

Trondheim Conferences on Biodiversity  
*The Eighth Conference*  
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## Food systems for a sustainable future: *Interlinkages between biodiversity and agriculture*

### 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.** Availability of food and nutrition, and equitability in access to them, are major issues in a world where so many people are still under-nourished. Ensuring availability of and access to adequate food and nutrition for a growing population is therefore a critical issue for Governments, and one which has potential security implications if sufficient food is not available. Agriculture - the production of

**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*.



***It is necessary for stakeholders with different yet compatible interests to work closely together to catalyse this shift towards sustainability.*** This will require openness, and significant dialogue. There is an emerging scientific - and to some extent political - consensus on appropriate strategies for achieving sustainability, and a range of solutions are already known, yet significant socioeconomic constraints exist, particularly at the national level. Addressing these topics requires collaboration from all sectors of society, including the business and financial sectors. Greater consideration needs to be given to how the expertise of those working in the areas of food production, health, biodiversity and climate change can be better leveraged, and how the many stakeholders can better collaborate for positive outcomes. This conference was intended as a step along the way.

***It is essential to be aware of the scale at which the issue under discussion is experienced or responded to.*** People are integral parts of the biosphere, shaping it from local to global scales, but at the same time they are fundamentally dependent on Earth's ecosystems. Many urgent challenges relate to a need for transformation from the local to the global perspective. These cross-scale interactions represent new challenges for governance and management of interdependent social-ecological systems and ecosystem services. The appropriate scale has to be defined related to the measures being discussed. For example agricultural landscapes are mosaics of both natural features and agricultural (and other) land uses in a particular geographic region. While some ecological structures and functions, and synergies and trade-offs between different forms of land use, can be managed at the farm or community level, others require governance at higher, even global levels.

***Recognising that the title of the conference was very broad in scope, it was decided to focus on production of crops and livestock.*** This is not because production of crops and livestock was thought to be more important or to cause more biodiversity impact than other aspects of food production (such as aquaculture and fisheries) or other aspects of agriculture. The choice was deliberately made to focus the conference on a specific issue in order to allow increased detail.

***Biodiversity for food and agriculture – or agricultural biodiversity – includes the biological diversity present in or of importance to agricultural, pastoral, forest, fishery and aquaculture production systems. It encompasses the variety and variability of animals, plants and microorganisms, at the genetic, species and ecosystem levels, which sustain the structure, functions and processes of production systems. It provides for nutrient cycling, pest and disease regulation, pollination and other ecosystem services. This diversity has been managed or influenced by farmers, pastoralists, forest dwellers and fisherfolk for hundreds of generations and reflects the diversity of both human activities and natural processes. Making use of this biodiversity and these ecological processes to enhance productivity of agricultural, pastoral, forest, fishery and aquaculture systems is sometimes described as “ecological intensification”.***

## **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.*** Recognising this, conservation programmes have increased over the past decade in both animal and plant genetic resources, and gene banks have increased in both size and number, and in the number and coverage of genetic diversity stored. However less progress has been made in *in situ* conservation of wild relatives and on-farm management of plant genetic resources.

***The range of genetic diversity within farmed animals and plants declines with production intensification.*** A relatively small number of animal and plant species provide the bulk of food production globally, and within these a high proportion of individuals have a relatively narrow range of genetic diversity. Commercial breeding tends to focus on a few species, which then has a tendency to lead to reduction in local genetic diversity. This is compounded by that fact that for developing countries it is often cheaper to import genetic material from the North. In order to counter this reduction in genetic diversity, countries would need their own breeding programmes so as to be able to utilize their own resources.

**Increased focus on the value of biodiversity to agriculture and food production can deliver very positive messages.** Increasing intraspecific diversity can have beneficial effects in terms of: risk management; improved productivity; responding to consumer demand; and for supporting control by communities. Significant traditional breed/variety diversity continues to be managed by smallholder farmers, and is used for example in addressing drought avoidance or resistance, or for increased resilience to pests. Mixes of varieties can be used to extend growing seasons, and to deliver optimum performance/results in variable environments.

