sustainable land and water management and climate projects: the need to bring together different stakeholders to work towards achieving integrated planning, comprehensive land-use planning and policy coherence, and the need to increase the role of the private sector, especially in contributing additional funds and financing, and triggering innovation and emerging technologies.

32. A representative of the GCF presented on the work and perspectives of the GCF on sustainable land and water management, agriculture and food security. The GCF is especially interested in and focused on transformative projects that can be examples of paradigm-shifting solutions to accelerating both the mitigation of and the adaptation to climate change. The GCF can promote innovative projects through a multitude of financial instruments, including grants, loans, equity and guarantees. Ongoing GCF agriculture and food security projects are directed at smallholder farmers, seeking to improve their agricultural productivity, income and resilience, and at agribusiness. Existing GCF funding levels do not allow the GCF to fully meet increasing demand from the agriculture sector. Currently, the public sector receives most of the funding devoted to adaptation, but the GCF is trying to increase the participation of the private sector, especially as a way of triggering innovative solutions. Concerning the future of the KJWA, the representative proposed that it could lead to the identification of innovative ideas and transformative projects; aim to find common ground in terms of methods and approaches for assessing adaptation, adaptation co-benefits and resilience; and contribute to finding concrete mechanisms to share good practices.

D. Presentations by observer constituencies

33. Experts representing seven non-State actors responded to the following questions:

(a) In the view of your constituency or organization, what are the most important synergies and trade-offs when implementing sustainable land and water management, including integrated watershed management strategies, to ensure food security in the context of climate change? What are the opportunities and challenges for your constituency or organization in this area?

(b) How can an outcome of the KJWA best contribute to the implementation, upscaling and measurement of the impacts and benefits of sustainable land and water management to ensure food security?

34. A representative of business and industry NGOs highlighted the important impacts that climate change is having on all stakeholders in the agriculture sector and the need to increase sustainable food production and sustainable land and water management. Nevertheless, numerous needs and gaps still have to be addressed to generalize these practices, and business and industry play a key role in aiding and accelerating solutions. For example, it is important to incorporate the natural capital concept and emerging understandings of value in the traditional view of the concept of highest and best use. The public sector also has an important role in triggering solutions from the private sector through dynamic policies and regulatory frameworks. Other activities are also necessary, such as interdisciplinary research, the promotion of indigenous expertise, the exchange of experience between companies, the development of sectoral bodies to enable them to deal with climate issues, and the building of partnerships between different institutions.

35. A representative of environmental NGOs emphasized the problems that are being exacerbated by climate change and certain practices, such as the use of synthetic nitrogen fertilizers. The representative highlighted the problem of many policies being gender-blind, especially in the global South, where women make up at least 43 per cent of farmers. Women farmers have insecure access to land, a lack of access to finance and extension services, lower literacy levels and a lack of access to information, markets and value addition. Therefore, women farmers are not able to maximize production. The representative proposed using 'no regrets' options like agroecological techniques, agroforestry, sustainable water management techniques (like rainwater harvesting and terraces) and gender responsiveness and inclusivity. She made the following recommendations for the KJWA: promote agroecology and agroforestry, move away from industrialized agriculture, encourage locally adapted seed diversity, increase research and development in agroecology and agroforestry, and ensure inclusivity and gender-responsive participation in policy development and in extension and training services.

36. A representative of farmers and agricultural NGOs acknowledged the many threats that the world is facing and highlighted the shifting climate, the growth in population and urban areas and the increased demand for water and land. The representative also noted the importance of water resources, the water cycle and healthy watersheds for agriculture and all life. The representative presented a successful case as an example of the proposed way forward to achieve the desired and needed sustainable use of resources. This way must be guided by inspirational leaders and built on partnerships that allow people to work together on common goals, one of which should be to produce nutritious and healthy food and maintain healthy ecosystems to achieve the SDGs. It is therefore essential to ensure participation of all stakeholders when creating policies and for learning from one another.

