COUNTRY REPORTS

THE STATE OF **NORWAY'S** BIODIVERSITY FOR FOOD AND AGRICULTURE

	منظمة الأغذية والزراعة للأمم المتحدة	联合国粮食及农业组织	Food and Agriculture Organization of the United Nations	Organisation des Nations Unies pour l'alimentation et l'agriculture	Продовольственная и сельскохозяйственная организация Объединенных Наций	Organización de las Naciones Unidas para la Alimentación y la Agricultura

Guidelines for the preparation of the Country Reports for *The State of the World's Biodiversity for Food and Agriculture*

November 30, 2013

COMMISSION ON GENETIC RESOURCES FOR FOOD AND AGRICULTURE

Country: Norway

National Focal Point: Ms Nina Sæther

INSTRUCTIONS FOR DYNAMIC GUIDELINES

How do I complete the dynamic guidelines?

1. You will require Adobe Reader to open the dynamic guidelines. Adobe Reader can be downloaded free of charge from: http://get.adobe.com/uk/reader/otherversions/. Use Adobe Reader Version 10 or higher.

2. Open the dynamic guidelines and save it (save as -> pdf) on your hard drive.

3. Please rename it <name of your country>.pdf.

4. You may forward the dynamic guidelines to stakeholders you would like to involve or inform by e-mail. You may also print and/or save the dynamic guidelines.

5. It is advisable to prepare textual responses (including any formatting such as bullet points) first in a separate document and then to copy and paste them into the form. Please use font Arial 10. Acronyms and abbreviations should be avoided if possible. If included, they must be introduced (i.e. written out in full) the first time they are used. Note that the text boxes are expandable. Once text has been entered, the box will automatically enlarge to make its content fully visible when you click outside its border.

6. When you have finished completing the dynamic guidelines, click the “Submit by Email” button on the last page and send the completed dynamic guidelines to SOW-BFA@fao.org. This should automatically attach the document to an email that you can then send. Otherwise, please attach the completed dynamic guidelines manually to an e-mail and send it to SOW-BFA@fao.org. A letter confirming official endorsement by relevant authorities should also be attached to the email.

7. You will receive a confirmation that the submission was successful.

Where can I get further assistance?

Should you have any questions regarding the dynamic guidelines, please address them by e-mail to SOW-BFA@fao.org.

How, by whom and by when must the completed dynamic guidelines be submitted?

Once officially endorsed by the relevant authorities, the completed dynamic guidelines should be submitted (click the “Submit by Email” button on the last page) by the National Focal Point. Completed dynamic guidelines should be sent **by December 31st, 2014**.

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THE ESSENTIAL ROLE OF COUNTRY REPORTS

The preparation of Country Reports is one of the most important steps in the process for preparing the first report on *The State of the World's Biodiversity for Food and Agriculture* (the SoWBFA Report), and will be critical in filling in gaps to existing information and establishing baseline information on biodiversity for food and agriculture, and on its role in providing multiple ecosystem services. The preparatory process of Country Reports should also be considered a strategic planning exercise and the report generated an overview of the country's sustainable management practices of biodiversity for food and agriculture and a tool for the assessment of national priorities and future needs to be addressed. Country Reports should also be seen as an opportunity to engage and stimulate the interests of a wide range of stakeholders from different sectors, and including smallholders.

The present Guidelines for Country Reports (Guidelines) aim to help countries to assemble baseline information and highlight the importance of a collaborative process, bringing together experts (including those stakeholders with experiential knowledge, such as farmers, pastoralists, forest dwellers and fisher folk) across sectors to assess available information and analyze gaps and needs. The Guidelines are also structured as a tool to guide data collection, planning and policy making at national level.

The Guidelines make a distinction between information countries may wish to provide in support to their own strategic planning, from the information needed for the preparation of the overall SoWBFA report. Countries may wish to draw upon documents prepared for the various sector State of the World's Reports for their cross-sectoral synthesis.

I. INTRODUCTION

1. The FAO Commission on Genetic Resources for Food and Agriculture (the Commission) is the only intergovernmental forum which specifically deals with the whole range of genetic resources for food and agriculture. Genetic resources for food and agriculture are the building blocks of biodiversity for food and agriculture. The mandate of the Commission covers all components of biodiversity for food and agriculture. To implement its broad work programme and to achieve its objectives through a planned and staged approach, the Commission adopted and subsequently revised and updated its Multi-Year Programme of Work (MYPOW). CGRFA-14/13/Report, *Appendix I*, Table 1.

2. One of the major milestones of the MYPOW is the presentation of the first report on *The State of the World's Biodiversity for Food and Agriculture* (the SoWBFA Report) to the Commission's Sixteenth Regular Session (to be held in 2017) and the consideration of follow-up to the SoWBFA Report, including through a possible Global Plan of Action. The SoWBFA Report will also be a major milestone in the context of the United Nations Decade on Biodiversity.

3. The Commission requested FAO, at its Eleventh Regular Session in 2007, to prepare the SoWBFA report, for consideration at its Sixteenth Regular Session, following a process agreed upon by the Commission. CGRFA-11/07/Report It stressed that the process for preparing the SoWBFA Report should be based on information from Country Reports and should also draw on thematic studies, reports from international organizations and inputs from other relevant stakeholders, including centres of excellence from developing countries. CGRFA-14/13/Report, paragraph 14.

4. The Commission stressed that the SoWBFA Report should focus on the interactions between sectors and on cross-sectoral matters, taking full advantage of existing information sources, including sectoral assessments. It also suggested that

priority be given to key supplementary information not available in existing sources. CGRFA-14/13/Report, paragraph 14.

5. The Commission acknowledged that the report's findings would be preliminary and incomplete in a number of areas and requested FAO to ensure that such information gaps would be assessed and highlighted in the report. It also requested FAO to include in the report lessons learned and success stories on the conservation and sustainable use of biodiversity for food and agriculture. CGRFA-14/13/Report, paragraph 15.

6. The SoWBFA Report will provide a baseline analysis of the state of knowledge. Incompleteness and gaps in available information should be clearly identified and acknowledged and used to direct future assessments. In compiling information for their Reports countries should state clearly where information is not available on specific subject areas.

7. The present Guidelines for the preparation of Country Reports contributing to the SoWBFA Report present an overall approach and a set of objectives that can guide the preparation of Country Reports, the scope of the report and the structure that can be used, as well as an appropriate timeline and process for their preparation.

8. The Guidelines assist countries to provide information complementary to sector reports in order to address the following questions:

- What is the state of the conservation and use of biodiversity for food security and nutrition, ecosystem services and sustainability?
- What trends can be identified in the conservation and use of biodiversity for food and agriculture and in the effects of major drivers of change?
- How can conservation and use of biodiversity for food and agriculture be improved and the contributions of biodiversity to food security and nutrition, ecosystem services, sustainability and the improvement of livelihoods of farmers, pastoralists, forest dwellers and fisher folk be enhanced?

9. Major differences exist between countries with respect to the nature, conservation and use of biodiversity for food and agriculture. To provide baseline information, highlight knowledge gaps and to facilitate the regional and global synthesis of the information countries are therefore invited to follow the structure provided in the Guidelines as closely as possible in the preparation of their Country Report.

II. OBJECTIVES OF THE GUIDELINES

10. These Guidelines have been prepared by FAO to assist in the preparation of Country Reports contributing to the SoWBFA Report. The Guidelines have been designed to assist countries to undertake a strategic assessment of their biodiversity for food and agriculture, with particular emphasis on components of biodiversity for food and agriculture that are not traditionally considered by the other sectoral assessments and yet contribute to the livelihoods of smallholder communities. These include uncultivated or wild food and non-food products, as well as species of importance to production systems.

III. SCOPE, STRUCTURE AND CONTENT

Scope of the Country Report

11. The scope of the Country Reports includes the variety and variability of animals, plants and micro-organisms at the genetic, species and ecosystem levels that sustain the structures, functions and processes in and around production systems, and that provide food and non-food agriculture products. A detailed description of the scope of the Country Report is provided in Annex 1. Production systems, as defined for the purposes of this report, include the livestock, crop, fisheries and aquaculture, and forest sectors (description provided in Annex 2).

12. The present Guidelines for the Country Report mainly focus on those areas not covered by sectoral reports, e.g. the biological diversity associated with different supporting and regulating ecosystem services within production systems or of importance to them, referred to hereinafter as associated biodiversity, as well as wild resources used for food. In addition to this, countries that previously presented or are currently preparing a Country Report on Plant, Animal, Aquatic or Forest Genetic Resources may wish to integrate information from these reports in the preparation of their Country Report for the SoWBFA.

13. The Guidelines should help countries to provide information from an ecosystem perspective, including on the provision of ecosystem services, and on the implementation of an ecosystem approach. They will also assist countries to report on the use of biodiversity for food and agriculture for food security and nutrition, rural livelihoods, sustainability and sustainable intensification as well as on relevant gender perspectives. In this way, the Guidelines will assist countries in describing the multiple functions and the multiple values to producers and users of biodiversity for food and agriculture.

