



SUMMARY OF THE EIGHTH TRONDHEIM CONFERENCE ON BIODIVERSITY: FOOD SYSTEMS FOR A SUSTAINABLE FUTURE: INTERLINKAGES BETWEEN BIODIVERSITY AND AGRICULTURE **31 MAY – 3 JUNE 2016**

The eighth Trondheim Conference on Biodiversity focused on the interlinkages between biodiversity and agriculture to develop food systems for a sustainable future. Regarding these interlinkages, participants discussed the imperatives and implications, policies and institutions, planning for a changing climate, and changing practices regarding these interlinkages. A Co-Chairs' report of the Conference, titled "Food systems for a sustainable future: interlinkages between biodiversity and agriculture," which captures the key messages arising from the Conference, will be transmitted to the Convention on Biodiversity's 13th Conference of the Parties (CBD COP 13).

Hosted by the Norwegian Government, in partnership with the CBD, the Food and Agriculture Organization of the UN (FAO), the Global Environment Facility (GEF), the UN Development Programme (UNDP), the UN Environment Programme (UNEP), the UN Educational, Scientific and Cultural Organization (UNESCO) and the World Bank, the Conference hosted some 304 experts from governments, including from the environment and agricultural sectors, relevant UN agencies, and international and non-governmental organizations.

This report provides a summary of the Conference proceedings and presentations, as well as of the Co-Chair's report. Presentations are available online at: www.trondheimconference.org.

A BRIEF HISTORY OF THE TRONDHEIM CONFERENCE ON BIODIVERSITY

Since 1993, the Trondheim Conference on Biodiversity has sought to enhance cross-sectorial dialogue on biodiversity research and management, and to establish the best possible scientific basis for policy and management decisions in relation to the CBD implementation. The Conference has provided important information to the CBD by focusing on the multi-dimensional nature of the Convention's implementation, and by recognizing the relevance of biodiversity-related issues for sustainable development.

The first Trondheim Conference, held in May 1993, provided scientific inputs to the first meeting of the Intergovernmental Committee of signatories to the CBD. The second Conference, held in July 1996, focused on invasive alien species, and contributed to the CBD's Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA 2) and the development of the Global Invasive Species Programme. The third Conference, held in September 1999, discussed the ecosystem approach for the sustainable use of biodiversity, and provided inputs to SBSTTA 5 and to discussions leading

to the adoption of the operational guidance and principles on the ecosystem approach at the CBD's 5th COP. The fourth Conference, held in June 2003, focused on technology transfer and capacity building. It informed SBSTTA 9 and the Bali Strategic Plan for Technology Support and Capacity Building.

The fifth Conference, held in November 2007, discussed biodiversity's role in sustainable development and how it contributes to poverty alleviation, as well as highlighted progress towards the CBD's 2010 target of significantly reducing the rate of biodiversity loss and reaching relevant Millennium Development Goals. The sixth Conference, held in February 2010, discussed the status of, and lessons learned from, the CBD 2010 target and post-2010 targets setting, including emerging issues and challenges for addressing drivers of biodiversity loss. The seventh Conference, held in May 2013, focused on the first goal of the Strategic Plan for Biodiversity 2011-2020, adopted by the CBD at COP 12. Through considering how careful alignment and a mix of policies, incentives and business strategies can help deliver sustainable development pathways, the meeting provided inputs to SBSTTA 17.

TRONDHEIM CONFERENCE REPORT

OPENING SESSION AND SETTING THE SCENE

On Tuesday, following a cultural performance by the award-winning Norwegian vocal group, Acabella, Co-Chairs Tone Solhaug, Ministry of Climate and Environment, and Nina Vik, Norwegian Environment Agency, officially opened the

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conference, emphasizing the ambition to advance dialogue between biodiversity and agriculture under the theme of “food systems for a sustainable future.”

Vidar Helgesen, Minister of Climate and Environment, Norway, underscored the importance of access and availability of food as key for achieving the 2030 Sustainable Development Agenda (2030 Agenda), noting the resource-intensive nature of food production. He highlighted the role of biodiversity both in providing critical ecosystem services for agriculture, as well as its adaptive role in providing genetic material to adapt food production in the face of climate change. Helgesen highlighted the global food system paradox in which up to two billion tonnes of food is wasted per year amidst serious food security challenges, noting that the linkages between food production, distribution and consumption requires a new approach to land use, which increases the ability of food systems to produce more with fewer resources. Finally, he underscored that increased knowledge and improved dialogue between science and policy communities is essential for achieving the Sustainable Development Goals (SDGs) in shaping a more sustainable food system for the future.

Nik Sekhran, Director, Sustainable Development Bureau for Policy and Programme Support, UN Development Programme (UNDP), envisaged a vastly different world in 2030, with a population of 8.3 billion people, of which half is living in water stress and contending with serious food security issues. He highlighted the importance of the 2030 Agenda, with its 17 SDGs and 169 targets, in addressing these challenges. He suggested that, if fully implemented, the world’s new development agenda would allow the world to “decouple economic growth from environmental plunder.”

Using a meal of fish and chips as an example, Sekhran sketched deficiencies in the current food system, saying the SDGs could provide the pathway to “a new recipe” for food production. He noted the need to: reverse the way wild plants and animals are harvested; decouple food production from deforestation and land degradation; foster agricultural genetic diversity in order to increase resilience; promote gender equity, inclusion and poverty reduction in agriculture; and increase efficiency and decrease waste, as well as decrease the use of chemical fertilizers and pesticides. Stressing the interrelatedness and universality of the 2030 Agenda, Sekhran said catalysts such as investments in food are needed to concurrently address a number of SDGs and targets, allowing the world to address SDG targets related to biodiversity, climate change, equality, poverty reduction and gender equity simultaneously.

Cuauhtémoc Ochoa Fernández, Ministry of Environment and Natural Resources, Mexico, underscored the importance of mainstreaming biodiversity for well-being in sectorial and inter-sectorial plans, programmes and policies as a central element of the Ministerial Declaration for the high-level segment of the Convention on Biodiversity’s 13th Conference of the Parties (CBD COP 13) in December 2016. He stated that biodiversity’s role in agriculture refers not only to food, fuel and fiber but also to regulating and supporting ecosystem services to ensure the productivity and resilience of agricultural systems. He emphasized that mainstreaming biodiversity requires a synergy among the Rio Conventions, biodiversity targets, sustainable production and consumption patterns along the food chain, as well as the full engagement and commitment of actors across all sectors. He noted the importance of thinking outside the “CBD box,” and promoting a clear and communicable vision, which sees agriculture achieving the common goals of addressing poverty, food insecurity and biodiversity loss.

Rita Ottervik, Mayor of Trondheim, said addressing a global concern such as biodiversity loss requires local action. She highlighted Trondheim’s efforts to preserve ecosystem services

in cooperation with land owners, volunteers and schools, including through: prioritizing ecosystem protection; restoring habitats; cleaning urban streams; preserving cultural landscapes for endangered plant communities; and combating invasive alien species.

On the need to transform the global food system to sustainably feed healthy populations, Sudhvir Singh, Director of Policy, EAT Initiative, said society’s collective challenge is to reduce the environmental footprint of the food systems that are currently responsible for emitting the most greenhouse gases, and cautioned that diet has overtaken tobacco use as the primary cause of human death. He underscored that no single sector has the answer, and urged partnerships through innovative solutions to effectively tackle the problem of unhealthy diets and food insecurity. In the area of research, Singh recommended developing integrated metrics to measure progress and altering consumer behavior to adjust unsustainable consumption patterns. He lamented that the introduction of monoculture production systems has compromised traditional ecosystem services through biodiversity loss, and highlighted collaboration with local municipalities through zoning for urban agriculture, regulations on sustainable transport networks, and school food programmes, as examples of innovative partnerships.

Knut Kvitvang Røflo, Director, Norwegian Agricultural Purchasing and Marketing Co-operation, and representing Felleskjøpet, two regional cooperatives owned by over 50,000 Norwegian farmers, emphasized developing an enabling environment for sustainable agriculture, and described the cooperative’s “proactive and pragmatic” approach to sustainability in the case of genetically-modified soy. He mentioned procurement policies for zero-deforestation soy, a moratorium for soy grown on recently deforested land, and the Norwegian feed industry undertaking wider commitments for sustainable soy production, including worker health and safety. He emphasized that smart sustainability policies are needed through collaboration across sectors that ensures profit to industry underpinned by science.