37. A representative of research and independent NGOs gave a presentation centred on the negative consequences of using fire in agriculture and on proposals for its elimination. The negative consequences include leading to more easily erodible soils; decreasing fertility, the soil's water-holding capacity and crop yields; requiring the increased use of fertilizers; producing health impacts; and increasing carbon emissions. To change these practices for more sustainable ones, multidisciplinary research and collaboration with all stakeholders are needed. It is important to recognize that farmers can change practices only when they have reliable alternatives and support for the transition. However, it is key to provide education and useful incentives to farmers and to know that change can come quickly, as shown in examples in which farmers learned about the greater profits possible from practices like no-till, low-till, no-till/direct seed, conservation agriculture, harvesting and monetizing straw, and harvesting for hay.

38. A representative of trade union NGOs stressed that the world food production system is not compatible with the sustainability of the climate, the environment, communities, employment or income, with 2 billion people lacking access to nutritious food and many millions suffering from hunger. Water, food security and nutrition are intrinsically linked, and there are many problems related to water management, such as a lack of access to safe drinking water and sanitation, water contamination, the political use of water, the volatility

of food prices from commodity speculation, and the climate crisis, which is increasing the degradation of water ecosystems. The representative said that discussions are needed in every country on agricultural workers, farmers, food processing workers, soil and water, the rights to food and equitable access to water, decent work, and skill development. They need to be a part of gender equality processes with the involvement of farmers, workers and indigenous peoples.

39. A representative of the women and gender constituency presented on the relationships between gender and integrated water resources management for food security. The representative explained that it is important to consider that water has multiple values, including reproductive, productive, environmental and sociocultural values; and that integrated water resources management has four pillars: equity, efficiency, environmental sustainability and an enabling environment. Gender is a cross-cutting factor in such management and has a special importance for equity. For example, although women perform a very high proportion of farming work, the number of women agricultural holders is minimal. In addition, women perform the biggest share of unpaid family work.

40. According to a representative of youth NGOs, sustainable land and water management is needed to feed the world, improve ecosystems and adapt to and mitigate the impacts of climate change. Collective awareness, political will, actual implementation and inclusive processes are needed to implement such management. The representative presented possible approaches to sustainable land management and sustainable water management, and synergies between them and other co-benefits. The representative also presented opportunities and challenges in the achievement of sustainable land and water management, like a lack of finance flows, the inclusion of local communities in planning or a lack of capacity-building. To guide implementation, the KJWA could highlight relevant frameworks and practices that increase soil organic carbon and promote diverse agroecological systems; develop guidelines for and promote cross-country collaboration; and propose incentives to adopt recommended practices.

IV. Summary of discussions and way forward

A. Summary of discussions

41. The plenary discussions were guided by three questions:

(a) What is needed to understand and reduce the risks and impacts of climate change on sustainable land and water management, taking into consideration approaches to addressing food security?

(b) What is needed to meet the needs of farmers and food systems while recognizing the role of youth, local communities and indigenous peoples, taking into account gender considerations?

(c) What are successful examples of achieving sustainable land and water management to ensure food security in the context of climate change?

1. Practices and approaches

42. Participants agreed that more sustainable land and water management systems are needed to address climate change and enhance food security. Multiple interconnections in such management were discussed, including the potential for integrated management systems to bring multiple benefits. Participants highlighted that a change for sustainability needs to be interdisciplinary and involve political, cultural and social aspects.

43. The necessity and urgency of focusing on increasing adaptation to climate change in agriculture was raised. This will be harder if temperatures increase by more than 1.5 °C, so some participants emphasized the need to mitigate emissions from agriculture.

44. Climate change impacts are already increasing in frequency and intensity, severely affecting farmers and food production systems. On the one hand, this results in more droughts owing to disturbed rainfall patterns, higher wind speeds, which increase dehydration, and a

general reduction in the water-holding capacity of soils. On the other hand, flooding is severely affecting agriculture and other infrastructure and is often exacerbated by erratic rainfall patterns, inadequate watershed management strategies and human alteration of floodplains. Risk assessments, risk reduction plans and land-use planning, modelling and projection can help to coordinate preventive measures but must be informed by existing efforts and connect institutions and stakeholders. An example of a preventive measure is ecosystem-based flood risk reduction by decreasing deforestation, which reduces erosion and sediment transport by floods, leading to reduced floods downstream. On many occasions, floods follow droughts, so developing multi-hazard risk assessments and plans looking at both threats was proposed as the best approach.