Structure of the Country Report

14. An Executive Summary is recommended, along with a section providing an Introduction to the Country, which would provide a description of the country and an overview of the different sectors.

15. Country Reports should follow as closely as possible the structure of the SoWBFA Report as presented in CGRFA-14/13/3 Appendix 1, which includes the following Chapters:

Chapter 1: Introduction
Chapter 2: Drivers of change
Chapter 3: The state and trends of biodiversity for food and agriculture
Chapter 4: The state of use of biodiversity for food and agriculture
Chapter 5: The state of interventions in the conservation and use of biodiversity for food and agriculture
Chapter 6: Future agendas for conservation and sustainable use of biodiversity for food and agriculture

16. An analysis of the different ways in which biodiversity for food and agriculture is used and supports cultural, social and economic values of local communities and traditional peoples will be an important aspect of the SoWBFA Report and of Country Reports. The Country Reports should therefore take full account of these aspects and seek the involvement of the widest range of stakeholders. In this respect, it is recommended that the scope of activities includes actions being taken by the public, private and nongovernmental sectors, and takes account of gender perspectives, and the needs, priorities and perspectives of indigenous peoples and local communities through their organizations.

IV. TIMELINE AND PROCESS

17. In line with the overall process, as established by the Commission, the Director-General of FAO sent a Circular State Letter on 10 June 2013 to countries requesting them to identify National Focal Points for the preparation of Country Reports by November 30, 2013, and invited countries to submit their Country Reports no later than 31 December 2014.

18. The following steps are recommended in preparing the Country Report, using a participatory approach:

- Each participating country should appoint a National Focal Point for the coordination of the preparation of the Country Report who will also act as focal point to FAO. National Focal Points should be communicated to Ms Linda Collette, Secretary, Commission on Genetic Resources for Food and Agriculture (cgrfa@fao.org), by November 30, 2013**.**
- Countries are encouraged to establish a national committee to oversee the preparation of the Country Report. Given the cross-sectoral nature of the Country Report, the national committee should consist of as many representative stakeholders as practical (representing government, research and civil society) including from different sectors (fisheries and aquaculture, forest, livestock and plants) and those able to support analysis of associated biodiversity. It is recommended that the national committee also include a gender specialist along with someone who can contribute to economic issues, with a natural resource management, environmental economics, or other relevant background. It is recommended that within the 13 months countries are given for the preparation of the Country Report, the national committee meets frequently to review progress and consults widely with key stakeholders.
- The national committee may find it useful to establish cross-sectoral and inter-departmental/inter-ministerial working groups to compile data and information for specific sections of the Country Report, or to write specific chapters of the Country Report.
- The National Focal Point should coordinate the preparation of the first draft of the Country Report, which should be reviewed by the national committee. The National Focal Point should facilitate a consultative process for broader stakeholder review, including stakeholders from various ministries, departments, NGOs, research institutions, and stakeholders with experiential knowledge, such as farmers, pastoralists, forest dwellers and fisher folk, etc.
- Following the stakeholder review, the National Focal Point should coordinate the finalization of the Country Report, submit it to the government for official endorsement and transmit it to FAO in one of the Organization's official languages (Arabic, Chinese, English, French, Russian and Spanish) by 31 December 2014. The Country Report will be an official government report.
- If countries are unable to submit final Country Reports by the set deadline, preliminary reports of findings should be provided to FAO to contribute to the identification of global priorities for inclusion in the SoWBFA Report.

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V. DETAILED METHODOLOGY AND GUIDANCE BY CHAPTER

The guidelines outline the suggested content and provide questions to assist countries to undertake their strategic analysis and develop each section of their Country Report. The questions are provided to facilitate analysis, to stimulate discussion and to ensure that the Country Report contains strategic directions that address priorities and needs. Questions that are critical to enable basic understanding of the conditions in your country and facilitate regional and global synthesis of the data and information collected are indicated in **bold**. Please try to ensure that data and information are provided for these questions wherever such information is available.

Questions are organized and formulated in relation to the production systems that are present in your country. Thus it is very important to fill in Table 1 in the Introduction to establish a list of production systems that will be used throughout the Guidelines.

EXECUTIVE SUMMARY

It is recommended that the Country Report contains an executive summary of 2-3 pages highlighting the main findings of the analysis and providing an overview of key issues, constraints and existing capacity to address the issues and challenges. The executive summary should indicate trends and driving forces and present an overview of the proposed strategic directions for future actions aimed at the national, regional and global levels.

Norway's first national report on biodiversity for food and agriculture presents information on the status and trends of animals, plants and micro-organisms that contribute directly or indirectly to agriculture, forestry and fisheries. The report focuses mainly on the components of biodiversity for food and agriculture that are not covered in Norway's sectoral country reports on plant (1995, 2008), animal (2002, 2014) and forest genetic resources (2012).
Status, trends and drivers of change
Overall, the status, trends and pressures are well documented with regard to Norway's animal, plant and forest genetic resources. Additional information on these components of biodiversity for food and agriculture can be found in Norway's sectoral country reports on plant, animal and forest genetic resources.

Since 2005, the Norwegian Biodiversity Information Centre has been assessing the status and trends of and pressures on different species of associated biodiversity in the agricultural landscape, forests and marine environments, following the criteria used by the Union for Conservation of Nature. This continuous work in progress has significantly contributed to increase the knowledge of the many "inhabitants" in the different ecosystems and habitats, including those of relevance to food and forestry production. In livestock grassland-based systems, changing livestock keeping practices over the past decades, involving less outfield grazing, have led to the disappearance of many open landscape dependent grass, wild plant and other associated biodiversity species. In 2010, the Norwegian Directorate for Nature Management estimated that approximately 22% of Norway's red-listed species are linked to agricultural landscapes. 60% of the threatened and near-threatened species in these landscapes are enduring losses caused by the cessation of their use and overgrowth (e.g. this is the case of certain grass species in semi-natural vegetation types that are no longer being grazed or cut). Intensive agriculture is estimated to affect 25% of the threatened and near-threatened species in cultural landscapes. Norwegian forests are rich in biological diversity. Approximately 60% of the known species in mainland-Norway is associated with forests. This rich diversity is largely due to the three-dimensional architecture of forests with much variation in structure, habitats and environments. With respect to forest-related biodiversity, while half of the threatened and near threatened red-listed species in Norway occur in forests, there is no indication that the status of these species has deteriorated between 2006 and 2010. Regarding the state of vertebrates in capture fisheries, several sea birds show a severe negative trend, whereas most fish species seem in good or even excellent state. As to micro-organisms, still little is known on how their status has evolved in the different production systems over the past ten years.

The importance and value of ecosystem services with respect to food and forestry production is widely acknowledged among the relevant stakeholder groups, as is the need to monitor their status and trends. To date, however, hardly any of the regulating or supporting ecosystem services (e.g. pollination, soil formation, etc.) essential to the country's production systems have systematically been studied or monitored. Neither have there been any regular assessments of species in relation to their

functions in relevant ecosystem processes. However, in the opinion of an expert commission, that reported on the value of ecosystem services in Norway (NOU 2013.10), the state of ecosystems in the country is relatively good, even if biological diversity and ecosystems are under a series of pressures (e.g. land use change, climate change, ocean acidification and invasive species).

The Nature Index is a tool for assessing the status and trends of biodiversity in Norway's major ecosystems. While this index is at present not used to assess the status and trends of biodiversity in actively managed agricultural systems, a number of ecosystems of relevance to food and agriculture, such as freshwater, open lowlands, forests and several marine systems are part of the index' scope.

The status and trends of an extensive number of wild food species are monitored on a regular basis by different institutes, such as, for example, the Norwegian Institute for Nature Research, with its National monitoring programme for wild cervids, and the Institute of Marine Research, that is responsible for managing data on Norway's marine environment and fish. Generally speaking, the status of the country's wild food species has remained relatively stable over the past years and there is no evidence of a significant threat of extinction or of the loss of any important wild food species. However, the possible threat of fish farming to wild fish resources, such as wild salmon, are under discussion. In Norway's fifth National Report to The Convention on Biological Diversity it is reported that sea lice and escaped farmed fish are substantial threats to wild salmon and sea trout.

THE STATE OF USE OF BIODIVERSITY FOR FOOD AND AGRICULTURE

The use of biodiversity for food and agriculture varies among sectors and production systems. For those where the application of an ecosystem approach is general practice (e.g. forestry and marine fisheries), all components of biodiversity tend to be given greater consideration, even if the focus with respect to associated biodiversity might still primarily be on conservation rather than on use. In agricultural production systems there are quite a few management practices that favor the use of biodiversity for food and agriculture, like for example organic farming (more than 5% of Norway's total arable land is organically farmed) and the application of integrated pest management (IPM) techniques (an estimated 30% of Norwegian growers followed the IPM principles in 2008).