Braulio Ferreira de Souza Dias, Executive Secretary, CBD, highlighted the value of the Trondheim Biodiversity Conferences in shaping the global biodiversity agenda. Noting that the agriculture sector is responsible for the majority of the world’s biodiversity loss, he said it is “the most important sector to deal with.” He characterized the Second International Conference on Nutrition in November 2014 as a “wasted opportunity” in recognizing the role of biodiversity and genetic resources in agriculture, saying the sectors should be allies rather than competitors. On the CBD’s Strategic Plan for Biodiversity 2011–2020, he highlighted the Aichi Biodiversity Targets and their overlaps with the agricultural sector, and noted particularly relevant targets such as those on: sustainable management of areas under agriculture, aquaculture and forestry; restoration and safeguarding of ecosystems that provide essential services; maintenance of genetic diversity; controlling the spread of invasive alien species; and reducing pollution levels.

De Souza Dias noted the need for increased agricultural productivity, “but not at any cost,” and called for greater nuance in the debate on the type of agricultural system needed in the future, given the variety of choices available. He welcomed increased recognition of synergies between different sustainable development issue areas at the global level, including through the SDGs, the Rio Conventions, and the Sendai Framework for Disaster Risk Reduction, but said the national level continues to suffer from insufficient dialogue and silo approaches. He welcomed the upcoming CBD COP 13 as an opportunity to help each country reduce its impacts on biodiversity, and to better manage biodiversity to feed the world.

René Castro Salazar, Assistant Director General, FAO, highlighted the bottom-up nature of the SDGs, noting the relevance of biodiversity to forestry, agriculture and fisheries, and the need to systematically fight food insecurity and poverty to achieve sustainability. He underscored that enabling inclusive, resilient and sustainable food systems requires working at the country level to support local efforts, while transferring resources and technologies across countries for climate change adaptation and mitigation. He highlighted FAO's efforts in mainstreaming biodiversity through cross-sectorial approaches and intergovernmental processes on crops, livestock, forestry, fisheries and aquaculture. He also highlighted Norway's distinctive role in directing countries' efforts for sustainable development, and emphasized that although the mandates, measurable goals and financial flows required for achieving sustainability exist, further actions are needed.

CONFERENCE ORGANIZATION

Ellen Hambro, Director General, Norwegian Environment Agency, noted the Conference objectives, including: bringing the latest scientific knowledge and country experiences to the CBD policy discourse; sharing knowledge between different countries, sectors and stakeholders; providing capacity building; ensuring balanced representation; and cultivating an informal and "non-negotiating" atmosphere. Hambro also provided an overview of past Conferences, stressing their role in developing the Strategic Plan for Biodiversity 2011-2020, and in achieving broader international recognition of the threat of invasive alien species. Introducing this year's Conference theme, Hambro highlighted its links to the implementation of the Aichi Biodiversity Targets and the SDGs, and said it would explore the latest knowledge on biodiversity and ecosystem services, and address trade-offs between, as well as possibilities to integrate, biodiversity and agricultural policies. Noting that despite ongoing debates and conflicts, there is much common ground between the agricultural and environmental communities, Hambro expressed confidence that the conference would foster fruitful discussions and sustainable outcomes, including as input to CBD COP 13.

Co-Chair Solhaug summarized the primary objectives of the meeting as: combining expert perspectives from the two disciplines of biodiversity and agriculture; contributing to CBD COP 13; and inspiring similar dialogues at the national level.

INTERLINKAGES BETWEEN BIODIVERSITY AND AGRICULTURE

PART I: IMPERATIVES AND IMPLICATIONS: This session was chaired by Alfred Apau Oteng-Yeboah, CBD Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA) National Focal Point, Ghana. Hanne Maren Blåfjell, State Secretary, Norwegian Ministry of Agriculture and Food, highlighted the genetic diversity of potatoes with adaptability to emerging soil and climatic conditions as an example of the interlinkage between biodiversity and active agriculture, and the key role of this diversity for Norwegian food security. She emphasized the importance of genetic diversity for preventing hunger and increasing food security, and expanded on Norway's contribution to a benefit-sharing fund that will support farmers and local communities in maintaining genetic diversity, thus underpinning food production through safeguarding seed samples in *ex-situ* gene banks. She noted that 20% of endangered species in Norway exist in cultivated landscapes, stressing the need to support active management of agricultural land by providing farmers with the technical and financial resources necessary for co-management to reduce the potential of conflict between biodiversity protection and food production.

Ann Tutwiler, Director General, Bioversity International, remarked that the debate on promoting agriculture and food security, on the one hand, and biodiversity, on the other, often descends into an "either, or" discussion, instead of a "yes, and" dialogue. She said that agricultural biodiversity can form a large part of the solution; but noted it is under increasing threat. Tutwiler stressed the link between agricultural biodiversity and human health issues such as diabetes, noting that diet is a sum of multiple ecosystem services. She highlighted Bioversity International's work with communities to assess local food systems and their nutritional gaps, and to identify and implement solutions for better dietary outcomes. She also stressed the need to address imbalances in food production, noting a global overproduction of meat, and an underproduction of nuts, fruits and vegetables; and drew attention to efforts to promote a focus on the nutritional, rather than caloric, yield of crops. Highlighting multiple projects that demonstrate that diversity of seeds and landscapes can deter pests and limit their damage, enhance soil conservation and reduce sedimentation, increase climate resilience, and promote wild biodiversity, she said seeds can contribute to the achievement of multiple SDGs, the Aichi Biodiversity Targets, and the Bonn Challenge for restoring deforested and degraded land. She announced the upcoming publication of the report, "Agrobiodiversity for Sustainable Food Systems," to be launched at CBD COP 13, which will collate the scientific evidence for the benefits of agrobiodiversity.

In response to questions from the floor, Tutwiler highlighted the work of the Royal Botanic Gardens, Kew, and the Global Crop Diversity Trust, as well as Bioversity International on crop wild relatives, and said that agricultural biodiversity can contribute to both climate change mitigation and adaptation, noting this as another reason to support it.

Irene Hoffmann, Food and Agriculture Organization of the UN (FAO), presented on the state of the world's genetic resources, highlighting the 10-year work cycle of the Commission on Genetic Resources for Food and Agriculture in preparing global assessments, identifying policy gaps, and monitoring National Biodiversity Strategies and Action Plans (NBSAPs) in achieving Aichi Biodiversity Target 13. She stressed that highly-selective Genetic Resources for Food and Agriculture (GRFA) provide higher shares of total production and are concentrated in a handful of global companies, with the majority of genetic diversity maintained by smallholders. As key drivers of GRFA loss, she identified habitat change, soil erosion and climate change, noting that biotechnologies have led to a reduction of GRFA diversity but may offer opportunities for breeding and conservation programmes for locally important GRFA. Regarding the world's livestock breeds, she lamented the insufficient knowledge of the extinction risk status for almost 60% of livestock breeds, identifying this as a challenge in achieving Aichi Biodiversity Target 13. She mentioned that alternative crop breeds, such as millet and sorghum, have not received the same attention as highly selected breeds such as maize, noting that countries outside the Organisation for Economic Co-operation and Development (OECD) face insufficient capacity for successful breeding programmes. She highlighted improvements in *ex-situ* conservation for plant breeding through the characterization of crop-wild relatives as well as increasing references to GRFA in country NBSAPs as positive examples of biodiversity mainstreaming. She stressed the importance of considering the economic externalities of intensive production, encouraging the support of smallholders through improved local empowerment, land tenure, and rural development initiatives, and partnering with industry for the conservation of alternative breeds.

Joseph ‘Dino’ Martins Visitacao, Nature Kenya, presented on the Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES) research on pollinators and food production, which found that more than 75% of leading food crops and almost 90% of the world’s flowering plants are pollinated by animals. He highlighted key overlaps between pollinators and the SDGs, noting that the economic value of animal pollination is estimated at between US\$235 and US\$577 billion annually, and the importance of such pollination for nutritious diets.

While noting the “counter-intuitive” finding that honey bee numbers are increasing globally due to commercialization, he stressed that up to 40% of bee species and 16.5% of vertebrates are under threat in some countries, thereby impacting the production of certain crops. He emphasized that a wide range of responses is available, drawing on scientific and indigenous and local knowledge, and he provided two case studies of jointly exploring solutions with local communities in Kenya’s Kakamega Forest and Kerio Valley. Key findings, he said, include that coffee’s quality, not just its yield, is driven by critical pollinators and favorable farm landscapes. To achieve results, he said, there is a need to cooperate with land-use planners, and to tailor findings to local settings.

In response to participants’ questions, Visitacao noted, amongst other things, the need to address the knowledge gap for certain regions such as sub-Saharan Africa, and for an international platform to share biodiversity data.