45. Rain-fed agriculture is especially vulnerable to droughts. Given their important contribution to food security, especially for the most vulnerable, rain-fed agricultural systems require more attention to increase their resilience and resistance to drought. Some practices were presented as useful in increasing the potential of rain-fed agriculture, like rainwater harvesting and using collected and stored groundwater to supplement crop production during the dry season. It was argued that long-term strategies are needed to ensure the sustainable use of water, including groundwater, by recycling and treating water.

46. Early warning systems and insurance are two complementary ways to address the impacts of climate change. It was questioned whether one of them should be prioritized. In areas where prevention is not possible (e.g. in already populated floodplains), early warning systems are required. Insurance comes into effect only when the damage is done and is thus only one part of the solution, but can be very important for farmers' livelihoods, so further work is needed to find appropriate climate change insurance for farmers. Lessons from existing pilot projects to test special insurance products for vulnerable communities will be valuable in the future.

47. Land degradation is a long-term condition exacerbated by climate change and unsustainable management that leads to low farming productivity and jeopardizes food security. Increasing soil carbon content can increase resilience and restore land productivity, resulting in multiple benefits. Nevertheless, improving soil carbon in arid environments is particularly difficult. High levels of biodiversity are associated with good-quality water and facilitate the improvement of soil quality. An example was presented of how to use crop and fish residues in fishmeal and inputs for crops, and to raise the carbon levels and water-holding capacity of soil as an input for agriculture. At the same time, it was highlighted how the change in soil carbon levels is very small and slow, and how long-term benefits arrive after short-term costs.

48. The advantages and disadvantages of applying synthetic fertilizers were discussed, taking into account different fertilization situations in different regions. Some participants highlighted the negative consequences of using synthetic fertilizers, as they pollute watersheds, decrease soil quality and contribute to greenhouse gas emissions. Other participants referred to the Abuja Declaration, which considers an increase in the use of synthetic fertilizers necessary to enhance production and ensure food security in many African regions. Participants discussed whether agroecological practices can be a good alternative to chemical fertilizers and whether increasing productivity with synthetic fertilizers could prevent the conversion of forests to agricultural land. However, in some cases, increasing agricultural productivity has led to incentives to expand farmland. Practices to reduce the overuse of synthetic fertilizers can be implemented through regulation and economic incentives, for example by using buffers to prevent erosion and reducing the run-off of chemicals to improve water quality in catchments. The improvement of soil fertility using agroecological practices is not immediate and needs time, so productivity increases progressively each year but can reach the level of conventional farming and bring multiple additional benefits, for example for resilience and biodiversity. However, the systematic upscaling of agroecological practices to the country level was seen as a challenge because of organic fertilizer availability.

49. Participants expressed concern over the degradation of many watersheds, caused partly by human action and partly by climate change, and noted the need for integrated watershed management strategies. Operationalization remains a challenge, and the

implementation of such strategies requires monitoring and evaluation as well as coordination with other watershed planning processes, including those related to adaptation.

50. Island and coastal communities face special water-related challenges caused by climate change, such as increased salinity and saltwater intrusion in coastal areas. Physical protection measures can protect against seawater intrusion, but policies are also needed to reduce groundwater depletion. Different strategies can be adopted to reduce groundwater depletion, such as selecting crops, changing the time of cultivation, selecting the type of irrigation required by crop, and controlled groundwater pumping. Flood irrigation crops can also be used in coastal areas to reduce seawater intrusion. There are also emerging technologies and varieties of crop adapted to higher salinity. The second problem in island and coastal communities is the degradation of coastal ecosystems due to unsustainable land practices that reduce ocean productivity. The main problems come from increased water contamination, higher erosion rates and decreased volumes of water flowing from watersheds to the sea, threatening livelihoods dependent on fishing and marine life.

51. Given the range of challenges and intervention options, participants cautioned that the diversity of agricultural systems around the world needs to be taken into account. The differences are explained by different regional climates, types of soil and crop, and farm sizes, and by all the socioeconomic and cultural elements associated with agriculture. Each system has its own challenges, and solutions are not always easily transferable or scalable. Ideas proposed to tackle this challenge were, for example, finding similarities between, and sharing experiences of farming in, agroecological zones with similar conditions. The diversity of farming systems can also be seen as an opportunity to learn from one another.