In terms of animal, aquatic and plant genetic resources for food and agriculture and of forest genetic resources, Norway uses its biodiversity relatively well. Between 1970 and 2005, the country's self-sufficiency rate in food remained stable at around 50%, with a domestic food production mainly based on locally developed plant varieties and native livestock breeds. During that period, Norway was for example more than 100% self-sufficient in dairy products and about 80% in potatoes (Norwegian Agricultural Economics Research Institute 2007). It should however be noted that the use of old traditional plant varieties and endangered native livestock breeds is still relatively low. Their potential contribution to ecosystem services (e.g. management of low alpine cultural landscapes through livestock grazing), and to food security are thereby not optimally exploited.

While hardly any component of associated biodiversity for food and agriculture is actively used, many wild food species are. Wild food species that are hunted, fished, harvested or picked are usually of marginal importance to the population's food supply and nutrition. However, both the non-herding and reindeer-herding Sámi, especially those who speak the traditional languages, tend to retain a traditional life style, still using wild foods, like for example fresh water fish and wild berries, in their daily diet (Nilsson et al., 2011).

STATE OF INTERVENTIONS ON CONSERVATION AND USE OF BIODIVERSITY FOR FOOD AND AGRICULTURE

With the 2009 Nature Diversity Act, Norway entered into a new era of biodiversity management. This Act is unique in the fact that it aims to protect biological diversity and ecological processes through their conservation and sustainable use across all sectors. It also includes provisions on alien species and on access to (most) terrestrial components of biodiversity, including genetic resources for food and agriculture.

Norway has many other national policies, programmes and enabling frameworks that support or influence the conservation and sustainable use of biodiversity for food and agriculture, one of the most effective being the Agricultural Environment Programme, which includes the Regional Environment Programme (RMP). In the RMP the priorities are set by the Ministry for Agriculture and Food (e.g. with respect to the species and habitats to conserve), while the decisions on the work programme are taken at county level. The RMP has particularly been successful with respect to the conservation of biodiverse pastures and to maintain associated biodiversity species, such as for example salamanders.

Ecosystem approaches like sustainable forest management promote sustainable production using broad social, economic and environmental goals. An important tool in this approach is the Forest Certification scheme (PEFC) that supports the implementation of sustainable forest management through the certification of forest properties and forest products. Moreover, in the 4.3% of Norway's productive forest area that is classified as protected forest area, forest owners do not undertake logging activities by definition to ensure the conservation of key biotopes. A share of these 4.3% falls under the voluntary protection scheme (frivillig vern), whereby forest owners voluntarily propose forest areas for protection and

conservation. Ecosystem approaches like sustainable forest management therefore significantly contribute to the conservation and sustainable use of biodiversity for food and agriculture.

A large number of Norwegian organizations and groups are involved in the country's efforts to conserve and use biodiversity for food and agriculture. Many of these organizations collaborate on specific activities, such as linking information, recording and monitoring systems, data sharing for species mapping, the development of breeding programmes, promotion and awareness raising initiatives, joint research projects, etc.

Norway's educational system also puts a lot of attention on the conservation, and to a lesser extent on the sustainable use, of associated biodiversity, ranging from school projects focusing on the importance of earthworms to higher education programmes on the diversity of marine organisms.

Finally, Norway is involved in the implementation of numerous regional and international initiatives targeting the conservation and sustainable use of associated biodiversity. Among many others, Norway is a Member country of the FAO Commission on Genetic Resources for Food and Agriculture; a contracting party both to the Convention on Biological Diversity and to the OSPAR Convention; and a Member of the Intergovernmental Panel on Biodiversity and Ecosystem Services (IPBES).

FUTURE AGENDA'S

The Government is currently in the process of drawing up an action plan to halt the loss of biodiversity and to implement relevant national environmental goals and targets, including those that are of relevance to agriculture, forestry and fisheries. Most of these goals and targets are linked to the Aichi biodiversity targets. The preparation of Norway´s National biodiversity action plan provides an excellent opportunity for stakeholders from different sectors to agree on and be jointly committed to the conservation and sustainable use of biodiversity in Norway.

On 1 October 2013, Norway ratified the Nagoya Protocol on access to genetic resources and the fair and equitable sharing of benefits arising from their utilization to the Convention on Biological Diversity, which entered into force on 12 October 2014. Work to bring national legislation relevant to access and benefit-sharing of genetic resources, as laid out in the Nature Diversity Act, in line with the Nagoya Protocol is expected to be finalized in 2015.

The Norwegian government is committed to increase the production and consumption of organic food to 15% by 2020 (White paper Nr.9 (2011-2012)). To reach this target, incentives, including in the form of subsidies will continue to be allocated to enhance both the number of organic farmers and the area under organic cultivation.

This report states that Norway has a lot of knowledge, experience and capacity in terms of the status and management of biodiversity for food and agriculture. However, in particular with respect to associated biodiversity and ecosystem services, there is a great need for research and knowledge development. Among others, monitoring activities of ecosystems, populations and species and data on the connections between them need to be strengthened.

Overall, efforts to raise public awareness on the importance of biodiversity for food and agriculture to food security and nutrition will be continued.

CHAPTER 1: Introduction to the Country and to the role of biodiversity for food and agriculture

Proposed structure of the chapter and information to be included in the Country Reports

The first objective of this Chapter is to present an overview that will help the reader appreciate the context for the Country Report by providing a general overview and summary of the features, demographics and major trends in overall biodiversity for food and agriculture in the country. Explicit attention should be given to associated biodiversity, ecosystem services and wild foods.

Countries that previously presented or are currently preparing a Country Report on Forest, Aquatic, Animal or Plant Genetic Resources, should be able to use some of the background information contained in these reports to prepare parts of their introductory section.

In this Chapter, countries will create a list of their different production systems that will be frequently referred to in subsequent chapters.

This chapter will seek information on the following topics:

- Basic information on the size and location of the country; its main physiographic and climatic features; human population;
- A synthesis of the current situation with respect to the current and potential contribution of biodiversity for food and agriculture to food security and nutrition, ecosystem health and sustainability of production systems, as supported by associated biodiversity and ecosystem services. Specific attention is also given to wild foods;
- Description of the different production systems within the country, as well as an overview of their importance to the national economy and rural livelihoods.

Preparation of the Country Report

1. Provide a description of the process that was followed in preparing the Country Report, preferably providing the names (with affiliations and addresses) of the participants, including all stakeholders consulted.

In November 2013, the Ministry of Agriculture and Food (LMD) nominated the Director of the Norwegian Genetic Resource Centre as Norway's national focal point for FAO for the preparation of The State of the World's Biodiversity for Food and Agriculture. LMD also established a one year part-time post for a project leader responsible for coordinating the preparation of Norway's report on the state of biodiversity for food and agriculture and for its timely delivery to FAO.

In line with the country report guidelines, a reference group was established to oversee the preparation of the country report, including representatives from research institutes, farmer organizations and the private sector. The Reference group met 3 times (in March and May 2014 and in January 2015) to assess progress made and provide guidance during the preparation of the country report and to discuss its finalization.

Sectoral inputs were mainly provided by the Norwegian Genetic Resource Centre, the Norwegian Forest and Landscape Institute and the existing national committees on animal, plant and forest genetic resources. The committees provided inputs during a joint meeting on 4 March 2014. In June 2014, the electronic questionnaire was shared with the Committee members, as well as with the Reference group, the Ministries of agriculture and food (LMD), climate and environment (KLD) and trade, industry and fisheries (NFD) for their feedback. The questionnaire was also submitted to the Norwegian Environment Agency for its comments and suggestions. Scientists from Bioforsk also provided significant inputs, including on the use of diversity promoting practices in agriculture. For the analysis of the status and trends of associated biodiversity, both the members of the Reference group and additional experts were consulted, including from the Norwegian Biodiversity Information Centre.

Names, affiliations and addresses of participants in the preparation of Norway's country report on biodiversity for food and agriculture:

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- Forest genetic resources (http://www.skogoglandskap.no/artikler/2007/genressursutvalg_skogtrer)
- Plant genetic resources (http://www.skogoglandskap.no/artikler/2007/genressursutvalg_planter)

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Main data sources:
Bioforsk: http://www.bioforsk.no
Ministry of Agriculture and Food: https://www.regjeringen.no
Ministry of Climate and Environment: https://www.regjeringen.no
Ministry of Trade, Industry and Fisheries: https://www.regjeringen.no
Norwegian Agricultural Authority: http://www.slf.dep.no
Norwegian Agricultural Economics Research Institute: http://www.nilf.no
Norwegian Biodiversity Information Centre: http://www.artsdatabanken.no
Norwegian Environment Agency: http://www.miljodirektoratet.no
Norwegian Forest and Landscape Institute: http://www.skogoglandskap.no
Norwegian Association of Fungi and Useful Plants (Norges sopp- og nyttevekstforbund): http://www.soppognyttevekster.no/
Oikos-Øokologisk Norge: http://www.oikos.no
State of the Environment Norway (Miljøstatus): http://www.environment.no
Statistics Norway: http://www.ssb.no

General overview of the country

2. In a few paragraphs, provide a synthetic overview of your country, including the size, location, main physiographic and climatic features. Include a section on human population, providing disaggregated data on women and men contribution and involvement in agriculture. Briefly discuss as well the overall nature and characteristics of the economy, including the contribution of the different sectors. You may wish to draw upon the country overviews provided in the first chapters of previous and ongoing Country Reports on Forest, Aquatic, Animal or Plant Genetic Resources.