**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.** It is estimated that 5–8% of current global crop production, with an annual global market value of US\$235–577 billion, is directly attributable to animal pollination. Many of the world’s most important cash crops benefit from animal pollination in terms of yield and/or quality and are leading export products, providing employment and income for millions of people. There are well documented declines in some wild and managed populations of pollinators.

**The vast majority of pollinator species are wild, including more than 20,000 species of bees.** Both wild and managed pollinators have globally significant roles in crop pollination, although their relative contributions differ according to crop and location. Crop yield and/or quality depend on both the abundance and diversity of pollinators, and a diverse community of pollinators generally provides more effective and stable crop pollination. Pollinator diversity also contributes to crop pollination even when managed pollinator species are present in high abundance.

**Diversity in and around farmers’ fields can significantly reduce pests and decrease disease damage.** This is significant when 13% of annual harvests are lost to pests and diseases, and farmers can lose entire crops. Such practices can also benefit pollinator species, many of which are currently in decline. Farming landscapes require active management in order to maintain both farm production and biodiversity conservation, increase co-benefits, and reduce conflict between the two.

**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.** Soils are absolutely critical to production of food, and are therefore also critical to food security and nutrition. Soils also host much of the world’s terrestrial biodiversity, and a wide range of soil organisms perform vital functions in the soil ecosystem.

**However, despite their importance, most of the world’s soil resources are in only fair, poor or very poor condition.** There are significant threats to soil function at the global scale, and the situation is likely to worsen unless actions are taken by individuals, the private sector, governments and international organizations. Despite the fact that the threats to soils and soil biodiversity are well known, problems are still growing and concerted action is needed. Such actions could include education and extension programmes, targeted research, and implementation of effective laws and policies.

**Without integrated review and assessment, many of the contributions of biodiversity and ecosystem services to agriculture are “invisible” and under-valued.** Within the landscape of smallholder production systems, different areas of land produce different ecosystem services, and in certain landscapes this can change rapidly with location. As a result, changes in land use can affect the services received. Decisions on land use therefore require an understanding of the landscape, the benefits received, and of impacts and trade-offs associated with different land-uses. Without this knowledge, impacts on natural ecosystem contributions and services (erosion control, soil formation, nutrient cycling, pest control, genetic diversity, pollination, moderation of extreme events, freshwater provisioning and climate regulation), will lead to a need for increased inputs and associated costs (irrigation, fertilizers, pesticides, bio-technology, labour, breeding and/or machinery).

**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.*** These threats include: major land conversion, significantly reducing natural habitats; being the single most significant threat to species; substantial emissions of greenhouse gases from deforestation, cultivation, livestock and fertilizers; pollution, particularly of inland water and marine systems; inappropriate use of pesticides impacting on pollinators; and the effects of exotic species and modified organisms.

***Increasing cooperation between biodiversity and agriculture sectors is critical to achieving both the SDGs and the Aichi Biodiversity Targets.*** This is evidenced by the fact that the agriculture sector both benefits from and impacts upon biodiversity and ecosystem services. Following a ‘business as usual’ model will not be sufficient, as it will make it difficult – if not impossible – to achieve both food security and the conservation and sustainable use of biodiversity and ecosystem services, as well as other SDGs.

## **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.*** Ethiopia is biodiversity rich, with a major contribution to crop species and a national economy dependent on agricultural exports. Ethiopia will need to increase food production to address projected population increase, but drivers linked to agriculture account for significant levels of biodiversity loss. A dedicated national institute addresses a wide range of issues from biodiversity conservation to access and benefit sharing. This includes both *in situ* and *ex situ* conservation activities, including significant focus on conservation of crop varieties and crop wild relatives, and a focus on research which is intended to enhance food security.

***A systematic approach to spatial planning can be a valuable tool for supporting biodiversity mainstreaming and agricultural production.*** Malaysia in its early years has taken affirmative actions through land use planning and investing in the agriculture sector to successfully alleviate poverty and promote socio-economic development. While the country still has over 50% of forest cover, land use changes have resulted in forest fragmentation, habitat loss, threats to biodiversity and wildlife conflict, and there is a desire to reduce this impact through mainstreaming of biodiversity into other sectors. A key approach has been to develop spatial plans which cascade down through government levels and across sectors. The goal is to achieve an efficient and equitable use of resources, and federal and state level infrastructure is in place to support implementation.

