

## Food systems for a sustainable future: *Interlinkages between biodiversity and agriculture*

### Summary findings from the report of the Co-Chairs

**SETTING THE SCENE: CONTEXT FOR PROMOTING INTERLINKAGES BETWEEN BIODIVERSITY AND AGRICULTURE:** *In 2015 the United Nations General Assembly adopted the 2030 Agenda for Sustainable Development with 17 Sustainable Development Goals. While the goals relate to work in different sectors, they are highly interdependent. In 2010, Parties to the Convention on Biological Diversity adopted the Strategic Plan for Biodiversity 2011-2020 and its 20 Aichi Biodiversity Targets. These targets have been broadly accepted as a framework for action for the conservation and sustainable use of biological diversity. Achievement of these goals and targets would be highly relevant for improving food systems and agricultural sustainability.*

- Food security now and in the future is one of the big issues of our time, and an issue with multiple dimensions
- Sustainable agriculture requires an integrated approach to working with different sectors and stakeholders at multiple levels
- Biodiversity and ecosystem services are essential in supporting agriculture in multiples ways and at all levels, and interlinkages should be seen as an opportunity
- Integrating biodiversity and ecosystem services into other sectors, including agriculture and food production, is an essential step in achieving the SDGs

**Key facts:** Statistics such as these taken from speakers' presentations help illustrate various dimensions of the interrelationship between agriculture and biodiversity:

- by 2030 world population will be 8.5 billion
- by 2030 food demand will have increased by 50%
- even today 795 million people are under-nourished
- just 3 crop species (wheat, rice and maize) represent 48% of average daily calories consumed
- genebanks around the world hold some 3.6 million crop accessions, half from 9 major crop species
- 70% of essential crop wild relative species are in need of protection
- 17% of livestock breeds are known to be at risk of extinction, another 58% are yet to be assessed
- smallholder farms (less than 2 hectares) represent over 475 million of the world's 570 million farms
- each year production on permanent cropland and arable land increases by 2-4% while the area cultivated increases only 1%
- drivers linked to agriculture account for 70% of the projected loss of terrestrial biodiversity
- globally 33% of our soils are degraded
- around one third of the food produced in the world for human consumption is lost or wasted
- greenhouse gas emissions from agricultural systems contribute 11% of total global warming potential

*References at the end of the document*

The figures suggest that continuing to produce food and feed people in the way we have is not sustainable. Yet we have many examples of sustainable agricultural practices. It is in this context that the conference addressed *Food Systems for a Sustainable Future*.

- 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
- It is necessary for stakeholders with different yet compatible interests to work closely together to catalyse this shift towards sustainability
- It is essential to be aware of the scale at which the issue under discussion is experienced or responded to
- Recognising that the title of the conference was very broad in scope, it was decided to focus on production of crops and livestock

**INTERLINKAGES BETWEEN BIODIVERSITY AND AGRICULTURE: IMPERATIVES AND IMPLICATIONS:** *Understanding of the importance of biodiversity and ecosystem services for agriculture and food and nutrition security is increasing as the result of a range of ongoing initiatives, and this can form the basis for developing future joint agendas with mutual benefits.*

- 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, fibre and fuel, carbon sequestration, water purification, climate regulation, nutrient cycling, habitat and flood regulation
- However, despite their importance, most of the world's soil resources are in only fair, poor or very poor condition
- Without integrated review and assessment, many of the contributions of biodiversity and ecosystem services to agriculture are "invisible" and under-valued

*Developments in agriculture have raised hundreds of millions of people out of poverty, yet at the same time agricultural activities can have significant adverse impacts on biodiversity and ecosystem services. Agriculture and food systems also have other significant environmental impacts. Increase in food production could well lead to further impacts, and consideration may need to be given to trade-offs between the agendas and concerns of different sectors.*

- It is important to appreciate that some agricultural practices have significant negative impacts on biodiversity and ecosystem services, and on other environmental issues addressed by the SDGs
- Increasing cooperation between biodiversity and agriculture sectors is critical to achieving both the SDGs and the Aichi Biodiversity Targets

**INTERLINKAGES BETWEEN BIODIVERSITY AND AGRICULTURE: POLICIES AND INSTITUTIONS:** *There are many examples of how interlinkages between biodiversity and agriculture can be further developed to the benefit of both sectors. Lessons from such examples will help in building understanding of what can be done in the future to increase cooperation and collaboration, and how this can be achieved.*