Norway is one of Europe's northernmost countries, ranging over some 1750 km between 58°N and 71°N (excluding Svalbard and Jan Mayen). The country's total area is 323,787 km2 (excluding the islands of Svalbard and Jan Mayen). It has a population of 5 million and a population density of 15.6 people per km2 (Statistics Norway, 2013). Approximately 1% of Norway's population are from Sámi origin (Nordic Sámi Institute: http://www.sami-statistics.info/default.asp?nc=4&id=110).

Norway's total agricultural area is 1.04 million hectares (ha). About 0.86 million ha of this land, or 2.7% of the country's total land area, is arable. Forests and other wooded land cover 14 million ha, occupying 43% of the country's total land area. Approximately 8.6 million ha of the country's forests are productive forest land, which are forest areas that can produce more than 1 m3 of wood per hectare per year. The most important tree species, both volume- and economic-wise, are spruce, pine and birch (Tomter & Dalen, 2014). Norway's remaining land area essentially consists of mountains, extensive grazing and other outlying land (outfields), lakes and urban and built-up areas.

The sea areas under Norway's jurisdiction are about six times larger than its land area and most of the important fish stocks in Norwegian waters are abundant and in good condition. It is estimated that both pelagic (i.e. capelin, mackerel and North Sea herring) and demersal (i.e. cod, haddock, saithe and Greenland halibut) fish stocks have tripled in Norwegian waters in the period 1985 to 2012 (Norwegian Ministry of Climate and Environment, 2014). The country's natural conditions are also favorable to fish farming. Norway's numerous fjords and its extensive number of islands along the coast are protected from the extreme conditions of the open sea and the water temperatures are ideal for the production of, inter alia, salmon, trout, cod and halibut.

Approximately 16.9% of the Norwegian mainland is protected as natural parks, nature reserves or landscape protected areas. 64% of these protected areas are located in the alpine zone. Protected areas make up 65% (or 39,800 km2) of the Svalbard Archipelago. Norway also has 12 marine protected areas covering a total of 85,416 km2, 2,402 km2 of which lies outside the country's territorial waters. In addition, the Nature Biodiversity Act includes provisions to protect and conserve specific areas and species on both land and sea.

Norway has substantial north-south and east-west climate gradients. Inland areas in northern and eastern Norway have a typical continental climate, with warm summers and cold winters. The entire coastline is characterised by a maritime climate, with relatively cool summers. The mean temperature in the winter months are above 0°C all along the coast from Lista (Vest-Agder) to the Lofoten area (Nordland). In the same period, the temperatures in the lower inland areas, both in the southern and northern parts of Norway, are much lower. The Finnmark Plateau is the country's coldest area, with mean temperatures in the winter months of around -15°C. In summer, the southern part of Østlandet (southeastern Norway) and the coastal areas of Sørlandet (southern Norway) have the country's highest mean temperatures. In July 2014, the average mean temperature in Oslo was approximately 20.8°C. Annual precipitation also varies. Areas about 30 to 40 km inland from the outer coast of Western Norway in the counties Hordaland and Sogn and Fjordane have the highest annual precipitation. With an annual precipitation of 3575 mm, the village of Brekke, which is located in the Gulen district in Sogn and Fjordane county, is the country's most pluvious area. However, based on measurements of annual run-off, some glaciers must have an annual precipitation of about 5000 mm per year. The driest areas are in the eastern and northern parts of the country, in respectively the valleys Østerdalen and Gudbrandsdalen and Finnmark. The length of the growing season, defined as the number of days with a mean temperature of more than 5°C, varies between 200 days in south-western Norway and 100 days along the coast of eastern Finnmark. In the mountainous regions, the growing season is even shorter (Meteorologisk institutt, 2015).

The Norwegian economic features are a combination of free market activity and government intervention. In 2012, the service sector as a whole accounted for approximately 57% of the country's gross domestic product (GDP), petroleum industries accounted for about 26% and manufacturing close to 7% (White paper Nr.12; The World Bank (2012)). In the same year, agriculture (0,4%), forestry (0,2%), fishing (0,4%) and aquaculture (0,3%) combined accounted for 1,3% of the country's GDP (SSB, 2012). Forestry, manufacture of wood and wood products, except furniture and manufacture of paper and paper products, accounted for less than 1% and the food processing industry for about 1,2% of the GDP.

Norwegian agriculture essentially consists of crop and livestock farming, horticulture, forestry, reindeer farming and other related activities, such as farm tourism. Grass production for fodder represents the largest and economically most important

plant production in Norwegian agriculture (Bioforsk, 2014).

One of the main characteristics of Norway's agricultural sector is the pluralism of its farmers. For generations, as the result of a series of circumstances intrinsic to Norway (geographic location, climate, etc.), the majority of farmers have generated their income from both on-farm and off-farm activities. The off-farm income used to be generated through forestry and fishery related activities. However, since the 1970s, farmers tend to generate their "secondary" income working on payroll for an employer or from other economic activities (Store Norske Leksikon, 2014). At present, approximately two out of three farmers are "part-time farmers".

Due to topography variation, production conditions and the forest ownership structure, Norway's forestry is essentially driven by small-scale forest owners. In 2011, there were more than 130,000 forest properties with at least 2.5 hectares of forest. 98% of these properties were privately owned, covering a total of 85% of the country's productive forest area (Tomter and Dalen, 2014).

In 2013, 57,000 people, or 2.2% of Norway's total labour force, worked in agriculture, forestry and fishing, approximately 83% of which were men (Statistics Norway, 2013). In the same year, there were slightly over 43,500 farms in the country. The majority of farmers (59%) own both agricultural and forest land, 29% exclusively own agricultural land and 12% are forest owners without agricultural land (Statistics Norway, 2010). In 2011, the forestry sector employed approximately 5,500 people, 17% of which were women (Tomter and Dalen, 2014; Steinset, SSB).

Over the last fifty years, the number of active farmers and fishermen more than halved and the size of each unit has increased. This trend is mainly the result of public policy and the general economic development of the country, as well as of competition from goods and services from low cost countries. Increasing oil-related activity in the mainland economy has provided income and employment at high wage levels in Norway (250,000 Norwegian jobs depend on oil). Norway's oil economy is creating, on the one hand, attractive employment opportunities, but is also pushing up unit labor costs and undermining the competitiveness of the other sectors of the mainland economy, including agriculture (IMF, 2013; What if the Norwegian oil economy is a bubble?-Sven Åke Bjørke, 2013). The declining number of farmers and fishermen can also to a certain extent be attributed to the increased efficiency in farming and fishing methods and equipment, resulting in labour being substituted by capital (Directorate of fisheries, 2010).
In the forestry sector, the number of employees has remained quite stable since the 1970s, and more recently, after a weak decline in 2003, this number is rising (Tomter and Dalen, 2014; Steinset, SSB).

Policies regulations and laws that have played/play a significant role in shaping Norway's food and agricultural landscape, include:
- Annual agricultural agreements: Government agricultural policy is modified on a yearly basis through annual agricultural agreements between the government and the two farmer's unions and through the annual state budget. Such agreements can address a range of issues, some of which may also require environmental considerations to be taken into account, such as matters dealing with food safety and the management of biological processes. As laid out in its Environmental Strategy 2008-2015, integrating environmental challenges into agricultural policies is a key objective of the Ministry of Agriculture and Food. While the Ministry of Agriculture and Food is responsible for drawing up government agricultural policies, the Norwegian Agricultural Authority (Landbruksdirektoratet) is the executive authority for their implementation. With respect to Norway's environmental goals and policies, this questionnaire includes information up until the publication of Proposal 1 S (2014-2015) to Parliament for the 2015 budget year.
- The Allodial Right (Odelsrett): To avoid the partitioning of agricultural land and preserve Norwegian farm culture, the inheritance of farms is regulated through the "Odelsrett", an ancient right in Norway by which the eldest child inherits the farm after his or her parent with the obligation to pay the other siblings their share of the estate. For children born before 1965, the eldest son would inherit the farm. Only if there were no sons, the eldest surviving daughter would be the farm's heir. With the "Odelsrett" having become more equal, the number of women farmers has continued to marginally increase. In 1999, women owned 26 per cent of all agriculture holdings with their share being larger in smaller holdings than in larger ones (Steen Jensen, 2005);
- The Land Act (Jordloven): The purpose of this Act is to provide suitable conditions to ensure that the land areas in the country, including forests and mountains and everything pertaining thereto (land resources), may be used in the manner that is most beneficial to society and to those working in the agricultural sector (this includes regulating farmland partitioning). According to this Act, land resource management shall be environmentally sound and, among other things, take into consideration protection of the soil as a production factor and preservation of land and cultural landscapes as a basis for life, health and well-being for human beings, animals and plants. The Act also takes into account that resources shall be used to meet the needs of the present without compromising the ability of future generations to meet their own needs.
- The public right of access (Allemannsretten) is an old and important principle in Norway, allowing everyone free, public access to non cultivated land, including forests. Cultivated land is only accessible outside the growing season between 15 October to 29 April. The general public may use the forests for recreational activities and sports at any time of year. Public access to nature is enforced through the Outdoor Recreation Act (Det norske Skogselskap, 2011).