Ronald Vargas Rojas, FAO, presented key findings of the Status of the World’s Soil Resources report, highlighting that soils provide multiple ecosystem services including carbon sequestration, nutrient cycling, and the provision of food and fuel. He stressed that soil biodiversity is essential, among other aspects, for food security, hydrological processes, suppression of pests, and decomposition. Rojas lamented that the current condition of soils worldwide is poor or very poor with a worsening outlook due to key threats of soil erosion, including loss of soil organic carbon, soil sealing, acidification, salinization, nutrient imbalance, and waterlogging, noting that all threats are related to the loss of soil biodiversity. He identified improved education and extension programmes, national soil information systems, and improved soil governance as key to achieving sustainable soil management. In the ensuing discussion, participants raised questions on the distinction between soil restoration and rehabilitation, and the role of increasing soil organic matter for enhancing links between biodiversity and agriculture. Rojas noted that soil restoration is a costly and complex process of restoring soils to their original state, while rehabilitation refers to restoring soils to the maximum extent possible, stressing that prevention of soil degradation should be prioritized.

On examples of ecosystem services in smallholder production systems in western Zambia, Natalia Estrada-Carmona, Bioversity International, cited many invisible positive and negative feedback loops, including aspects of soil formation and pest control. On the challenges of food production in the floodplains in Zambia, she cited road construction, shifting crop-cultivation patterns, deforestation, poor soils, high levels of poverty and food insecurity as well as impacts of climate change. She presented on the “flood pulse system” in the study area, describing a wide variety of ecosystem services, and expanded on the effects of the “invisible qualities” of natural resources, highlighting: trade-offs between ecosystem services; spatial dynamics and gender aspects of accessibility to benefits, and the temporal aspects of farming in Zambia. She emphasized the need to move beyond merely focusing on carbon content and productivity of crops, towards including the nutrient value of diverse food crops, and urged an integration of scientific and local knowledge systems. Responding to a question on the role of government

in alleviating poverty, Estrada emphasized the need for participatory approaches to identify the most suitable crops and diversification strategies.

Neville Ash, Director, UNEP World Conservation Monitoring Centre (WCMC), explored the impacts of agriculture on biodiversity, noting that agriculture has the greatest impact on the planet through, among others, habitat conversion and fragmentation, pollution and the introduction of exotic modified species. On the impact on land use and land cover change, he said that 38% of land cover not under ice is used for agriculture, while livestock contribute 54% of methane gas emissions. He noted that agricultural pollution is the leading cause of water quality impacts on inland waters through leaching, run-off, eutrophication, heavy metals, and organic contamination. On the impacts of pesticides, he cited research that pollinator decline is primarily due to changes in land use, intensive agricultural practices and pesticides. On the negative consequences of introducing exotic and modified species he identified deliberate and accidental introductions, hybridization and genetic decline, and facilitated spread from agricultural practices. As policy implications, he highlighted that not all yield increases are equal, and emphasized the need to consider the scale at which policies will be applied, which should be devised alongside demand and waste strategies. Participants commented on: the need for adequately managing population growth; considering “land sharing” options on small plot sizes through combining conservation and agriculture, and determining an appropriate indicator for biodiversity as a component of “land sparing” (exclusively practicing conservation).

PART II: POLICIES AND INSTITUTIONS: In this session which convened on Wednesday and was chaired by Teona Karchava, Ministry of Environment and Natural Resource Protection, Georgia, participants considered alignment of biodiversity and agricultural priorities identified in the SDGs, followed by global examples in achieving these priorities.

Devra Jarvis, Bioversity International, discussed the Global Environment Facility’s (GEF) efforts to mainstream biodiversity into the agricultural sector. She noted the importance of deliberately mainstreaming intra-specific crop diversity into agricultural production systems, to address and respond to: unpredictable weather patterns; low-input environments; growing consumer demand for diverse and natural food-based products; and the desire of communities to maintain control over their crop resources.

Jarvis stressed that much diversity exists in agro-ecosystems, and discussed projects that demonstrate the function of such diversity, citing pest and disease damage reduction in crops and cross-breeding to maintain productivity while improving taste. She emphasized the importance of access to diversity for farmers and communities, and the potential role of community seed banks, diversity fairs and community biodiversity registries. She noted potential measures to ensure that those maintaining diversity benefit from these efforts, including: benefit-sharing protocols for research; material transfer agreements; legal and policy recognition of the contribution of local communities; agrotourism; and changing consumer norms to celebrate diversity. She highlighted the need to scale up local diversity interventions to the national and international level, stressing that a wide range of interventions are already available.

One participant requested more information on how to ensure communities enjoy the benefits of diversity, including through premiums on conservation, while another participant inquired about factors to take into account when pursuing biodiversity to control pests.

Gemedo Dalle Tussie, Ethiopian Biodiversity Institute, discussed the role of national institutions in delivering biodiversity conservation and food security, highlighting Ethiopia's cross-sectorial policy directives at the federal and regional levels. He identified the role of his organization in coordinating national implementation of international instruments related to biodiversity, as well as for both *ex-situ* agrobiodiversity conservation through national and community seed banks, and *in-situ* on-farm conservation. On the success of national institutional approaches, he underscored Ethiopia's gene banks as supporting research to ensure improved food security and noted that mainstreaming biodiversity is critical but requires more concrete specification as to what should be mainstreamed.

Nagulendran Kangayatkarasu, Public Service Department, Malaysia, shared his country's experience in mainstreaming biodiversity through spatial planning. Briefly sketching the country's history, he said that the cultivation of rubber and palm oil had helped transform Malaysia into a rapidly developing economy, with poverty levels dropping from 52% to 0.6% between 1957 and 2014.

He noted, however, that Malaysia's forest cover level had dropped significantly during the same time, entailing significant threats to biodiversity, including: forest fragmentation, habitat loss and degradation, human-wildlife conflicts, and poaching. He highlighted his government's active efforts to address this problem including through its pledge to keep 50% of the country under forest cover, and the spatial plan provided for in Malaysia's current National Development Planning Framework, which seeks, *inter alia*, to optimize use of land and natural resources while conserving biodiversity. He highlighted efforts to pursue sustainable land management in Malaysia by linking major forest complexes to secure critical wildlife habitats.

Kangayatkarasu noted that challenges to the project include a lack of leadership and capacity at different levels; limited funding; legal issues, including questions of jurisdiction and enforcement; and limited public awareness and political buy-in. On the way forward, he stressed: the need to educate citizens on the importance of biodiversity, including through "experiential learning" and promotional campaigns; the importance of accessing new funding, including through UNDP's Biodiversity Finance Initiative, and the need to harness the country's bio-economy and sustainable tourism potential.

Carl Obst, Institute for the Development of Environmental-Economic Accounting, presented on an environmental-economic accounting mechanism for mainstreaming biodiversity in agriculture, noting that standard agricultural models examine fuel and fertilizer inputs, labor and produced capital to assess productivity and efficiency but lack information on soil fertility, nutrient cycling, the capital costs of degrading ecosystems and biodiversity among other things. He illustrated an addition to the standard model that considers ecosystems as capital assets which, in terms of biodiversity, can be measured in order to identify ecosystem services as inputs to agricultural production, and which allows trade-offs between the provision of environmental benefits and agricultural outputs to become readily discernible to policy makers. He noted that the "system of environmental-economic accounting" has resulted in a diverse array of accounting projects around the world with applications relevant for integrated international reporting on the SDGs and Aichi Biodiversity Target 2 on national accounting estimates for biodiversity as well as for local and regional spatial planning. He stressed that location is critical in mainstreaming biodiversity into economic models and emphasized that ecosystem services are as much about economics as the environment.

Elisabeth Nordgård Gabrielsen, Norwegian Ministry of Trade, Industry and Fisheries, presented Norway's sustainable use and biodiversity considerations in fisheries and aquaculture management. She noted that Norway's oceans, which represent a large percentage of the country's food production sector, if managed sustainably, could support achievement of at least seven of the SDGs for the country, and substantially reduce poverty and unemployment. She emphasized the importance of collaboration between the international biodiversity and agricultural sectors to achieve the Aichi Biodiversity Targets through combining priorities in international agreements such as the CBD and FAO's Committee on Fisheries. Using the example of close cooperation between Norway and Russia in managing marine resources in the arctic region, Gabrielsen reported on statistics that show that the decline in marine resources can be reversed. She elaborated on legislation in Norway with a strong focus on the government investing in research and mapping of oceans and marine resources. As examples of regulations, she cited explicit protection of cold-water coral reefs, and reducing potential impacts of farmed salmon through the "polluter pays" principle and through tracing escaped farmed salmon.