- 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 targeted actions
- 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
- As a part of this, the importance of community seed banks was recognised
- 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 them not being taken into account
- Accounting systems that incorporate a full understanding of the values of biodiversity and ecosystem services can be significant drivers for changes in approach

**INTERLINKAGES BETWEEN BIODIVERSITY AND AGRICULTURE: PLANNING FOR A CHANGING CLIMATE:** *Achieving food security and ensuring the conservation and sustainable use of biodiversity and ecosystem services are both threatened by climate change, and the increasingly severe weather conditions experienced in certain regions of the world. These issues need to be taken into account in considering the interlinkages between biodiversity and agriculture.*

- 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 for agriculture are already apparent

*The Paris Agreement adopted by Parties to the United Nations Framework Convention on Climate Change in December 2015 explicitly recognises that food production systems are vulnerable to the adverse impacts of climate change, and that food production should not be compromised by the global response to the threat of climate change. The agreement also refers to the importance of maintaining ecosystem integrity and resilience when planning and implementing response to climate change.*

- 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 that focus on the relationship between communities and their environments, are particularly useful for exploring the roles and aspirations of local communities
- Conserving local varieties and land races is one of the actions that can be taken to support adaptation to climate change
- Linkages between trade, climate change, agriculture, and biodiversity conservation also need to be considered

**INTERLINKAGES BETWEEN BIODIVERSITY AND AGRICULTURE: CHANGING PRACTICES:** *With the need to feed an increasing world population and to address concerns about equity in access to food and nutrition, there will inevitably be changes in agriculture and food production systems. This is both a potential threat to biodiversity and ecosystem services, and an opportunity to take action to change practices.*

- Multifunctional agricultural landscapes can be an effective means for increasing understanding of interlinkages and moving towards sustainability
- The interlinkages between biodiversity and agriculture are complex, but unless these interlinkages are properly understood it will be difficult to bring about effective change
- However, understanding these interlinkages also requires a clearer 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 in the right way
- A massive amount of food produced for human consumption is lost or wasted at some point along the production and consumption chain, and this 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
- It is feasible to move away from intensive and industrial agricultural practices to make food systems more ethical and address some of the biggest challenges faced by the global community
- Knowledge, advice and innovation is necessary for helping farmers, as a group and as individuals, to increase productivity while decreasing their impact on the environment

**OUTLOOK 2030:** *The globally adopted framework for action set out in the SDGs provides a major opportunity for driving and achieving changes in practice. Governments are already working to address the*

*SDGs, and they are similarly fundamental to the work of intergovernmental organizations. Building on this, there are significant opportunities to increase the engagement of the private sector and civil society. With commitment this will lead to increased understanding of the interlinkages among sectors, and recognition of the need for policy coherence in order to ensure that these interlinkages are properly addressed.*

- Global agreement on the SDGs was a tremendous success, and provides an excellent basis from which to work
- There is opportunity to harness the power of the market towards achievement of the SDGs and Aichi Biodiversity Targets through public-private dialogue and collaboration
- There is a common interest in making the relationship between agriculture and biodiversity work, but this will also require policy coherence between the different sectors
- The existing landscape of intergovernmental bodies is well placed to support the transformative changes needed to achieve all of the SDGs
- It is important to act now, and to increase the momentum of moving from talking to action
- A key action is taking the issues up further at the CBD Conference of the Parties and its High Level Segment, but this is not the only forum and outreach will be extended further

#### THE TRONDHEIM CONFERENCE

Since 1993, the Trondheim Conferences on Biodiversity have provided a valuable forum for dialogue amongst stakeholders on key issues relating to implementation of the Convention on Biological Diversity (CBD). Recognising the importance of mainstreaming biodiversity considerations across government and society, the eighth Trondheim Conference focused on the interlinkages between agriculture and biodiversity, the roles that biodiversity and ecosystem services play in “food systems for a sustainable future”, and the opportunities provided by an increased understanding of the interactions. Some 300 participants from around 95 countries, deliberately chosen from both the biodiversity and agriculture sectors, considered the ways in which biodiversity and ecosystem services contribute to food production and future food security, and the ways in which a careful alignment and mix of policies, incentives and practical approaches can help deliver development pathways that lead to a more sustainable society. The Government of Norway hosted the Conference in cooperation with the CBD-secretariat, FAO, UNDP, UNEP, UNESCO, the GEF Secretariat and the World Bank. These summary findings are extracted from the the summary report prepared by the Conference co-chairs.