Role of biodiversity for food and agriculture

Countries that previously presented or are currently preparing a Country Report on Forest, Aquatic, Animal or Plant Genetic Resources, should be able to use some of the background information contained in these reports to prepare this part of their introductory section. Detailed information on associated biodiversity, ecosystem services and wild foods will be provided in chapters 2, 3, 4, and 5 of the Country Report, and thus, countries may wish to consider developing this section after completing the main body of the Country Report.

3. Provide a summary of the role of biodiversity for food and agriculture in improving food security and nutrition, the livelihoods of farmers, pastoralists, forest dwellers and fisher folk, ecosystem health and sustainability of production systems in your country. Specific attention should be given to associated biodiversity, ecosystem services and to wild foods. The summary should also draw attention to the *ex situ* and *in situ* conservation of biodiversity for food and agriculture, the most significant aspects of use to improve food security and nutrition in the country, major changes observed in the last 10 years and the main factors causing changes. Significant risks or dangers to the conservation and use of biodiversity for food and agriculture may also be highlighted.

Securing a safe, nutritionally adequate and culturally acceptable supply of food is considered a priority to the Norwegian authorities. In this context, the Norwegian biodiversity policy and action plan (White paper Nr.42 (2000-2001)), in accordance with the Convention on Biological Diversity, recognizes the importance of the diversity of both domesticated or cultivated and of wild or uncultivated species, as well as the value of life-sustaining processes and ecosystem services, such as soil formation, cleansing of air and water, regulation of carbon and nitrogen cycles and the ability of the environment to mitigate the effects of environmental pressures such as pollution.

Norway is aware of the importance of the delivery of ecosystem services to sustainable production. Many research activities have been/are being undertaken to improve the country's knowledge and policy development in this field. In 2013, an expert commission, which was appointed by the Norwegian Government, published a report entitled Natural Benefits-on the value of ecosystem services (NOU 2013.10). This report will be built on to improve the country's natural resource management. In the Commission's opinion the state of Norwegian ecosystems is relatively good, even if Norway’s biological diversity and Norwegian ecosystems are under a series of pressures (e.g. land use change, climate change, ocean acidification and invasive species). The report also identified a great need for research and knowledge development and recommended to, inter alia, improve knowledge about biological diversity and ecosystem services, including by strengthening the monitoring of Norwegian ecosystems, populations and species. The report also encouraged the establishment of a special research programme that would look into biological diversity, ecosystem functions and ecosystem services and the connections between them, including from an interdisciplinary perspective. Such a programme would contribute to improving the integration of biological diversity and ecosystem services considerations in decision-making processes.

The Norwegian Biodiversity Information Centre also plays a key role in raising awareness on the importance of associated biodiversity and their role in the delivery of ecosystem services. In 2013, the Centre released a publication on the state of knowledge of insect pollination in Norway (Totland et al., 2013). This publication highlights that the number and diversity of pollinators in Norway is declining and that the seed production of many plant species in the country either depend or is favoured by insect visiting flowers (i.e. it is estimated that the seed production of 80% of wild plant species is pollination dependent).
In 2014, in the context of the FAO Global Pollination Project, the Norwegian Institute for Nature Research (NINA) published an assessment report of Norwegian pollination deficits (Åström et al., 2014). In collaboration with an internal research programme at NINA and the Bioforsk-led PolliClover project, NINA, together with the Norwegian Institute for Agricultural and Environmental Research and the Norwegian Forest and Landscape Institute, performed pollination deficits measurements in two crops for two seasons (i.e. commercial apple orchards and red clover seed production), gaining experiences of working with the pollination deficit protocol* in Norway. These experiences are briefly presented in the assessment report of Norwegian pollination deficits.

More research is also being undertaken in relation to associated biodiversity in forests. This is important, as approximately 60% of the 31,000 species (including invertebrates, fungi, lichens and bryophytes, excl. micro-organisms) in mainland Norway are believed to be associated with forests (Gjerde, I., Brandrud, T.E., Ohlson, M. & Ødegaard, F., 2010). When mapping the spread and occurrence of Norway's 30 main tree species, the Norwegian Forest and Landscape Institute also identified their pollen and seed dispersal vectors. Insects were among the main pollen vectors and birds and mammals were identified as the main seed dispersal vectors, next to water and wind (Myking & Skrøppa, 2001).

Norway also has a significant diversity of wild foods, including a broad variety of berries, edible fungi, wild fruit trees and wild animals, such as different types of deer, birds and fish. While those who harvest wild foods through hunting and picking essentially do so for leisure, it should be mentioned that such activities, in particular hobby fishing and hunting are also revenue-generating. In 2009, for example, the wild game meat value was estimated at about USD 78 million, with the value of

moose meat accounting for approximately USD 47 million. In the same year, Norwegian forest owners earned more than USD 29 million by selling their hunting rights, with additional income being generated by providing hunting-associated services, such as renting out cabins (SSB, 2009). "Recreational use of private property" has also become a lucrative source of income for riparian landowners, who lease their fishing rights, especially for wild salmon fishing, and provide other services, such as accommodation, food and guiding tours. In 2008, 80% of the riparian land owners leased their fishing rights in one form or another. The remaining 20% indicated they either wanted to fish themselves, or that they considered the value of their fishing rights to be too low. The average net income generated from leasing fishing rights was slightly less than USD 5,000 per owner per year, a figure that significantly varied per owner based on the type of ownership, the form of lease and the quality of the fishing rights (Stensland, 2011).

Wild foods play a particularly important role in the diet and lifestyle of reindeer herding Sámi (NB: throughout this questionnaire, most of the information that is provided on the Sámi relates to reindeer herding Sámi). Before the 20th century, the traditional Sámi diet was composed almost exclusively of foods of animal origin (mainly reindeer) with the addition of fish and plant foods (e.g. cloud- and lingonberries) when available (Haglin, 1991). During the last century, the diet of many Sámi has progressively become more like the diet of the non-Sámi populations in Norway, with an increase in the intake of carbohydrates from plant foods and a decrease in meat protein. Recent surveys have found that the dietary patterns of the population in Norway tend to vary by geographic area rather than by ethnicity (Sami or Norwegian). There does however seem to be a clear link between ethnicity and dietary pattern among the Sami population living in the interior parts of the country. This part of the Sámi population still obtains most of its protein intake from reindeer meat supplemented by lake fish, and consequently has a significantly lower incidence of iron deficiency to the Sámi living in coastal regions (Haglin, 1999; Fagleg analysegruppe for samisk statistikk, 2009). Generally speaking, Norwegian Sámi were found to have a higher intake of fat, table sugar, and coffee compared to non-Sámi Norwegians (Nilsen et al., 1999) and a lower intake of fruit and vegetables, with the exception of berries when they are available (Haglin, 1991; Haglin, 1999; Nilsen et al., 1991). Their consumption of dairy products is also lower (Ross et al., 2006).
Studies have shown that some types of traditional foods, such as reindeer meat and fresh cod, are particularly rich in essential nutrients, even if some of these foods may also contain contaminants. Contamination with persistent organic pollutants and heavy metals has been quite extensively documented for fish and other forms of seafood and more recently also for reindeer. Generally speaking, reindeer meat across Norway contains very low levels of pollutants, even if parts of South Sámi reindeer areas of Trøndelag were heavily polluted with radioactive cesium after Chernobyl, which is still affecting the food safety of reindeer meat from these areas. The consumption of fish liver from fish caught in the fjords is not recommended due to its content of hazardous substances. The extent to which food safety issues in relation to traditional foods has affected the Sámi people's choices in terms of food and eating habits, is not known (Fagleg analysegruppe for samisk statistikk (2013)).

The knowledge of biological diversity, including biological diversity for food and agriculture, has steadily increased over the past ten years. This has contributed to raising awareness on its importance among those who conserve and use this diversity, as well as among policy makers and the broader public. In terms of the conservation and sustainable use of biodiversity for food and agriculture, Norway recognizes there are quite a few cross-sectoral challenges that need to be addressed. The country's principle is for each sector to integrate environmental concerns into sectorial policies, including the maintenance and use of biodiversity. However, at times trade-offs favoring the state of biodiversity in one over another sector need to be made (for example, wildlife policies protecting predators in sheep grazing areas; infrastructure expanding at the expense of farmland and farmland biodiversity). In addition, over the past decades, both the steady decline in number of farmers and the abandonment of traditional farming practices have led to important land use changes that have had an impact on associated biodiversity, ecosystem services and wild foods in the country. For example, the reducing number of grazing livestock has resulted into a large proportion of former grazing areas to become overgrown, negatively affecting species diversity of herbs and grasses and of their associated biodiversity in outlying fields and forests.

Norway recognizes that the conservation and use of genetic resources for food and agriculture is crucial to ensuring sustainable food production and food security and it views in situ, on-farm and ex situ conservation as complementary approaches.