PART III: PLANNING FOR A CHANGING CLIMATE:

On Wednesday, in this session chaired by Rojina Manandhar, UN Framework Convention on Climate Change (UNFCCC) Secretariat, Paul Leadley, Université Paris-Sud, explored linkages between climate change and biodiversity loss, and policies and behavioral changes that could address both issues simultaneously. He noted that agricultural systems are responsible for 11% of total global warming, and that the sector is the largest contributor to terrestrial biodiversity loss. Among agricultural practices that have negative effects on both climate and biodiversity, he identified: habitat conversion, intensive cultivation practices, nitrogen fertilizer use, and ruminant farming.

He stressed working closely with the climate change community to promote policy synergies, given the negative impacts of climate change on food production and biodiversity conservation. He provided several examples of win-win policies and measures, including: better pasture management through planting of more productive species while fencing off areas that are unsuitable for cattle consumption; shifting subsidies from intensive agriculture to grasslands to promote carbon storage and the conservation of farmland birds; and growing legumes in grasslands to increase pollinator diversity while reducing harmful chemical emissions.

Leadley emphasized the key role of changing dietary patterns, including a shift towards a more vegetarian diet, in climate change mitigation, biodiversity conservation, water security and health, to allow the planet to feed nine billion people with less additional land required. He stressed behavioral change as "a very important conversation to have."

In response to questions from participants, Leadley noted, *inter alia*, that while urban agriculture cannot contribute significantly to global food production, it could have profound effects in terms of reconnecting people with their food, and changing the way they eat. He stressed the importance of reducing global food waste.

Gigi Manicad, Oxfam Novib, presented on the "Sowing Diversity = Harvesting Security" (SD=HS) initiative which aims to strengthen farmer seed systems, rights, and technical knowledge in enhancing food security for climate change adaptation. She highlighted the use of participatory tool kits, FAO farmer field schools, diagnostic planning, and biocultural assessments to analyze crop diversity and seed security. She noted the importance of climate change perceptions of farmers and collecting disaggregated data for women's needs and roles in order to educate and empower local communities for climate change adaptation. She also highlighted the efforts of farming

communities in the Mekong Delta in producing higher volumes and better quality of selected rice breeds than the private sector, and the importance of gender-blind tools for enhancing the agency of women in managing biodiversity. In calling attention to the lack of recognition of farmer seed systems in most national seed policies and laws, she stressed the added value of SD=HS in influencing local, national and global policies through evidence-based validation by indigenous and farming communities.

Asta Tamang, Ministry of Agriculture and Forests, Bhutan, presented on Bhutan's experiences in conservation for local varieties and landraces and strengthening agrobiodiversity towards climate change adaptation. After providing a brief background to biodiversity conservation in Bhutan, she outlined the impacts of climate change in her country, including: outbreaks of pest and disease mainly in crops, fruit species and spices; drought; erratic rainfall and heavy floods causing damage to infrastructure; and glacial lake formation due to glacier melt. On plant GRFA and the regulatory framework in Bhutan, she outlined guiding principles in the conservation and sustainable use of crop diversity, including distribution of local crop seeds, participatory community-based seed selection and seed banks, biodiversity fairs and farm-product value addition. As main impacts of the government's GRFA initiative, she highlighted: livelihood improvements; connecting farmers and consumers; health and nutrition improvement; additional employment opportunities; an increase in productivity and land area; improved food security; enhanced resilience of farming ecosystems; women and community empowerment; and preservation of traditional food culture.

Marc Sadler, Global Lead on Climate-Smart Agriculture, World Bank, said a business-as-usual approach to agriculture would not feed 9 billion people by 2050. He highlighted the impacts of climate change on the food system, including: short-term volatility of the food market, which has been linked to extreme weather events; future yield losses that will increase land intensification and biodiversity loss; and the risk of a future production collapse.

He noted that by 2050, business-as-usual agriculture will represent 70% of the world's "carbon budget" for remaining below a 2° C temperature increase and stressed that the sector "will be the new big oil" unless it transforms. He identified numerous problems with the current food system, including: high levels of water consumption, in particular by the livestock and food and beverage industries; and the role of food waste, which, in regions such as North America and Oceania, is as high as 45%. He identified livestock as a major driver of climate change, responsible for about 60% of agriculture's greenhouse gas emissions, and also pointed to the climate impacts on rice and palm oil production.

He noted division among major stakeholders in the agricultural sector, and said that, as the most vulnerable sector to climate change, agriculture must be part of the solution. On the role of climate-smart agriculture, he said this approach could increase agricultural productivity, while strengthening resilience and reducing emissions. Sadler stressed the need to upscale programmes, and encouraged participants to think about solutions that could have a considerable impact, such as improving livestock farm efficiency to match the top 10% of livestock farmers, spreading agroforestry across the African continent, and mainstreaming biodiversity in agriculture.

Alexander Kasterine, International Trade Centre, presented on the linkages between trade, climate change, agriculture and biodiversity conservation. He identified the role of his organization in building climate resilience and improving agricultural value chains by working with smallholder farmers in strengthening organization and bargaining power; training for compliance with sustainability certifications; and creating

direct market linkages between small and medium enterprises (SMEs) and international buyers. In promoting greater agrobiodiversity of quinoa and cacao in Peru, Kasterine noted that trade specialization of diverse commercial varieties of these crops resulted in improved welfare of farmers over a ten-year period, emphasizing the importance of assigning property rights to derive value from diverse quinoa varieties through new markets, and building public-private partnerships to integrate sustainability into the supply chain. On the impacts of climate change on the agri-food trade, he underscored the importance of climate-resilient crop varieties and export diversification, citing an example from the tea sector in Kenya that produced positive outcomes, including a legal requirement for energy auditing. He stressed that trade in agriculture reduces poverty by facilitating emerging markets for biodiversity.

PART IV: CHANGING PRACTICES: On Thursday, in the session chaired by Marc Magaud, IUCN, Alexander Müller, The Economics of Ecosystems and Biodiversity for Agriculture and Food (TEEBAgFood), explained that a comprehensive social and economic evaluation of the complexity of the eco-agri-food system demonstrates that the market environment in which farmers operate is distorted by both positive and negative externalities, and is trapped within a paradigm of "cheap food," resulting in both food waste and food insecurity for farmers. To illustrate this, he differentiated between smallholder-grown maize as a diverse and nutritious staple food, dependent on agro-biodiversity, and maize produced through intensive and mechanized production methods, which is primarily used for animal feed and industrial purposes, such as ethanol production and low-cost sweeteners. He noted inconsistencies between the market emphasis on cheap and efficient maize production, and several production aspects including: increasingly unaffordable access to nutritious food; high costs to the health system; increasing concentrations of manure loads into waterways; and a growing risk of antibiotic resistance. He emphasized that linking biodiversity with agriculture to ensure food security requires a more comprehensive approach to examining food production systems, in order to combat malnutrition and food waste associated with the industrialization of agriculture.

Stressing the importance of understanding local contexts, Paul Melville, Ministry for Primary Industries, New Zealand, sketched the history of his country's land use and related policies. He noted his country has a high agricultural export rate given its low population density and said farms in the country may blur the boundaries between agroecological and industrial approaches, as they can contain elements of both.

Melville identified four types of incentives that guide agricultural approaches, related to the natural environment, government policy, market and consumer signals, and community values. While highlighting some examples of legislation and policies for sustainable resource management, including for riparian planting and revegetation of marginal land, he noted New Zealand's positive experiences with deregulation, and more negative experiences with subsidies, especially once they were removed. He stressed the key role of the macro-level policy framework for directing investment and actions and said his country's policy framework focuses on promoting farmers' responsiveness and flexibility to market signals. He said capacity building and technology use are crucial to allow farmers to respond to government and market signals.

On a question regarding the efficiency and environmental impact of New Zealand's production, Melville stressed that New Zealand does not produce more than other countries with equal agricultural capacity, and noted the negative sustainability implications in other countries if New Zealand were to produce only for its own consumption.

Margaux Denis, Ministry of Agriculture, Agrifood and Forestry, France, presented on the benefits to biodiversity that can be achieved when addressing food waste. On food waste trends in France, she warned that 20 to 30 kg of food per person per year is lost or wasted, resulting in direct economic, social and environmental impacts. She described recent legislation developed during a participatory process aimed at prioritizing actions to prevent food waste, including prevention, food and compost valorization and donation or transformation of food. Among regulatory measures to reduce waste, she identified the obligation of France's large retailers to form partnerships with charities and to document the nature of these obligations.