52. Concerning NAP procedures, experts explained that countries follow different models to prepare their NAPs. For example, some countries have agricultural NAPs and others are preparing local adaptation plans. Concerning how the KJWA could contribute to NAP processes, an expert explained that, as these processes are country driven, each country should decide the way forward. Different challenges in the NAP process were discussed, including collecting statistics for implementation and developing indicators for monitoring and evaluation. Different international institutions provide support to countries for planning policy actions on agriculture in the context of NAPs and NDCs.

53. Participants mentioned that stakeholder engagement must be a priority in agriculture projects and climate-related processes, such as NAP processes, starting from project design and being tracked throughout implementation. Special consideration needs to be given to vulnerable groups, indigenous peoples, women and young farmers. In many cases, it was found that climate change challenges are affecting women farmers more, leading to a need for strategies to solve these problems, for example by creating cultural conversations in communities before starting to work in them; encouraging men to take on part of the burden holding back the rest of the family; encouraging extension and training to provide services to women without requiring high levels of literacy or digital information skills; meeting with women where they are; and promoting both cash crops and subsistence crops.

2. Measurement and data

54. Measurement, reporting and verification systems are required to operationalize and scale up investment in sustainable land and water management. Without information on the progress of implementation, it is difficult to attract investment on a large scale. This requires and will produce data, for example on biodiversity, climate, rainfall and soil. With better data and metrics, it is easier to plan and fine-tune climate change solutions in agriculture. Science-based monitoring and data analysis can support decision-making, but initially it is important to find ways of sharing data and systematically addressing the lack of data, including a lack of indicators, data management capacity in countries, and reference data. It was also highlighted that consideration should be given to collecting data lying outside the main scope of projects, for example by measuring the mitigation effects of adaptation projects.

55. Furthermore, as data are important, data collection needs to capture people's realities and the voices of people suffering from climate change, so it is also important to increase the collection and use of data from farmer groups. As an example of this, a project was presented in which farmers worked in teams to measure soil organic carbon in Bangladesh. Some 80

per cent of farmers in the world are smallholder farmers, so it would be beneficial to have a repository of information on how agricultural extension can reach small farmers to inform them about best practices.

3. Support

56. Many participants highlighted that access to adequate means of implementation is essential for implementing sustainable land and water management and addressing climate change in the agriculture sector, in particular in developing countries and in the face of the growing adaptation needs of the sector. Current national and international policies on, and incentives for, food production were discussed, and efforts were made to identify how international support and cooperation can enhance sustainable land and water management. Participants highlighted how funding, which is especially difficult to obtain for developing countries, is required for various urgent activities, for example drought and flood adaptation measures; research on agroecology and other climate change adaptation and sustainable land and water management practices; the implementation of adaptation and strategies for such management; research on, and the conservation of, the genetic properties of biological diversity; and capacity-building and extension services.

57. New technologies can facilitate the implementation of sustainable land and water management, but the question is how to make such technologies available to farmers on the ground, especially small-scale farmers in countries with low technological development. Participants also questioned what strategy could be used to transfer technologies to countries to help them to use their lands better. Technology transfer and capacity-building need to be done using different formats, such as training workshops and webinars. Internet-based methodologies are opening new possibilities to facilitate technology transfer. Examples include interactive platforms to encourage the sharing of experience, learning from others with similar experience, working with open-source software solutions, and capacity-building marketplaces that help to identify needs, offer solutions and find potential partners. Some participants highlighted the need to support capacity-building and agricultural extension in countries so that the required knowledge and skills can actually reach farmers.

58. The actual funding available for sustainable land and water management and climate change projects is difficult to ascertain, as institutions use different sectoral classifications for agriculture, food security and water management. Some financing entities highlighted that they are addressing this issue as a result of KJWA discussions. The representatives also explained that most projects are integrated, addressing a wide range of issues at the same time, and that, in country-driven processes, each country decides which sector it wants to work on.