As explained in more detail in Norway's Country Report on the State of Plant Genetic Resources for Food and Agriculture (Asdal, 2008), the close collaboration and coordination between the Nordic Genetic Resource Centre (NordGen) and the Norwegian plant genetic resources programme is essential to the national efforts regarding the conservation and use of food and feed crops and their wild relatives. For more than 30 years, NordGen has been the main body for conservation of Norwegian seed propagated crops and potatoes, in addition to administrating the documentation and database systems covering all agricultural and horticultural crops, including material maintained in national field gene banks. NordGen has also conducted a series of projects on the characterisation, evaluation and the use of the conserved plant genetic material. The collections held or administered by NordGen are a common Nordic resource, under common Nordic management. The material is accessible to all free of charge and relevant material is included under the Multilateral System of the International Treaty on Plant Genetic Resources for Food and Agriculture. NordGen also coordinates Nordic participation in European and international networks and projects (Asdal, 2008).

Within plant breeding, a Public Private Partnership for Pre-breeding was established in 2011 at the regional level by the Nordic Council of Ministers. Using both public funds and funds from commercial breeding companies, the partnership supports Nordic

plant breeding programmes for barley, rye grass and apple to meet long-term needs of the agricultural and horticultural industries, specifically regarding adaptation to climate change, setting targets for environmental policies, and responding to demands from consumers, markets, etc. Within this partnership, for example, the Nordic apple project will produce and disseminate knowledge concerning levels of susceptibility against fruit tree canker and storage diseases in apple cultivars of potential interest for plant breeding and cultivar development in the Nordic countries. The sole commercial plant-breeding company in Norway is Graminor. Among others, Graminor develops new and improved plant varieties and tests imported varieties to provide Norwegian farming and horticulture with a diversity of disease-free field crops and horticultural plants which are suitable for Norwegian growing conditions. A limited number of other plant breeding initiatives are being undertaken at the national level, but these cannot be characterized as commercial breeding.

Small-scale farming and hobby gardening also contribute to the use and in situ conservation of landraces and traditional plant varieties. Natural selection as well as selection pressures imposed by farmers and gardeners ensure landraces continue to evolve, providing opportunities for further local crop adaptation and improvement. In Norway, there have been individuals who have cared for certain varieties over many years. The national programme on plant genetic resources for food and agriculture has supported such dedicated enthusiasts in establishing networks within different crop groups whereby farmers or gardeners are appointed custodians and maintain certain varieties each year. These custodians produce seeds or propagate plant parts for distribution and prepare annual reports about the conservation of each maintained variety. Through the establishment of a national PGR programme in 2001 and a public campaign in 2007, 12 of the missing mandate varieties of the country's four main fruit crops (apple, pear, plum and cherries) were found in old orchards or private gardens. These varieties are now being propagated and trees will be added to existing collections. NordGen provides seeds from their collections to farmers and gardeners who want to cultivate varieties that are not available through the seed marketing system. This is a free service aiming at sustainable use of genetic resources and at raising public awareness. Botanical and public gardens, as well as open air museums are also important for the maintenance of traditional plant varieties.

Commercial livestock breeding plays an equally important role in the country's sustainable food production. There are three commercial breeding associations in Norway, namely GENO, Norsvin and the Norwegian sheep and goat association. Each of these associations is run by farmer-owned enterprises. Norwegian animal breeding is often described as sustainable and is characterized by broad breeding goals, sustainable and effective breeding populations, the use of dual purpose breeds and a strong participation of farmers. The three breeding associations provide breeding material, mainly consisting of commercial native breeds (about 98%), to farmers across the country. Only in the poultry sector is breeding material supplied by international breeding companies.

Norway's small-scale farm structure is believed to have considerably contributed to the use and conservation of old, native breeds in mainstream farming systems. This has been of major importance for the survival of these breeds and has contributed to the continued existence of viable populations of several historical breeds (Sæther, 2002). In 1989 and 1991, a national registration process was undertaken to record conservation worthy cattle breeds and herds. This process has since been expanded to also include other national livestock species.
The exportation of breeding material also contributes to the conservation and use of Norway's native livestock diversity, with the revenue of such exports being used to financially support the commercial breeding programmes of Norwegian dairy cattle and pig breeding cooperatives.

Norway also has a long history in tree breeding activities, particularly for Norway spruce. Norwegian spruce for timber production is still the country's priority species in breeding. Norway's tree breeding strategy (2010-2040) aims at, inter alia, spruce forests with high CO2 sequestration, high genetic variation and resilience to climatic change.

Norway administers vast oceans with some of the world's richest fishing resources. Both fisheries and aquaculture significantly contribute to food security in the country. In average, Norwegians between the age of 18 and 70 consume 79 grams of fish/fish-related products per day, making freshwater and saltwater fish an important part of the Norwegian diet (Totland et al., 2012). Commonly consumed fish species include cod, haddock, herring, mackerel, trout and salmon. Production is year-round, albeit with some seasonal variations, particularly for capture fisheries. Even so, domestic production of seafood would be able to substitute all inland needs for animal protein (FAO, 2011).

* The FAO Global Pollination Project seeks to build capacity for pollination studies internationally. It adds information to the knowledge base of the International Panel for Biodiversity and Ecosystem Services (IPBES) and implements the Pollination deficit protocol, which outlines a unified method to investigate pollination and measure pollination deficits in various agricultural systems around the world (Vaissière et al. 2011). The Pollination deficit protocol is being implemented in Norway, its applicability to Nordic conditions is being analyzed and its strength in relation to alternative research strategies is being evaluated.

Production systems in the country

IMPORTANT: Throughout these guidelines, questions on production systems will refer to the production systems identified in Table 1 as present in your country.

4. Indicate, for each of the production systems listed in Table 1 below, whether it is found in your country or not, regardless of its importance.

Table 1. Production systems present in the country.

Sector	**Code**	**Production system names** (Place pointer on the production system name for a detailed description)	**Check if present in the country**
Livestock	L1	Livestock grassland-based systems: Tropics	☐
	L2	Livestock grassland-based systems: Subtropics	☐
	L3	Livestock grassland-based systems: Temperate	☐
	L4	Livestock grassland-based systems: Boreal and /or highlands	☒
	L5	Livestock landless systems: Tropics	☐
	L6	Livestock landless systems: Subtropics	☐
	L7	Livestock landless systems: Temperate	☐
	L8	Livestock landless systems: Boreal and /or highlands	☐
Forest	F1	Naturally regenerated forests: Tropics	☐
	F2	Naturally regenerated forests: Subtropics	☐
	F3	Naturally regenerated forests: Temperate	☐
	F4	Naturally regenerated forests: Boreal and /or highlands	☐
	F5	Planted forests: Tropics	☐
	F6	Planted forests: Subtropics	☐
	F7	Planted forests: Temperate	☐
	F8	Planted forests: Boreal and /or highlands	☐
Aquaculture and Fisheries	A1	Self-recruiting capture fisheries: Tropics	☐
	A2	Self-recruiting capture fisheries: Subtropics	☐
	A3	Self-recruiting capture fisheries: Temperate	☐
	A4	Self-recruiting capture fisheries: Boreal and /or highlands	☒
	A5	Culture-based fisheries: Tropics	☐
	A6	Culture-based fisheries: Subtropics	☐
	A7	Culture-based fisheries: Temperate	☐
	A8	Culture-based fisheries: Boreal and /or highlands	☐
	A9	Fed aquaculture: Tropics	☐
	A10	Fed aquaculture: Subtropics	☐
	A11	Fed aquaculture: Temperate	☐
	A12	Fed aquaculture: Boreal and /or highlands	☒
	A13	Non-fed aquaculture: Tropics	☐
	A14	Non-fed aquaculture: Subtropics	☐
	A15	Non-fed aquaculture: Temperate	☐

	A16	Non-fed aquaculture: Boreal and /or highlands	☐
Crops	C1	Irrigated crops (rice) : Tropics	☐
	C2	Irrigated crops (rice) : Subtropics	☐
	C3	Irrigated crops (rice) : Temperate	☐
	C4	Irrigated crops (rice) : Boreal and /or highlands	☐
	C5	Irrigated crops (other) : Tropics	☐
	C6	Irrigated crops (other) : Subtropics	☐
	C7	Irrigated crops (other) : Temperate	☐
	C8	Irrigated crops (other) : Boreal and /or highlands	☐
	C9	Rainfed crops : Tropics	☐
	C10	Rainfed crops : Subtropics	☐
	C11	Rainfed crops : Temperate	☐
	C12	Rainfed crops : Boreal and /or highlands	☒
Mixed	M1	Mixed systems (livestock, crop, forest and /or aquatic and fisheries): Tropics	☐
	M2	Mixed systems (livestock, crop, forest and /or aquatic and fisheries): Subtropics	☐
	M3	Mixed systems (livestock, crop, forest and /or aquatic and fisheries): Temperate	☐
	M4	Mixed systems (livestock, crop, forest and /or aquatic and fisheries): Boreal and /or highlands	☒
Others [please specify]	O1	Semi-natural forests: Boreal	☒
Others [please specify]	O2		☐
Others [please specify]	O3		☐
Others [please specify]	O4		☐
Others [please specify]	O5		☐

5. Provide in Table 2 a description for each production system. Countries may wish to use the following criteria, where information is available:

Environmental features and characteristics:

a) additional information on climate (arid, semi-arid, humid, subhumid);
b) features of the landscape mosaic.