Citing results from a recent study, she reported that 3% of national carbon dioxide emissions are due to food waste. As consequences of unsustainable agricultural production processes, Denis listed deforestation, threatened species extinction and a general decline in species abundance and diversity. She outlined the core principles of the French agroecology initiatives, including enhancement of biodiversity in wild and cultured agro-ecosystems, enhancement of biological regulations and managing bio- and geochemical cycles.

Martina Laura Speranza, National Agricultural Technology Institute (INTA), Argentina, presented on her organization's work to promote rural extension services that enable innovation processes for territorial development and emphasize social inclusion and environmental sustainability. She explained that these efforts include: co-construction of extension service strategies together with local communities; network building; knowledge management; and implementation of public policies. She noted INTA's role as the only organization in Latin America to integrate extension and research, enabling dialogue with a diverse range of actors.

Among the challenges involved in this work, she identified: lack of access to water and land; lack of infrastructure and services; poor access to finance; and ensuring productivity and added value. She also highlighted the "paradox" of responding to local communities' demands, on the one hand, and seeking to address sustainability aspects such as biodiversity conservation that does not arise explicitly from local demands. She explained that INTA is seeking to respond to these challenges through, *inter alia*, a new approach that integrates climate change adaptation, desertification, biodiversity and gender. Noting that a system can only change from the inside, she highlighted INTA's intention to work with extension professionals who take on a role as "development agents," and go beyond the provision of technical assistance to analyze local situations and demands to facilitate solutions.

Emile Frison, International Panel of Experts on Sustainable Food Systems (IPES-Food), presented on the release of a major report by his organization on transforming food systems from high-input industrial agricultural systems to diversified agroecological systems. He highlighted misconceptions regarding the productivity of organic versus conventional agriculture, noting that over the long-term, a combination of traditional and organic agriculture results in an 80% increase in food production compared to industrial agriculture alone. Using a political economy analysis of food systems, he identified several "lock-ins" preventing a transition towards diversified agroecological systems despite the evidence that they can deliver on all dimensions of sustainable food systems, including: export orientation; an expectation of cheap food linked to a "feed the world" narrative; short-term thinking of policy makers and industry in prioritizing election cycles and returns on investment; and a concentration of power in vested interests that seek to maintain unsustainable industrial agricultural systems. Among ways to overcome these obstacles, he proposed: developing new indicators that measure success

beyond GDP or yield per hectare and instead consider nutrient content per hectare and livelihood resilience; using public procurement to support local agroecological produce; and strengthening social movements which unify constituencies around agroecology.

PANEL SESSION: PRACTICAL EXAMPLES OF BUILDING INTERLINKAGES BETWEEN BIODIVERSITY AND AGRICULTURE

This session was held on Thursday and was moderated by Mark Zimsky, GEF Secretariat.

Emphasizing the importance of sustainability and biodiversity, Evelyn Nguleka, President, World Farmers' Organisation, said that farmers represent the solution to addressing climate change, depending on the farming methods and policies they support. On the carbon footprint of the livestock industry, she highlighted the nutritional value and soil fertility benefits derived from the sector, and said its emissions should be addressed through innovation. Nguleka lamented a focus on cheap food production, explaining that this may entail the environment being compromised.

Pedro Arraes Pereira, Institute for Agricultural Research and Extension, Goiás State, Brazil, described the driving forces that are shifting the Brazilian agricultural system towards low-carbon emissions and biodiversity conservation, highlighting crop-livestock-forest integration and the Brazilian Forest Code. He presented examples of integrated systems that restore degraded pastures, reduce pressure on native forests and consider soil characteristics in intensifying agriculture that maintains biodiversity.

Characterizing biodiversity loss as a "free-rider" problem, Lorin Fries, World Economic Forum, emphasized the role of the market, and said that as part of the private sector, farmers can be incentivized to make sustainable choices. She highlighted her organization's efforts to catalyze 19 agricultural private-public partnerships in different regions, which had contributed to production increases while simultaneously reducing water use and carbon emissions.

Stefan Leiner, European Commission, spoke on mainstreaming biodiversity into the EU Common Agricultural Policy, noting diverse implementations of strategies across the EU member states and said that agriculture presents a unique dilemma in which both intensification and land abandonment have resulted in biodiversity loss. Through an example from Ireland, he stressed the importance of public subsidies for maintaining biodiversity, the need to obtain farmer support for such policies and the need to foster strong cooperation between farmers and the public agencies implementing such policies.

Lim Li Ching, IPES-Food, highlighted an IPES-Food report that suggested the current food system is "broken," with current agricultural practices destroying the resource base. She urged a paradigm shift away from the industrial, specialized systems model of intensive farming, which is supported by perverse incentives and powerful actors. She reported on the feedback loops identified by IPES that keep these systems "locked in," urging different pathways such as revised procurement procedures, shifting the centers of power, and including farmers and scientists in finding sustainable solutions.

In the ensuing discussion, one participant enquired how public-private dialogues for agriculture could be promoted at the global level. Fries responded by stressing that biodiversity does not register on the business agenda and urged scientists and policymakers to communicate their messages to the business sector in order to overcome ideological and cultural gaps.

On the environmental impact of the livestock industry, Nguleka highlighted the need to consider the impact of the industry's emissions versus the environmental benefits of

avoiding use of chemical fertilizers if manure is harnessed effectively. Together with Arraes, she stressed that intensification is not a question of farm size, but of efficiency of production.

On empowering farmers for agroecological production, Lim emphasized the role of women in agriculture, farmer-managed seed systems, and farmers sharing best practices through experiential learning, while Nguleka underscored the importance of policies to provide infrastructure to improve the bargaining power of family farmers.

Responding to a question on whether subsidies for biodiversity mainstreaming should be considered as tariff barriers under the international trade system, Leiner stressed the need to distinguish between subsidies and protectionism, as “subsidies are not necessarily bad for trade.” He emphasized the importance of improving policy coherence, even internally within the environmental sector, and welcomed the focus of CBD COP 13 on mainstreaming biodiversity.

In response to a question on the integration of agroforestry within agricultural policy in Brazil, Arraes stated that farmers are now incentivized through lower interest loans to undertake agroforestry.

In conclusion, panelists highlighted, *inter alia*, the role of improved extension services in addressing complex environmental challenges, the need to confront vested interests by empowering farmers to promote sustainable agriculture, and the importance of communication to break down sectorial silos.

ROUNDTABLE DISCUSSIONS

INTERLINKAGES BETWEEN BIODIVERSITY AND AGRICULTURE: On Wednesday and Thursday, participants convened in parallel roundtables where they considered a set of questions focused on understanding successes, challenges and trade-offs in addressing the relationship between conservation and sustainable use of biodiversity and agricultural development at the national and regional levels. This was followed by a session on how biodiversity can be integrated into sustainable agricultural development.

Amongst mechanisms that are currently being applied at the national level to address the relationship between the conservation and sustainable use of biodiversity and agricultural development, participants identified, *inter alia*: national strategies, programmes and action plans; regulations and laws; subsidies and incentives; certification schemes; improved coordination, cooperation and dialogue across sectors; extension services; financial resource provision; spatial planning and mapping; protected areas; industry initiatives; public-private partnerships; financial resource provision; and indigenous knowledge.

Regarding barriers to designing measures for improved integration of agriculture and biodiversity at the national level, participants identified: ineffective subsidies and missing incentives for biodiversity; a lack of holistic planning; trade-offs between livelihood and biodiversity concerns in relation to production and pricing; and competing or unplanned land uses among other issues.

On how sustainable agriculture should integrate biodiversity, participants raised, *inter alia*: the role of incentives that stimulate rural development; the need to demonstrate the short and longer term return on investment of biodiversity; and the importance of systems thinking, including taking into account landscape approaches, water and spatial planning, and socio-

cultural aspects. They also noted the importance of changing consumer habits, policy coherence, awareness raising, capacity building, risk management and bottom-up and community-based approaches.

For actions that could be taken to address financial and technological gaps to facilitate effective interlinkages between biodiversity and agriculture, participants identified: consumer and producer education, including labeling products on their carbon and biodiversity footprints; strengthening value chains; and enhancing positive subsidies and incentives for conservation while removing subsidies for pesticide and fertilizer use. Participants also raised the need for cooperative multi-stakeholder networks, technological development and transfer to developing countries, and innovative financial mechanisms.

On effective ways of addressing trade-offs between agriculture and biodiversity priorities and at which level of the value chain these actions should take place, participants highlighted: integrated policy development for sustainable agricultural policies across governments; local empowerment through locally-sourced food and direct markets leading to local ownership; consumer and producer education through labeling and information; avoiding food waste; economic evaluation through cost-benefit analysis of biodiversity for agriculture; incentives such as taxation, promoting positive behavior and reforming negative incentives; and developing sustainable procurement policies.