***There are a number of key challenges in implementing mainstreaming approaches, which require targeted actions.*** In the Malaysia example, these key challenges include: cultivating leadership; ensuring multi-stakeholder engagement; securing funding; addressing legal and jurisdictional issues, and enforcement; and building the necessary capacity. Implementation therefore needs: clear identification and communication of priorities; thinking about mainstreaming not only in terms of policy, but also in terms of science and knowledge; resource mobilization including new and innovative financing; raising awareness; promoting and fostering equity; and changing attitudes and practice.

***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.*** This is particularly so when supported by strategies for marketing diversity and increasing uptake, and legal and policy recognition of the contribution of local communities. Scaling up can be achieved through further development at the original site and/or through adaptation to other contexts, coupled with diffusion and replication.

***As a part of this, the importance of community seed banks was recognised.*** Farmers’ seed systems are a major source of diversity, and the foundation of the global plant genetic resources for food and agriculture. Innovations from farmers need to be scaled up and mainstreamed. The connection between indigenous and scientific knowledge through a multiple evidence base was seen as one solution.

***Gender and social inclusion is a significant issue for ensuring full engagement of all relevant stakeholders.***

Women and agricultural biodiversity are closely linked, the role of women in managing and conserving agricultural biodiversity was stressed and exemplified with indigenous women who are actively engaged in seed management and in participatory varietal selection and breeding. In order not to exclude women from development, policies and interventions should be conceived and implemented in a gendered way.

***Accounting systems often overlook the values of biodiversity and ecosystem services, resulting in them not being taken into account.*** In traditional accounting, one can assess the value of agricultural outputs, and understand the costs in terms of the physical inputs (such as the value of land or the cost of fertilizers). However other issues are ignored, including soil fertility, nutrient cycling, pollination, and so on. Mainstreaming includes integrating these hidden costs and benefits, recognising the natural capital and the benefits that the natural capital delivers.

***Accounting systems that incorporate a full understanding of the values of biodiversity and ecosystem services can be significant drivers for changes in approach.*** The concerns described above have led to a reconsideration of agricultural accounting to also embed ecosystem assets and services into the same framework. This can be done without valuation in monetary terms, the aim being to communicate value and relevance so that it is easier to consider the issues in planning and decision making. Following the UN System of Environmental-Economic Accounting standards and guidelines, there are many different initiatives and countries working with and testing this 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.*** There is a widespread expectation of substantial conversion of natural habitats to croplands in future years, therefore it is important to consider scenarios for simultaneously addressing biodiversity loss, achievement of development goals, and keeping global warming to 1.5°C. Examples were used to illustrate how scenarios can support discussion: scenarios on future pasture management in the Amazon led to proposals for actions to reduce deforestation and improve productivity; scenarios were used to explore potential impacts of different agricultural policies in the EU; and scenarios have been developed to show expected impacts on emissions, land use and biodiversity of different diet and food system choices.

***Climate change impacts for agriculture are already apparent,*** in terms of short term volatility as a result of extreme weather events, yield losses increasing cost structures, production collapse, and changes in crop distributions. 'Business as usual' would require far more land in the future, and would result in a massive increase in greenhouse gas emissions. Meanwhile, changes in wealth distribution are leading to changes in diet, and if that involves increased intake of animal protein then this will also drive further land-use change, increase in greenhouse gas emission and use of water, and further biodiversity loss.

***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.*** This requires increasing productivity sustainably, enhancing the resilience of producers and supply chains, and reducing emissions. There are existing examples of what can be done in all

regions. There are similarly examples of where synergies can be found between emissions reduction and the interests of biodiversity in areas as wide ranging as manure management and agroforestry. Given this, it is important to find ways to effectively communicate what can be done by scaling up the use of existing technologies and practices for achieving more effective water management and use, for example, or exploring opportunities for making more livestock farmers as efficient as the top 10%.