#### References for the statistics on the first page:

- UN (2015), UN projects world population to reach 8.5 billion by 2030, driven by growth in developing countries. [www.un.org/sustainabledevelopment/blog/2015/07/un-projects-world-population-to-reach-8-5-billion-by-2030-driven-by-growth-in-developing-countries/](http://www.un.org/sustainabledevelopment/blog/2015/07/un-projects-world-population-to-reach-8-5-billion-by-2030-driven-by-growth-in-developing-countries/)
- Searchinger, T, C. Hanson, J. Ranganathan, B. Lipinski, R. Waite, R. Winterbottom, A. Dinshaw and R. Heimlich (2013), Creating a Sustainable Food Future - A menu of solutions to sustainably feed more than 9 billion people by 2050, World Resources Report 2013–14: Interim Findings. [https://www.wri.org/sites/default/files/wri13\\_report\\_4c\\_wrr\\_online.pdf](https://www.wri.org/sites/default/files/wri13_report_4c_wrr_online.pdf)
- FAO, IFAD and WFP. 2015. The State of Food Insecurity in the World 2015. Meeting the 2015 international hunger targets: taking stock of uneven progress. Rome. [www.fao.org/3/a-i4646e/index.html](http://www.fao.org/3/a-i4646e/index.html)
- Calculated from FAO Food balance sheets
- FAO Commission on Genetic Resources for Food and Agriculture (2016), Monitoring the implementation of the Second Global Plan of Action and preparing The Third Report on the State of the World’s Plant Genetic Resources for Food and Agriculture (CGRFA/WG-PGR-8/16/4). [www.fao.org/3/a-mq723e.pdf](http://www.fao.org/3/a-mq723e.pdf)
- Castañeda-Álvarez, Nora P, Colin K Khoury, Harold A Achicanoy, Vician Bernau, Hannes Dempewolf, Ruth J Eastwood, Luigi Guarino, et al. (2016), Global Conservation Priorities for Crop Wild Relatives. *Nature Plants* 2 (March 21): 16022. [dx.doi.org/10.1038/nplants.2016.22](https://doi.org/10.1038/nplants.2016.22)
- FAO (2015), The Second Report on the State of the World’s Animal Genetic Resources for Food and Agriculture, edited by B.D. Scherf & D. Pilling. FAO Commission on Genetic Resources for Food and Agriculture. Rome. [www.fao.org/3/a-i4787e/index.html](http://www.fao.org/3/a-i4787e/index.html)
- FAO (2014), The State of Food and Agriculture: Innovation in family farming. [www.fao.org/3/a-i4036e.pdf](http://www.fao.org/3/a-i4036e.pdf)
- FAO (2013), FAO Statistical Yearbook 2013 World Food and Agriculture. [www.fao.org/docrep/018/i3107e/i3107e.PDF](http://www.fao.org/docrep/018/i3107e/i3107e.PDF)
- Secretariat of the Convention on Biological Diversity (2014) Global Biodiversity Outlook 4. Montréal.
- FAO and ITPS (2015), Status of the World’s Soil Resources (SWSR) – Main Report. Food and Agriculture Organization of the United Nations and Intergovernmental Technical Panel on Soils, Rome. [www.fao.org/documents/card/en/c/c6814873-efc3-41db-b7d3-2081a10ede50/](http://www.fao.org/documents/card/en/c/c6814873-efc3-41db-b7d3-2081a10ede50/)
- FAO (2011), Global food losses and food waste – extent, causes and prevention. [www.fao.org/save-food/resources/keyfindings/en/](http://www.fao.org/save-food/resources/keyfindings/en/)
- According to the IPCC (2014), the Agriculture, Forestry and Other Land Use (AFOLU) sector is responsible for just under a quarter of anthropogenic greenhouse gas emissions mainly from deforestation and agricultural emissions from livestock, soil and nutrient management. See Chapter 11 of the Contribution of Working Group III to the Fifth IPCC Assessment Report. [www.ipcc.ch/pdf/assessment-report/ar5/wg3/ipcc\\_wg3\\_ar5\\_chapter11.pdf](http://www.ipcc.ch/pdf/assessment-report/ar5/wg3/ipcc_wg3_ar5_chapter11.pdf)