Regarding the CBD’s role in integrating biodiversity into sustainable agriculture, several developments were identified as positive, including NBSAPs, COP 13’s theme of mainstreaming biodiversity, and support for intergovernmental processes. On gaps in the CBD’s achievements to this end, participants identified the need for capacity building on ecosystem service valuation, limited guidance on incentive mechanisms for biodiversity, and high staff turnover at the national level.

On how ongoing processes within the High Level Political Forum on Sustainable Development (HLPF) are currently contributing to the integration of conservation and sustainable use of biodiversity and sustainable agriculture, participants highlighted, *inter alia*: a narrative change beyond the need to increase food production; creation of a coherent monitoring process building on, and using the same indicators as the CBD; development of an integrated approach towards SDG achievement within and across the SDGs, across sectors, and in national and international frameworks; and cross-sectorial awareness raising and linking. Some also noted a lack of understanding on how the HLPF will function. On gaps in the HLPF’s functioning, participants raised: how the Forum will interact with the local level; issues with national-level coordination; and a lack of capacity and resources.

On positive initiatives of the FAO in contributing to the sustainable use of biodiversity in agriculture, participants raised technical cooperation projects with farmers; improved dialogue between environment and agriculture agencies, and timely information on plant and animal genetic resources. On gaps, participants noted difficulties in access to funding, slow implementation of projects, and the need to improve monitoring and evaluation of projects, among others.

On how ongoing processes within the Committee on World Food Security (CFS) are currently contributing to the integration of conservation and sustainable use of biodiversity

on the one hand, and sustainable agriculture on the other, participants highlighted a lack of understanding of the CFS's work. Regarding gaps in what the CFS is achieving, they noted the need to bring the biodiversity dimension into the CFS agenda, and for dialogue among different ministries.

Regarding ongoing processes within the World Trade Organization (WTO), participants praised increased market links for smallholder farmers but lamented: limited integration of biodiversity-based solutions; incompatible agendas between free-market promotion and sustainable agriculture; poor ministerial communication; and the slow pace of WTO processes on emerging issues.

On other intergovernmental processes and mechanisms that are currently contributing to the integration of conservation and sustainable use of biodiversity and sustainable agriculture, participants highlighted: IPBES and its work on adverse impacts on pollinators; regional environmental agendas, including in Latin America; the International Slow Food Movement; seed exchange efforts; and the IUCN Red List of Threatened Plants. On gaps in what other intergovernmental processes are achieving, they mentioned: a lack of political inter-agency collaboration; inadequate training of decision makers; the need for guidelines on good governance for better cooperation; a lack of high-level political will; discrepancies between a focus on *ex-situ* and *in-situ* conservation; and competition among different stakeholders. They also highlighted the need: to consider the impacts of subsidies; to support global consumer education; and for differentiation between agricultural production of food and non-food.

DEVELOPING ROADMAPS TOWARDS TRANSITIONS TO SUSTAINABLE AGRICULTURE: On Thursday afternoon, participants worked in roundtable groups to develop ideas for actions by intergovernmental processes to encourage the integration of biodiversity considerations into agriculture, while addressing barriers and trade-offs at the national level. Sixteen groups developed and presented posters on their ideas, with participants then casting their votes for the option they considered most suited to integrating biodiversity into agriculture. The top three ideas addressed:

- intergovernmental processes such as the CBD and FAO transforming food systems for food security by incorporating agroecology through collaboration with international and national governments;
- FAO-developed farmer-centered support tools that are integrated with farmer experiences and needs at national and local levels; and
- alignment of national trade policies by national governments and the Group of Seven (G-7) countries through NBSAPs and their implementation and integrating biodiversity and the SDGs into national trade and WTO policies.

Closing the roundtable session, Hesiquio Benítez Díaz, Mexico, noted his intent to present participants' ideas at CBD COP 13 in December, and stressed the need to consider biodiversity "before, during and after" agricultural activities. He highlighted that to mainstream biodiversity into agriculture will be very difficult given that even the term "mainstreaming" remains undefined, and stressed the need to find different ways to convince a diverse range of actors to implement change.

OUTLOOK 2030

This session took place on Friday morning and was chaired by Valerie Hickey, World Bank Group. Jon Karleiv Andreas Lomøy, Director General, Norwegian Agency for Development Cooperation, presented on the opportunity in Norway for breaking down silos and delivering sustainable agriculture in order to achieve national implementation of the SDGs. He challenged participants to build on the successes of previous decades, including developing the 17 SDGs, but urged: approaching implementation of the SDGs holistically and through bringing together the relevant sectors; devising new policies to enable implementation of the SDGs and reforming perverse subsidies and incentives; transforming the agricultural

sector to empower subsistence farmers while celebrating multi-functionality and diversity instead of cultivating "endless maize fields"; diversifying the financial toolkit to focus on implementation of the SDGs; moving away from silo approaches through an integrated understanding of individual initiatives; and translating global and national thinking into local actions.

Stressing the need to "shift thinking from seeing business as a threat," Lorin Fries, WEF, said that private sector engagement is needed for transformation of in the global food system. She noted that engagement with the private sector could help to: refocus power and resources on aligned goals; accelerate investment into responsible activities; and mitigate and shift undesirable business approaches through both a carrot-and-stick approach.

Fries said public-private partnerships can help align visions and actions between the business, government and social sectors, and spotlighted the work of the WEF's New Vision for Agriculture (NVA). Among the NVA's main activities, she highlighted: agenda shaping, for instance through the WEF's Annual Meeting in Davos; insight sharing, through promotion of innovation and best practices; and collaboration building by catalyzing, supporting and upscaling multi-stakeholder partnerships. She noted that US\$10.5 billion had been mobilized, and 9.5 million farmers engaged, through country-led NVA partnerships in Africa, Asia and Latin America.

Noting that "a window of opportunity has opened for increased cross-sectorial cooperation," Fries stressed the need to: leverage the increased expectation for businesses to act as corporate citizens in light of the SDGs and other global commitments; recognize the increased interest in agriculture and food systems across diverse industry sectors; and ally with mission-driven system leaders within companies to identify and pursue common priorities.

David Cooper, Deputy Executive Secretary, CBD, spoke on the linkages between biodiversity and sustainable agriculture as key to achieving the Aichi Biodiversity Targets, emphasizing the indivisibility of the 2030 Agenda and saying that the SDGs can only be achieved if addressed in unison. He summarized important dimensions of biodiversity for agriculture, including genetic diversity, pollination, landscape maintenance and climate regulation, and highlighted three specific links as they relate to achieving the Aichi Biodiversity Targets and the SDGs: containing agricultural expansion by increasing the efficiency of production; deploying biodiversity to support agricultural productivity, and moderating demand for agricultural products by changing dietary patterns. He mentioned that achieving these objectives requires improved spatial planning through a landscape-based approach; introducing supply chain interventions such as investment in zero-deforestation initiatives for soy and palm oil, and aligning economic incentives with changing social norms to influence consumer behavior. Finally, he underscored the importance of legal and policy coherence in aligning social norms and economic incentives for achieving sustainable agriculture.

Mette Løyche Wilkie, Director, Division of Environmental Policy Implementation, UNEP, presented on the Programme's support to countries in integrating biodiversity and ecosystem services into agricultural planning. She highlighted a number of key facts, including that: there are 795 million hungry people in the world; agriculture employs a third of the active labor force; and under business-as-usual practices, agricultural production would need to be increased by 60% by 2050 to meet demand. She also noted that: agriculture is responsible for approximately 80% of tropical deforestation; 50% of habitable land has been converted for farming; 22% of animal breeds are at risk of extinction; and genetic resources are being lost at a rapid rate.

UNEP's work to help countries deal with these challenges, she explained, addresses: analysis, including through its Global Environment Outlook series; awareness-raising, including through the UNEPLive platform and UN Environment

Assembly (UNEA) resolutions on topics such as food waste, pastoralism and illegal trade in wildlife; and advising of governments, including on NBSAP development and on alignment of fiscal policies with overarching policies. She also pointed to UNEP's efforts in: alliance building, such as through the Roundtable on Sustainable Palm Oil and the Great Apes Survival Partnership; and advocacy, including through World Environment Day and the Think.Eat.Save. and Wild for Life campaigns. While noting that achieving the 2030 Agenda represents a great challenge, she emphasized it represents an opportunity to transform agricultural production and consumption patterns to become truly sustainable.