***Biocultural assessments that focus on the relationship between communities and their environments, are particularly useful for exploring the roles and aspirations of local communities.*** Local assessment and scenario development helps local communities to identify effective adaptation practices, and a multiple evidence base approach allows the incorporation of long-term predictive models within adaptation plans. The approach combines indigenous peoples' and local communities' experiences and indigenous knowledge with model-based information to develop appropriate adaptation plans and actions, and provides a framework for linking socioecological systems with the biophysical processes of climate-induced changes.

***Conserving local varieties and land races is one of the actions that can be taken to support adaptation to climate change.*** Despite their alternate socioeconomic development model of "Gross National Happiness", a robust approach to biodiversity conservation and low input agriculture, Bhutan is affected by the consequences of climate change. Since agriculture supports the livelihoods of more than 50% of the population, the impact of climate change on agriculture has significant implications. Consequently, consideration is being given to the potential for using plant genetic resources to help adapt to climate change, including both *ex situ* and *in situ* approaches. Conserving local varieties and land races is one of a series of interventions to promote and maintain on-farm diversity that have been producing a wide range of visible impacts. This has been further supported through product development, packaging, and creating market demand in order to conserve local crop diversity and enhance farming ecosystem resilience.

***Linkages between trade, climate change, agriculture, and biodiversity conservation also need to be considered.*** Trade can be a stimulus for biodiversity loss and drive product specialisation, but it can also incentivise biodiversity conservation and sustainable use through approaches such as policy design, building markets and setting new standards and other economic incentives. Meanwhile climate change is exacerbating the challenges. Drawing on examples in a range of countries there are various lessons for seeking effective solutions. Trade in agriculture reduces rural poverty, but often at the cost of greater specialization. However markets that promote good biodiversity management can be found, although this may need clearer understanding of property rights and responsibilities in order to build appreciation of value. In addition, removing market distortions such as energy subsidies and unpriced water is essential.

#### **PANEL SESSION ON "PRACTICAL EXAMPLES OF INTERLINKAGES BETWEEN BIODIVERSITY AND AGRICULTURE"**

A panel session was convened to foster discussion around different approaches that are currently being used by a variety of stakeholders at different levels to enhance the interlinkages between biodiversity and agriculture. Based on the experience and perspectives of experts with knowledge of different stakeholder groups and levels, a selection of practical examples was presented and discussed. Key points included the following:

- As a group, farmers will make practical changes that support achievement of the SDGs, but what they need is support through advice and innovation, and not dictation of what to grow and where to grow it
- Encouragement is needed for farmers to increase production without increasing acreage, coupled with incentives for farmers to manage biodiversity, and research (including long-term research) to identify opportunities and solutions
- National policies and legislation, coupled with targeted research programmes and appropriate extension activities, can lead to a more sustainable approach to crop production and reduced environmental impacts, as has been demonstrated in Brazil
- Integrated production systems can deliver agricultural intensification at scales that result in positive biodiversity outcomes if the appropriate mix of incentives is provided by the public sector

- Transformation is needed, which requires changes in skills and markets, and a shift in how companies are behaving as good corporate citizens
- Public-private partnerships offer a practical and necessary mode of cooperation to identify opportunities and solutions for mutually positive outcomes for agricultural production and maintenance of biodiversity
- Regional policy frameworks can provide significant direction and incentives, helping to drive changes in behaviour and support particular types of actions
- Farmers and scientists should work together to define future research agendas, building and communicating the evidence base for change, and scaling up successful examples of good practice
- Mixed messages and guidance impacts both national and farm-level decision making, and policy coherence is essential for driving positive change
- With respect to levels for change, it was suggested that both policy and business levers are needed, and should be considered for use in complementary ways as they have different reach and areas of effect
- Businesses, governments and people should work together to find answers, with the biodiversity and agriculture sectors seeking compatible solutions to achieve each sector's primary objectives

#### **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 concept of multi-functionality recognizes the agricultural landscape as producing not only commodities (food, feed, fibres, agrofuels, medicinal products and ornamentals), but also non-commodity outputs such as pollination and cultural heritage. Maximising the production of a single service, such as production of a monoculture crop, can have negative impacts on other services. It is important to understand synergies and trade-offs between different ecosystem services. It is also important to understand the underlying ecosystem functions or services that one service is dependent on – for example some crops are dependent on pollination, which can be hampered by pesticide used on other crops which are the pollinators of the first crop.