Rural livelihoods and sustainable use:

c) share of smallholders;
d) proportion of the production system found in urban or peri-urban context;
e) share of the population actively contributing to the production system disaggregated by gender, including number of employees if available;
f) importance of the production system to the incomes, livelihoods and well-being of rural communities;
g) levels of agricultural intensification and the reliance of synthetic inputs, modern varieties, fossil fuels, etc.

Table 2. Description or characterization of production systems within the country

Production system	**Description**

Livestock grassland-based systems: Boreal and /or highlands	NOTE 1 In Norway, the available information on the state of biodiversity for food and agriculture is collected and analyzed at the national level and not at production system level. For the purpose of this report, we therefore used relevant national level data, in combination with expert views, when filling in the questionnaire at the production system level. There are more production systems in Norway than the ones listed for this report and they are categorized differently. However, to facilitate FAO's analysis for the preparation of The State of the World's Biodiversity for Food and Agriculture, various production systems were clustered into a single one, following, as much as possible, the nomenclature proposed by FAO. Only for the forest sector, where none of the proposed categories accurately described the Norwegian situation, a new category was introduced (O1 Semi-natural forests:Boreal). Additional descriptive information is provided in Table 2 for each of the listed production systems. NOTE 2 Reindeer herding is an important production system in Norway, particularly in Finnmark, the country's largest, least populated and most northern county. However, the different characteristics and dynamics related to this production system will be addressed throughout the report only when relevant and not as systematically as for the other production systems listed in this Table. A more detailed description of reindeer herding is therefore provided in this note. Reindeer herding is an extensive production system based on seasonal migration of reindeer herds. It is of particular importance at the local level from central to northern Norway, especially for the Sámi population. Reindeer mainly feed on herbs and grasses during the summer and on lichen during the winter. To secure sufficient food supply the reindeer herding sector depends on access to extensive land/pasture areas. The loss of grazing land and the obstruction of migration routes due to direct and indirect impacts from competing land use (e.g. infrastructure, industrial development or other human activity) are major challenges for reindeer herding. Norway's six reindeer pasture areas are East Finnmark, West Finnmark, Troms, Nordland, North Trøndelag and South Trøndelag/Hedmark, which are divided into reindeer pasture districts. There can be quite some variation between the management of reindeer herds in the different pasture areas, and even between different husbandry units within a single district. The sustainability of reindeer husbandry in Norway is under several pressures, including from too many reindeer in West Finnmark. The maximum quota set by the Norwegian government would require a reduction in reindeer numbers to protect pastures (particularly the lichens) and secure a future for Sámi reindeer husbandry, while the reindeer herders consider encroachment by competing land-use interests to be the largest threat to pastures and the sustainable development of reindeer husbandry. Southwards, pressures on land are also challenging. Increasing infrastructure development and land-use activities compete for the same pastures (Johnsen, 2014). The authorities invested considerable resources to protect reindeer herding in these areas. Climate change and different pasture rotation are challenges in all reindeer districts. DESCRIPTION OF LIVESTOCK GRASSLAND-BASED SYSTEMS Livestock production systems with ruminants (cattle, sheep and goats or a combination of these species) obtaining a large portion of their forage intake by harvesting and grazing (8 weeks minimum) cultivated and natural pastures.
Self-recruiting capture fisheries: Boreal and /or highlands	See NOTE 1 at the top of this Table Approximately 12,800 Norwegians are directly employed in marine capture fisheries (FAO, 2011). In this sector, relatively few, but efficient fishing boats are being used, ranging from large ocean to small coastal vessels. Between 2000 to 2011 the number of registered vessels reduced by more than half to a fleet of approximately 6,000 boats. The main capture species include herring, cod, capelin, mackerel, saithe, blue whiting, and haddock. A number of additional species with high commercial value are caught in smaller quantities (i.e. prawns, Greenland halibut and ling). The average annual total catch in the 2001-10 period was around 2.5 million tonnes with an export value of more than USD 3 billion. Fluctuations in catch are partially due to the natural variability of pelagic stocks such as capelin and herring. In addition to fish, Norway also exploits krill and sea mammals, including various species of seals and mink whales (FAO, 2011).

Fed aquaculture: Boreal and / or highlands	See NOTE 1 at the top of this Table Norway's long coast and cold clear waters provide the perfect conditions for aquaculture production. The farms are situated in coastal areas and mostly use net pens systems. The Norwegian aquaculture industry started out with small players following a "learning-by-doing" approach, but it has grown into a very effective and professional industry since. Aquaculture production more than doubled between 2000 to 2011, reaching 1.14 million tons in 2011. In parallel, the number of fish farmers increased from about 4300 in 2000 to about 5800 in 2011. The country's aquaculture production is dominated by Atlantic salmon farmed in marine cages (93% share in 2011), other important farmed species include rainbow trout (5%) and Atlantic cod (1%). In addition, extensive development efforts are taking place to expand aquaculture activities to other species such as Atlantic halibut, wolf fish and shellfish. Norway is a world-leading exporter of salmon. In 2013, Norwegian producers exported salmon and trout for close to USD 7,1 billion. The industry employs approximately 5900 people directly, mostly in coastal districts. Including ripple-effects, this number increases to 23,600. The government’s policy is to enable growth and competitiveness, within a framework of environmental sustainability. In the short term, sea lice and farmed fish escapes are the two most important challenges to be dealt with. In the longer term, the use of coastal areas and feed resources will be among the important issues to solve. Indicators to define an acceptable threshold of escaped farmed salmon in Norwegian rivers has been developed, and corresponding indicators to measure the effect of sea lice on wild stock are on their way. Such indicators are important tools for better aquaculture management. Discharges of dissolved nitrogen and phosphorus and organic material from the aquaculture sector constitute a minor environmental problem in Norway. The Norwegian Government is bound by international law to ensure sustainable harvesting of all fish stocks, used either for human consumption or feed.
Rainfed crops : Boreal and /or highlands	See NOTE 1 at the top of this Table The majority of crops cultivated in Norway are rainfed. A minor share of crop producers invested in an irrigation system as a precautionary measure. Figures indeed show that existing irrigation systems are not used to their full potential and/or on a regular basis (SSB, 2010). Norway's major agricultural crops include cereals (including oats, barley, rye and wheat), rape oil seeds and potatoes. Forage crops, including tubers, green fodder and cultivated grassland varieties are also grown. The country's main horticultural crops include vegetables such as carrots, cabbage and other brassica, onions, lettuce and greenhouse tomatoes; and fruit, such as strawberries, cherries, raspberries, apple and plums. Cloudberries, billberries and lingonberries are wild berry varieties that are harvested from the wild by hand.
Mixed systems (livestock, crop, forest and /or aquatic and fisheries): Boreal and /or highlands	See NOTE 1 at the top of this Table Production systems with livestock, crops and forest land. This category includes pig and poultry farms that also grow cereals, as well as farms that keep several species of livestock (possibly a mixture of monogastrics and ruminants), cultivate land and own forest land. In mixed systems, farmers need to comply with the minimum spreadable acreage requirement to spread their manure.

Semi-natural forests: Boreal	See NOTE 1 at the top of this Table Norway's productive forest land covers an area of approximately 8.6 million ha. In 2012, 0.5% of this area, or about 45 000 ha, were clear-cut forest, 14 700 ha of which were regenerated by planting (Statistical Yearbook, table 357). 22 and 4.3%, respectively, of the country's productive forest area are protective and protected forests. Norway has mixture of planted and naturally regenerated forests, and very few stands can be characterized as “forest plantations” in the way the term plantations is being used at the global level (Interview with Tore Skrøppa on 19/02/2014). The country's forests are therefore probably best described as semi-natural forests, which are neither undisturbed by man nor plantations. They represent mainly managed forests modified by man through silviculture and assisted regeneration (FAO, 2002). Forestry in Norway is characterized by small-scale properties, combining forestry and agriculture. In 2011, Norway had 130,000 forest properties with more than 2.5 hectares of forest, with the average size of privately owned farms with forest resources being 45 hectares. In Norway, privately owned forests account for more than 80% of the country's total productive forest area.

6. Provide a map of production systems in your country, marking the places and regions mentioned in the Country Report.

Add

Delete

7. For each production system found in your country (refer to Table 1), indicate in Table 3 the area under production (km^2, hectares, acres, other). If not applicable, indicate the estimated production quantity (major products aggregated) using the appropriate unit or measure (tonne, head, inventory, cubic metre, etc.) for the production system. If available, indicate the contribution of the production system to the agricultural sector economy in the country (%). Please use the most recent data available and indicate the year of reference for the data or estimates. Specify NK if not known or NA if not applicable.