On a question about UNEP's work on sustainable consumption and production (SCP), she noted that UNEP serves as the Secretariat for the 10-Year Framework of Programmes on SCP, and highlighted resolutions and side events on SCP at UNEA; as well as a GEF project on food security and food systems.

Midori Paxton, UNDP, presented on UNDP's work to link sustainable agriculture and biodiversity in the context of the 2030 Sustainable Development Agenda emphasizing that the production of agricultural commodities represents the largest driver of deforestation yet is the "bedrock" of rural economies, contributing to economic development and food security. In response to this dilemma, Paxton illustrated UNDP's "Green Commodities Programme" (GCP) as a means to address biodiversity loss through sustainable commodity production in connecting global markets with national partners and smallholder producers. She highlighted several approaches for advancing deforestation-free commodities under the GCP, including: working at the policy and planning level; strengthening agricultural extension services; the establishment of national commodity platforms taking the form of long-term national action plans, and the development of economic incentives. She also identified the key role of the private sector in terms of their purchasing power to influence governments and their expertise in productivity and supply chains, and to ensuring that sustainability interventions are commercially viable. On a question regarding how unsustainable practices are defined within national commodity platforms, Paxton emphasized that this depends on the country and the commodity in question but involves incorporating scientific knowledge and extension services to strengthen the capacity of national commodity commissions.

Michael Clark, FAO, identified how the FAO sees its own role in implementing the 2030 Agenda, praising the universality, "lateral orientation," and country-led aspects of the SDGs, yet stressed the challenge of communicating action around the SDGs. He identified several key themes of the SDG policy agenda for FAO including: a "leave no-one behind" approach to address inequalities, empowering women and indigenous people to become agents for development; ending hunger, malnutrition and poverty; promoting sustainable agriculture, forests and fisheries; and combating and adapting to climate change. He emphasized that achieving this agenda requires the mobilization of means of implementation through partnerships as key to effective and inclusive governance, and an accountability framework relying on data reporting, monitoring of commitments by Member States and extensive follow-up and review. He underscored FAO's responsibilities on biodiversity as relating to defining clear indicators that can be field-tested and which depend on sustaining capacity development through country-level partnerships. Finally, he stressed that the integration of biodiversity and sustainable agriculture requires "striking balances" which can only be achieved through multi-stakeholder partnerships and data-driven accountability. On a question regarding the viability of partnerships given the challenges of implementing and monitoring the SDGs, Clark stressed that the FAO has many "political entry points" which countries can leverage to drive the sustainable agriculture agenda.

In a video message addressing the conference, Erik Solheim, OECD and incoming UNEP Executive Director, stressed that food is at the core of human happiness and dignity. He cited gains made in reducing poverty and defeating hunger, but said

that an associated negative environmental impact in some instances could ultimately undermine the progress achieved. Emphasizing the importance of SDG 1 on ending poverty and SDG 2 on ending hunger and achieving food security, he said "we must do it with the environment, rather than by destroying the environment."

Solheim referred to food waste levels in rich countries as "obscene" but stressed that solutions exist, such as in France where big steps towards food waste reduction are being taken. Stressing that "nice words do not bring food to the table," and that success can only be achieved together, he encouraged participants to work with business, whose investments, he said, are 100 times as large as that of foreign aid. He also urged engagement with citizens, and using easy-to-understand and emotional language that appeals to environmental consciousness, noting that both markets and votes are dependent on people.

CO-CHAIRS' REPORT

On Friday, Rapporteur Jerry Harrison, UNEP-WCMC, presented the draft Co-Chairs' report titled "Food Systems for a Sustainable Future: interlinkages between biodiversity and agriculture," noting that the report synthesizes key messages distilled from the different sessions.

During the ensuing discussion, participants provided feedback on the report, including to: strengthen the language on sustainable agricultural intensification and reflect the need for a paradigm shift in order to transform the food production systems; include positive messages such as reduction in deforestation rates in Brazil; reflect the need for longer research timelines; and compile a brief summary of the key messages for dissemination.

CO-CHAIRS' REPORT: FOOD SYSTEMS FOR A SUSTAINABLE FUTURE - INTERLINKAGES BETWEEN BIODIVERSITY AND AGRICULTURE: The report provides a summary of the Conference proceedings, as well as key messages developed during the four days' sessions.

Under the title "Setting the scene: Context for promoting interlinkages between biodiversity and agriculture," key messages include:

- availability of food and nutrition and their equitable access are critical issues now and in the future, and ensuring availability of, and access to adequate food and nutrition for growing populations is one of governments' major priorities;
- sustainable agriculture requires an integrated approach in working with different sectors and stakeholders at multiple levels;
- biodiversity and ecosystem services are essential in supporting agriculture in multiple ways and at all levels, and interlinkages should be seen as opportunities;
- integrating biodiversity and ecosystem services into other sectors, including agriculture and food production, is an essential step in achieving the SDGs;
- while there is a clear imperative to achieve food security and nutrition, this is not a simple issue as a result of regional imbalances in population growth, diet and nutrition;
- the necessity for stakeholders with different yet compatible interests to work closely together to catalyze this shift towards sustainability; and
- the need to be aware of the scale at which the issue under discussion is experienced or responded to, when considering these issues.

Under the title "Interlinkages between biodiversity and agriculture: imperatives and implications," the following key messages included:

- biodiversity provides the raw materials that produce the plant varieties and animal breeds upon which agriculture and food systems depend;
- the range of genetic diversity within farmed animals and plants declines with production intensification;
- increased focus on the value of biodiversity to agriculture and food production can deliver very positive messages;

- animal pollinators play a vital role in food production, as more than three quarters of the leading types of global food crops rely to some extent on animal pollination for yield and/or quality;
- the vast majority of pollinator species are wild, including more than 20,000 species of bees;
- diversity in and around farmers' fields can significantly reduce pests and decrease disease damage;
- soils deliver multiple ecosystem services that enable life on earth, including delivery of food, fiber and fuel, carbon sequestration, water purification, climate regulation, nutrient cycling and habitat and flood regulation;
- most of the world's soil resources are in fair, poor or very poor conditions, in spite of their importance;
- without integrated review, many of the contributions of biodiversity and ecosystem services to agriculture are "invisible" and under-valued;
- developments in agriculture have raised millions of people out of poverty, yet at the same time agricultural activities can have significant adverse impacts on biodiversity and on ecosystem functions and services; and
- increasing cooperation between the biodiversity and agriculture sectors is critical to achieving both the SDGs and the Aichi Biodiversity Targets.

Under the title "Interlinkages between biodiversity and agriculture: policies and institutions," the following key messages included:

- institutions working at the interface between agriculture and biodiversity can play a significant role;
- a systematic approach to spatial planning can be a valuable tool for supporting biodiversity mainstreaming and agricultural production;
- there are a number of key challenges in implementing mainstreaming approaches, which require particular responses;
- access to genetic diversity can be increased through a range of public and private approaches, and benefit sharing can be a major opportunity for stakeholder engagement, for example through community seed banks;
- gender and social inclusion is a significant issue for ensuring full engagement of all relevant stakeholders;
- accounting systems often overlook the values of biodiversity and ecosystem services, resulting in a lack of consideration; and
- accounting systems that incorporate a full understanding of the values of biodiversity and ecosystem services can be significant drivers for changes in approach.

Under the title "Interlinkages between biodiversity and agriculture: planning for a changing climate," the following key messages included:

- scenarios and models can be used in a variety of ways to explore understanding on the interlinkages between biodiversity, agriculture and climate change;
- climate change impacts on agriculture are already apparent worldwide;
- there is a need to build food systems that meet increased demand while remaining profitable and sustainable in the face of climate change;
- biocultural assessments focus on the relationship between communities and their environments, and are particularly useful for exploring the role and aspirations of local communities;
- conserving local varieties and landraces is one of the actions that can be taken to support adaptation to climate change; and
- linkages between trade, climate change, agriculture and biodiversity conservation also need to be considered.

Under the title "Interlinkages between biodiversity and agriculture: changing practices," the following key messages included:

- the interlinkages between biodiversity and agriculture are complex, but unless these interlinkages are properly understood, it will be difficult to bring about effective change;
- understanding these linkages requires a clear understanding of the specific products and production systems, and how the products are used;
- promoting positive incentive measures in the agriculture sector for conservation of biodiversity and ecosystem services can have positive effects if implemented correctly;
- a massive amount of food produced for human consumption is lost or wasted at some point along the production or consumption chain, which needs to be addressed;
- agricultural extension services have been significantly reduced in recent decades, but where they exist they can play a significant role in fostering innovation and changes in practice; and
- it is feasible to move away from intensive and agricultural practices to make food systems more ethical and address some of the biggest challenges faced by the global community.