***The interlinkages between biodiversity and agriculture are complex, but unless these interlinkages are properly understood it will be difficult to bring about effective change.*** As has already been indicated, in order to fully understand agriculture and food systems it is essential to understand the role of all components in the system, including the often hidden values of biodiversity and ecosystem services. This requires the development of a more holistic integrated view than is often the case. Where necessary this holistic view also needs to take account of consumer and market forces, and of interlinkages with other sectors such as health.

***However, understanding these interlinkages also requires a clearer understanding of the specific products and production systems, and how the products are used.*** For example, maize could be a food crop delivered through small scale production or a major cash crop. Many factors are different in these two scales of production, including impacts on biodiversity. Consideration might also need to be given as to whether the resulting maize is used to produce ethanol or high fructose corn syrup, recognising that the latter has become a major sweetener in soft drinks (therefore impacting on other crops and also indirectly on diet). Increased production of cheap maize has also resulted in changes in livestock management.

***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.*** Incentives can range from government policies to community values, and from natural incentives to market and consumer incentives, and there are



many examples of the use of different approaches. However, it is important to get incentives and subsidies right, or they can have unintended consequences. Protection of biodiversity and ecosystem services can be addressed both through regulatory approaches to resource management, and with subsidies for planting native species, and re-vegetation of marginal land. In the case of New Zealand this is supported by emissions trading schemes, afforestation grants and erosion control programmes.

***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.*** FAO has estimated that about one third of all human food produced is lost or wasted, equivalent to some 30% of agricultural land. This has economical, societal and environmental impacts, with clear implications for the biodiversity and ecosystem services that have been impacted by agriculture, and for greenhouse gas emissions from agriculture and food production related activities. A recent French law promotes actions against food waste within the retail sector in particular (for example supermarkets are banned from destroying edible food and have to look for a partnership with at least one charity). However, all actors in the food chain have a role to play in preventing and reducing food waste, from those who produce and process foods to consumers.

***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.*** Such services are particularly valuable when they integrate advice from multiple sectors (for example, productivity, biodiversity, and climate change adaptation and mitigation), and facilitate networking and sharing of experience. Family farmers depend on biodiversity and are seen as crucial for taking care of it as well as holding relevant knowledge. Extension services should go beyond technical assistance to include understanding of the communities and their needs and aspirations. The example given from Argentina involved integrated extension activities and research, working with a wide range of stakeholders, and included building networks and managing knowledge.

***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.*** This is the conclusion of the first report of the International Panel of Experts on Sustainable Food Systems, *From Uniformity to Diversity: A paradigm shift from industrial agriculture to diversified agroecological systems*. It is believed that such systems can compete with industrial agriculture in terms of outputs, with a rather lower environmental impact. In carrying out the review the panel have also considered why a transition is not happening faster and identify eight emerging opportunities whereby, the foundations of the desired transition are already being laid by farmers, consumers, civil society. It was suggested that a political economy approach would help address the barriers to change.

***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.*** In part this can be achieved by encouraging farmers to increase production without increasing acreage through appropriate incentives and extension activities. However this will also need further work to identify opportunities and solutions for scaling up, including further targeted research at the farm level and more broadly.

## ROUNDTABLE DISCUSSIONS

The High-Level Segment of next meeting of the Conference of the Parties to the Convention on Biological Diversity (CBD COP13) will provide guidance on how to integrate biodiversity into sectoral practices for a number of sectors, including agriculture. Roundtable discussions were held to provide inputs to the preparation for the High-Level Segment. In addition, they identified ways of helping to support national planning and policy development to provide an enabling environment for the consideration of biodiversity and ecosystem services in sustainable agriculture.