59. One of the remaining challenges in sustainable land and water management and in climate adaptation and mitigation projects is to solve the problem of long-term benefits and initial, short-term costs. Very frequently, interventions have benefits in the long term for both society (e.g. carbon sequestration, improved water quality, higher biodiversity) and the implementer (e.g. improved soil fertility, improved availability of wood). However, they have short-term costs that often cannot be covered by farmers owing to a lack of access to investment capital or uncertainty about investment risks. Therefore, innovative business models are explored, in which short-term costs can be covered and long-term benefits achieved. It is essential to adopt a long-term vision to give support to local communities while ensuring their participation in planning and prioritizing sustainable land and water management activities.

60. Participants also discussed how private sector funding in agriculture and climate finance can be increased in the future. One proposal focused on de-risking: the private sector needs profits but is not investing in the agriculture sector because of the high risks it faces. Increasing the role of blended finance (the participation of the public and private sectors in the same projects) was also proposed (de-risking is one example of how to do this).

4. Cooperation and partnerships

61. One participant suggested that a useful task for future work under the KJWA would be to work towards (creating or enhancing) a platform with a compendium of success stories and good practices related to different problems. In that way, financing entities and other

implementing agencies could build on existing experience of knowledge-sharing and the development of ideas to scale up implementation. Ongoing multilateral collaboration initiatives such as the Global Research Alliance on Agricultural Greenhouse Gases and the Global Alliance for Climate-Smart Agriculture could also be invited to contribute. Participants also discussed the possibility of financing entities selecting interesting initiatives and proposing them as models for the implementation of project ideas in other countries, so that each entity could make proposals and adapt them for implementation in a particular country. Participants also raised the need for the KJWA to work together with financial entities in the future to set up dialogues with relevant people, increase the exchange of ideas and convert ideas into action. Many participants highlighted that the work under the KJWA could include collecting a compilation of successful means of implementation, taking into account the specific needs of different regions, to support people on the ground.

62. International cooperation was presented as especially crucial in transboundary watershed management. For example, different policies and practices are associated with seepage losses and evapotranspiration, which affect downstream countries. Another example showed how, in drought years, if water is not released, the downstream impact can be severe. Policies on watershed management are also often conflicting. Cooperation and the facilitation of policy dialogues on watershed management can help to address policy and capacity bottlenecks, find compromise solutions and resolve potential conflicts.

B. Way forward

63. Food security is threatened by water scarcity and transboundary water conflicts, but also by land degradation, increased population, climate change, food market volatility and political instability. Climate change plays a particular role in this complex system, and addressing climate adaptation is essential to safeguarding food security. At the same time, increasing agricultural productivity can increase food production for a growing population while contributing to the mitigation of climate change and bringing additional environmental benefits. Sustainable land and water management, including integrated watershed management strategies, can contribute to improving agricultural practices and achieving these objectives, in particular when focusing on the immediate and effective implementation of ‘no regrets’ options.

64. The KJWA could be used by Parties to create an enabling environment that allows donor agencies, institutions and financing entities to mobilize dedicated means of implementation for sustainable land and water management, including climate finance, technology transfer and capacity-building. Several representatives of constituted bodies and financing entities highlighted that it would be helpful to deliver clear messages under the KJWA on the needs and priorities of developing countries in terms of support in relation to agriculture, sustainable land and water management and climate change. This could extend to limiting risks in order to facilitate investment by the private sector. Participants encouraged Parties to use the KJWA to promote existing frameworks and strengthen national coordination at the strategic level, for example in the context of including sustainable land and water management activities and objectives in national strategy documents such as NAPs and NDCs.

65. Participants noted that the KJWA is useful for international collaboration, to facilitate knowledge- and data-sharing, to promote cooperation on agricultural matters and to assist Parties in matters related to agriculture and climate change. Participants emphasized the need for discussions to explore opportunities to scale up and replicate successful initiatives and projects. Participants suggested that a platform could be useful to provide information on success stories and best practices that could inform dialogues on catalysing ideas to scale up implementation, transform the outcomes of the KJWA into paradigm-shifting solutions and assist countries in translating policy frameworks into action plans at the regional and national level.