CLOSING SESSION

On Friday, Hesiquio Benítez Díaz, General Director, National Commission for the Knowledge and Use of Biodiversity, Mexico, provided details of CBD COP 13 and the parallel meetings of the 8th Conference of the Parties serving as the Meeting of the Parties (COP/MOP 8) of the Cartagena Protocol on Biosafety and the COP/MOP 2 of the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization taking place from 4-17 December 2016 in Cancún, Mexico. He noted several new features of COP 13 including: having the high-level segment take place prior to the work of the COP; inviting Ministries of Agriculture, Fisheries, Forestry and Tourism in addition to Ministries of the Environment to the high-level segment, and for the first time integrating the Conference of the Parties of the CBD with the COP/MOPs. He noted the theme of COP 13 on "mainstreaming biodiversity for human well-being" requires both a communication campaign to mainstream biodiversity and also indicators to show how biodiversity can be integrated into the forestry, fishery, agriculture and tourism sectors. He then provided an overview of the activities taking place in Cancún, with emphasis on parallel forums led by civil society, indigenous and local communities, youth, scientists and business. He mentioned that biodiversity mainstreaming would be adopted in a ministerial declaration and that the outcomes from Trondheim would be "very useful" particularly for ministries of agriculture in the preparation of COP 13. He then presented a short video on the importance of biodiversity conservation and Mexico's role in hosting COP 13.

Conference Co-Chairs Solhaug and Vik thanked speakers, participants and organizers for their contributions, encouraging all to communicate key messages to their respective governments and other stakeholders. They closed the meeting at 12:59 p.m.

UPCOMING MEETINGS

HLPF 2016: The United Nations High-Level Political Forum on Sustainable Development (HLPF) will meet to consider the follow-up and review of the 2030 Sustainable Development Agenda. The forum is expected to: provide political leadership, guidance and recommendations on the Agenda's implementation and follow-up; keep track of progress; and facilitate coherent policies informed by evidence, science and country experiences. dates: 11-20 June 2016 **location:** UN Headquarters, New York **contact:** UN Division for Sustainable Development **email:** dsd@un.org **www:** <https://sustainabledevelopment.un.org/hlpf2016>

EAT Stockholm Food Forum: The third Forum brings together representatives from science, business politics, and civil society to shift food systems towards greater sustainability, security, and equity within planetary boundaries. The Forum will cover consumption and production patterns, cities, accountability, technology and innovation across the food industry. **dates:** 13-14 June 2016 **location:** Stockholm, Sweden **contact:** Erik Aasheim **phone:** +47-40-22-47-47 **email:** erik@eatforum.org **www:** <http://eatforum.org/event/eat-stockholm-food-forum-2016/>

CITES COP17: The 17th meeting of the Conference of the Parties to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES COP17) will review progress made since COP16 in Bangkok in 2013, the future direction of the Convention, and proposals to include new species under CITES regulatory controls. **dates:** 24 September - 5 October 2016 **location:** Johannesburg, South Africa **contact:** CITES Secretariat **phone:** +41-22-917-81-39/40 **fax:** +41-22-797-34-17 **email:** info@cites.org **www:** <https://cites.org/cop17>

BBNJ PrepCom 2: The second meeting of the Preparatory Committee for an international legally binding instrument on marine biodiversity in areas beyond national jurisdiction (BBNJ) will address marine genetic resources, area-based management tools, environmental impact assessments, capacity building, transfer of marine technology, and crosscutting issues. **dates:** 26 August – 9 September 2016 **location:** UN Headquarters, New York **contact:** UN Division for Ocean Affairs and the Law of the Sea Secretariat **phone:** +1-212-963-3962 **email:** doalos@un.org **www:** <http://www.un.org/depts/los/biodiversity/prepcom.htm>

IUCN World Conservation Congress: Held every four years, the Congress is the world's largest conservation event, bringing together leaders from governments, the public sector, non-governmental organizations, business, UN agencies, and indigenous and grassroots organizations. **dates:** 1-10 September 2016 **location:** Honolulu, Hawaii, USA **contact:** IUCN Secretariat **phone:** +41-22-999-0368 **fax:** +41-22-999-0002 **email:** congress@iucn.org **www:** <http://www.iucnworldconservationcongress.org>

European Ecosystem Services Conference: Convening under the theme, "Helping nature to help us," The European Ecosystem Services Conference will focus on the role that healthy ecosystems play in supporting human well-being and the protection of nature. The meeting agenda includes: keynote presentations from policy, practice and science; interactive sessions to demonstrate working examples of ecosystem services and natural capital; and scientific sessions among others. **dates:** 19-23 September 2016 **location:** Antwerp, Belgium **contact:** Martine van Weelden or Iskra Konovska, Ecosystem Services Partnership **phone:** +31-317-763-990 **email:** conference@es-partnership.org **www:** <http://www.esconference2016.eu/86157#.VygYo2P6taQEvents>

First International Agrobiodiversity Congress 2016: Organized by the Indian Society of Plant Genetic Resources and Bioersivity International, this event will provide a platform for stakeholders to discuss issues and ideas around the sustainable management of agricultural biodiversity. It will cover numerous themes including: agrobiodiversity for food, nutrition and ecosystem services; agrobiodiversity for adaptation and mitigation of climate change, access and benefit-sharing, and biosafety and biosecurity issues among others. **dates:** 6-9 November 2016 **location:** New Delhi, India **contact:** Congress Secretariat (Bioersivity International) **phone:** +91-11-25849000/1/2 **fax:** +91-11-25849002 **email:** info@iac2016.in **www:** <http://www.iac2016.in/index.html#home>

UNFCCC COP 22: During COP 22 of the UN Framework Convention on Climate Change (UNFCCC), parties will meet to, *inter alia*, begin preparations for entry into force the Paris

Agreement **dates:** 7-18 November 2016 **location:** Marrakesh, Morocco **contact:** UNFCCC Secretariat **phone:** +49-228 815-1000 **fax:** +49-228-815-1999 **email:** secretariat@unfccc.int **www:** <http://unfccc.int/>

CMS StC45: The 45th meeting of the Standing Committee of the Convention on the Conservation of Migratory Species of Wild Animals (CMS) will take place in November 2016. It will be preceded by a meeting of the CMS Budget and Finance Sub-Committee on the afternoon of Tuesday, 8 November 2016. **dates:** 9-10 November 2016 **location:** Bonn, Germany **contact:** CMS Secretariat **phone:** +49-228-815-2401 **fax:** +49-228-815-2449 **email:** cms.secretariat@cms.int **www:** <http://www.cms.int/en/news/2015028-dates-45th-meeting-cms-standing-committee>

CBD COP 13, COP/MOP 8 to the Cartagena Protocol on Biosafety and COP/MOP 2 to the Nagoya Protocol on Access and Benefit-sharing: The thirteenth meeting of the Conference of the Parties to the Convention on Biological Diversity (CBD COP 13), the eighth meeting of the Conference of the Parties serving as the Meeting of the Parties to the Cartagena Protocol on Biosafety (COP/MOP 8), and the second meeting of the Conference of the Parties serving as the Meeting of the Parties to the Nagoya Protocol on Access and Benefit-sharing (COP/MOP 2) will be held concurrently **dates:** 4-17 December 2016 **location:** Cancún, Mexico **contact:** CBD Secretariat **phone:** +1-514-288-2220 **fax:** +1-514-288-6588 **email:** secretariat@cbd.int **www:** <https://www.cbd.int/>

GLOSSARY

2030 Agenda	2030 Agenda for Sustainable Development
COP	Conference of the Parties
COP/MOP	Conference of the Parties serving as the Meeting of the Parties
CBD	Convention on Biological Diversity
CFS	Committee on World Food Security
GEF	Global Environment Facility
GRFA	Genetic resources for food and agriculture
HLPF	High Level Political Forum on Sustainable Development
INTA	National Institute of Agricultural Technology
IPES-Food	International Panel of Experts on Sustainable Food Systems
IPBES	Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services
FAO	Food and Agriculture Organization of the UN
NBSAP	National Biodiversity Strategies and Action Plans
NVA	New Vision for Agriculture
OECD	Organisation for Economic Co-operation and Development
SCP	Sustainable Consumption and Production
SDG	Sustainable Development Goal
SMEs	Small and medium-sized enterprises
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
WCMC	World Conservation Monitoring Centre
WEF	World Economic Forum
WTO	World Trade Organization