In the first round of discussion, participants identified the ***following types of elements as being important for sustainable agriculture***: secure livelihoods; climate resilience; conservation agriculture; avoidance of harm to biodiversity; crop diversification; and empowered farmers as change agents (recalling also the earlier word cloud).

Current national-level mechanisms used to address the relationship between conservation and sustainable use of biodiversity and agricultural development were then discussed. **Categories of mechanisms used at the national level include:** regulation; incentives; labelling and certification; spatial planning; institutional arrangements to improve coordination, cooperation and dialogue across sectors; and national biodiversity strategies, programmes and action plans informed by ecosystem assessments, contributed to by agriculture sector

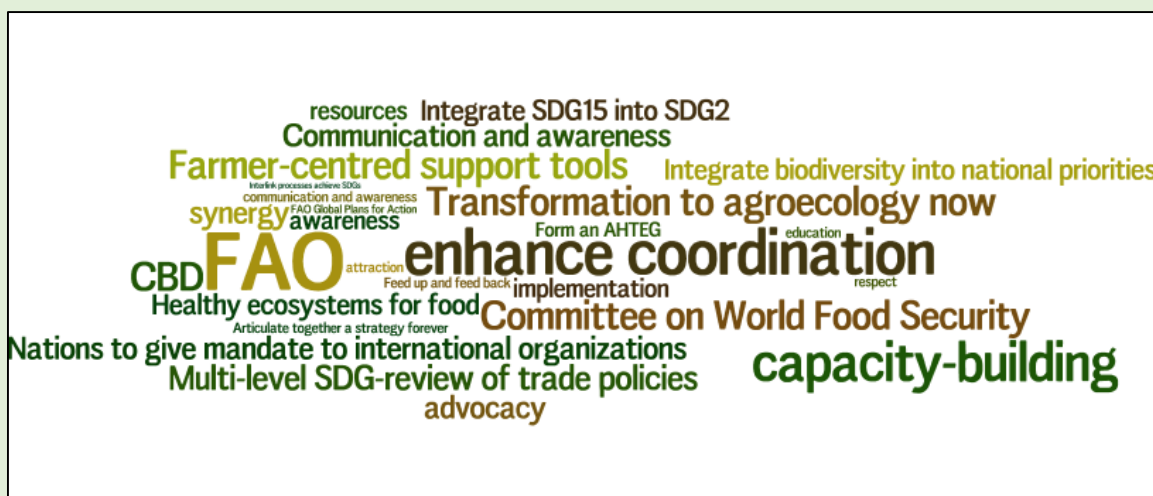
As part of this discussion, **potential barriers and trade-offs to be considered** when designing such mechanisms were highlighted. Examples of the types of barriers/trade-offs raised included:

- ineffective subsidies
- lack of understanding and awareness
- insufficient institutional collaboration
- perceived trade-off between biodiversity considerations, food security and poverty alleviation
- business case for considering biodiversity in agriculture is not clear

On the subsequent day, the discussions moved on to considering the following questions (with examples of the responses interspersed in italicised text):

- How sustainable agriculture should integrate biodiversity?  
*Demonstrate to producers the economic benefits of biodiversity to agricultural production*  
*Enhance understanding of the systems (natural environment and production) involved*
- What actions can be taken to address financial and technological gaps that need to be addressed in order to facilitate effective interlinkages between biodiversity and agriculture?  
*Develop technical knowledge packages for extension services on sustainable agriculture*  
*Establish regional working groups for developing funding proposals*
- What are effective ways of addressing trade-offs between agriculture and biodiversity priorities? At which level of the value chain, producer-consumer?  
*Watershed-landscape approaches, beyond farm-by-farm planning*  
*Cost-benefit analyses to inform producer-level decisions*

After considering how intergovernmental processes such as the Convention on Biological Diversity, World Trade Organization and those under FAO, are supporting work on the interlinkages between biodiversity and agriculture, the groups worked to produce options to enhance the work of these processes to facilitate the integration of biodiversity considerations into sustainable agriculture. In addition to the detail (which can be found on the conference website), summary options were voted on by those involved in the discussions, and the options and the relative weightings can be seen in the following word cloud.



The wealth of material resulting from the discussions during the roundtable sessions can be found on the conference website [www.miljodirektoratet.no/en/Biodiversity/](http://www.miljodirektoratet.no/en/Biodiversity/)

## 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.** The SDGs are intended as an integrated package, so the drive to achieve the SDGs is relevant to all sectors, and all sectors have a role to play. As a result it becomes very important to actively consider multi-functionality in the landscape, and to promote and facilitate dialogue amongst all major stakeholders around a common agenda. This includes finding new ways to finance work in addressing the global challenges, and more effective ways to bring the many stakeholders together.

**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.** Private sector engagement is needed for transformative change in global food systems, including for those changes that increase recognition of the importance and value of biodiversity and ecosystem services. Public-private dialogue and partnerships can align vision and action between business, government and civil society; lessons can be learned and principles adopted from early examples in practice. There is a window of opportunity for increased cross-sector collaboration, and to engage diverse industries including those from sectors such as finance, transportation and technology.

**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.** This will clearly need a reconciliation of future agriculture and food production needs with biodiversity concerns, but this is achievable, and there are existing experiences and opportunities that can be built upon in doing so. However this will take time and effort to achieve, and will necessarily include changes in current practices and behaviours. While examples of good practice and the use of appropriate tools will help support this, steps to increase policy coherence between the different sectors are also critical.

**The existing landscape of intergovernmental bodies is well placed to support the transformative changes needed to achieve all of the SDGs.** In particular those intergovernmental organizations and processes involved in supporting organization of the Trondheim Conference all have mandates and agendas directly relevant to achievement of the SDGs. Each of these organizations are working through their own processes, programmes and projects to address specific aspects of the SDGs, working in together with Governments and networks of collaborating organizations. In doing so they draw on the attributes, core functions and comparative advantages of their respective organizations.

**It is important to act now, and to increase the momentum of moving from talking to action.** It was agreed that the issues discussed during the conference are relevant to us all. A key issue in moving the agenda on is to bring people together, and this the Trondheim Conferences on Biodiversity have always aimed to do. This dialogue must be continued, and complemented by further developing communication and engagement activities. However action is urgently required, and the need for more talk should not delay 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.** As was indicated at the start of the conference, this summary and other outputs will provide inputs to the CBD COP and in particular to the High Level Segment which is addressing mainstreaming. However other opportunities for communicating the outcomes are also being considered, including the meetings of the High-level Political Forum on Sustainable Development and the FAO Committee on Agriculture.

## 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). However, while society has stepped up efforts to stem the loss of biodiversity and recognise the importance of healthy ecosystems, human pressure on the biosphere has continued to rise. In the twenty-three years since the Trondheim Conferences began, the world's human population has grown by 30%, there has been a huge increase in consumption and production (as indicated by a threefold increase in world average GDP), and trade has increased five-fold. Such factors are significant in driving land-use change, and in leading to over-harvesting, pollution, climate change and invasions of alien species. All of this contributes to a continuing erosion of the biosphere, which then has further impacts.

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.

With the active support of a 'Friends of the Co-Chairs' group chosen to represent the full range of conference participants, the conference Co-Chairs prepared this report as a means of conveying the key messages from a diverse range of presentations and discussions, and from some very active panel discussions and round tables that allowed every participant the opportunity to make input. This summary report cannot hope to cover the richness of the contributions made by participants, particularly in the roundtables, but the essence of these discussions is hopefully included, and more detail can be found on the conference website ([www.miljodirektoratet.no/en/Biodiversity/](http://www.miljodirektoratet.no/en/Biodiversity/)), including copies of presentations and more detail on the outcomes of the roundtable discussions.

While the Co-Chairs' report was considered by participants on the final day of the conference and their comments taken account of, the two conference chairs, Tone Solhaug and Nina Vik, are ultimately responsible for the summary presented in this synthesis of the conference proceedings.

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

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