Table 3. Area under production, production quantity and contribution to the agricultural sector economy of production systems in the country.

Production systems	**Area**		**Production - quantity**		**Contribution to the agricultural sector economy**	**Reference year**
	Value	**Unit (enter)**	**Value**	**Unit (enter)**	**%**	**year**
Livestock grassland-based systems: Boreal and /or highlands	536,408	Hectare			agriculture= 31% of the	2013 (SLF); 2(
Self-recruiting capture fisheries: Boreal and /or highlands			2,500,000	Tonnes	31% (or 0.4% of GDP)	2009 (Directc
Fed aquaculture: Boreal and / or highlands			1,140,000 (includ	Tonnes	23% (or 0.3% of GDP)	2013 (Directc
Rainfed crops : Boreal and /or highlands	304,116	Hectare			agriculture= 31% (or 0.	2012 (SSB)
Mixed systems (livestock, crop, forest and /or aquatic and fisheries): Boreal and /or highlands	127,937	Hectare			agriculture= 31% (or 0.	2012 (SSB)
Semi-natural forests: Boreal	8,600,000 (avai	Hectare	8,900,000 (felled t	m3	15% (or 0.2% of GDP)	2012 (Tomte

8. Comment on the effects on biodiversity for food and agriculture of production destined for exportation versus production for local and/or national consumption. Where information is available, indicate for each production system the proportion of production that is destined for export, the major commodities involved, the impact on the methods of production (e.g. adoption of specific production practices to meet export needs) and the implications for biodiversity.

Norway's agricultural production has a strong domestic focus. Priority is given to maintaining domestic production and covering the national demand for products that grow naturally in the country. The limited quantity of exported products is estimated to be of no major influence on the status of the country's biodiversity for food and agriculture.

There are situations where exports actually contribute to maintaining Norway's biodiversity for food and agriculture. For example, the revenue of exporting breeding material is used to financially support the costly breeding programmes of Norwegian dairy cattle and pig breeding cooperatives. Such programmes contribute to maintaining and using the country's native livestock diversity.

Nearly all of the country's meat, milk and egg production is consumed locally and Norway is more or less self-sufficient with regard to these products. The two main exported animal products are skin from fur-bearing animals and wool with respectively 98 and 86% of their total production being destined for export (Sæther, 2013). In 2013, Norway also exported about 12,000 tons of cheese (mainly Jarlsberg).

Norway's exports in terms of food crops are very limited. Nearly 100% of the country's production of cereals, oil seed crops, vegetable varieties, potatoes, fruit, berries and fodder crops are consumed locally, with the production of wheat, rye, barley and oat covering approximately two thirds of the domestic demand (SSB, 2012).

In terms of forestry and fishery products Norway is a net exporting country.

FORESTRY

Norway is an important producer of forest and of forest products and the export revenue from forestry is substantial. In 2012, the country exported approximately 500,000 m3 of processed timber (80% of which was sawn timber from spruce and pine trees), 1.6 million m3 of logs (the highest volume for the past 25 years) and manufactured products (mostly pulp and paper) for a total value of more than USD 1.5 billion. 75% of this revenue was generated through the exports of pulp and paper. Compared to 2011, this revenue decreased by approximately USD 240 million, due to the down-scaling of the Norwegian pulp and paper industry (Tomter & Dalen, 2014; Steinset, SSB).
Norway has also exported less processed timber since 2000. Whereas the country used to export between 700,000 to 800,000 m3 of processed timber per year in the 1990s, it exported a little less than 500,000 m3 in 2012. One of the major drivers behind the gradual decrease in the exports of processed timber has been the increasing demand for these products on the domestic market (Tomter & Dalen, 2014). The quantity and diversity of tree species does not seem to be affected by the exports of timber products and pulp and paper. In addition, it is also interesting to note that the annual increment in tree volume has been bypassing the drain of wood (volume of harvested trees and of trees that have died from natural causes) for nearly a hundred years.

A well developed breeding programme has been established for Norwegian spruce (Picea abies) to ensure both the sustainable use and maintain the genetic diversity of the species. While 95% of Norway's forest breeding activities are related to spruce, breeding programmes have also been developed for pine and Christmas trees. Christmas trees are harvested before they reproduce (in average forest trees are fertile after 15 to 20 years), whereas other tree species naturally regenerate.

When extensively spread, foreign tree species can have negative effects on biodiversity. These effects are being evaluated through a specific regulation on the use of foreign tree species that is in line with the Nature Diversity Act. At present, only 1% of Norway’s total timber volume relies on foreign tree species. In the context of foreign tree species, the use of Sitka spruce (Picea sitchensis) in some parts of Norway is discussed. In total, approximately 50,000 ha is planted with Sitka spruce. These stands are mostly located on the country’s southern and western coastlines. While this tree species is recognized as a valuable resource it is also blacklisted because it can spread into coastal heathlands. Norway’s coastal heathlands used to be actively managed, including through grazing. With the disappearance of traditional management practices the coastal heathlands have become an endangered nature type. However, had there been no spread of Sitka spruce in these particular areas, similar ecological effects would have been caused by the invasion of pine, spruce and deciduous tree species. Sitka spruce thrives well in the rough Norwegian coastal climate and it retains more CO_2 than the native spruce species (i.e. Norwegian Sitka spruce plantations bind approximately 600,000 tons of CO_2 per year) (Andreassen, 2014).

FISHERIES AND AQUACULTURE

In 2013, Norway exported 2,430,000 tons of seafood products from fisheries and aquaculture with a total export value of USD 9

billion. This is an increase of 17% compared to the export value in 2012 (Norwegian Seafood Council, 2014). These figures indicate that in 2013, 31 million meals were exported on a daily basis. Fisheries and aquaculture production is year-round, albeit with some seasonal variations, particularly for capture fisheries. Even though approximately 95% of Norway's total seafood production is exported, the domestic market is still important to the national fisheries industry, as reflected in the high Norwegian consumption levels of fish and fish-related products. In factual terms, the domestic production of fish and other seafood products, such as crustaceans, would be able to substitute most of the currently imported animal proteins.

CHAPTER 2: Drivers of change

Proposed structure of the chapter and information to be included in the Country Reports

This Chapter provides an assessment of the major drivers causing changes (drivers list and descriptions provided in Annex 3), either positive or negative, on the state of biodiversity for food and agriculture in the country, with specific attention to changes in the associated biodiversity in and around production systems, ecosystem services and wild foods. This Chapter also encourages countries to compare drivers between different production systems.

The Chapter will address the following topics related to drivers of change in biodiversity for food and agriculture:

- The effects of drivers and stressors over the past ten years on a) associated biodiversity, b) ecosystem services and c) wild foods;
- Impacts of drivers on the involvement of women in the maintenance and use of biodiversity for food and agriculture, the application and preservation of traditional knowledge, and rural poverty alleviation;
- Countermeasures addressing current and emerging drivers, best practices and lessons learned.

The Country Report should include information or reference to any specific studies that have been carried out in the last ten or so years that relate observed changes in the extent or distribution of associated biodiversity and wild foods in the country to different drivers.

IMPORTANT: Throughout these guidelines, questions on production systems will refer to the production systems identified in Table 1 as present in your country.

One of the main objectives of this report is to identify knowledge gaps and to provide baseline information for future assessments. Thus please indicate where information is unavailable.

Effects of drivers of change on associated biodiversity

9. What have been the most important drivers affecting the extent and distribution of associated biodiversity in the last 10 years in your country? In describing the drivers you may wish to indicate the production systems where associated biodiversity is most affected and identify drivers that are common to the various components of associated biodiversity listed. Indicate where possible the indicators used to measure changes, along with the sources of information.

Since the retreat, about 12,000 years ago, of the glaciers covering virtually the total area of Norway, continued species immigration and succession have been shaping the country's natural environment. Norway's physical-geographical conditions (i.e topography and climate) have, to a large degree, determined the country's landscapes and its habitat types, thereby influencing the extent and distribution of associated biodiversity.

AGRICULTURAL HABITATS

1. Land use change
Land use change is considered to be the main threat to associated biodiversity species in agricultural landscapes. This can include:
a. farming intensification, including ploughing (inappropriate timing can lead to soil erosion), the sustained application of manure and fertilizers, the use of pesticides and herbicides and poor drainage (poorly drained land will easily become waterlogged and prone to surface run-off), as well as changes in the use of field boundaries and border zones. From a biodiversity perspective, the many elements in the surroundings of farmed land (and specifically intensively farmed land), such as habitat islands in the

fields, open field boundaries and road verges, small remnants of unfertilized grassland vegetation, ditches, streams, farm ponds and large, solitary trees may be the last refuges for many species of plants and animals. Many threatened or near threatened species occur in areas that have been or are strongly affected by human activities, particularly farming. Of these areas, meadows, pastures and rough grazing are the most important with 741 species (20% of all threatened and near threatened species), with the dominating species being beetles, fungi, butterflies, moths and vascular plants. More intensively worked farmland, like arable land and sown grassland, are important habitats for 119 threatened and/or near threatened species. Areas of constructed grounds like farmyards, residential areas including gardens and parks, sports grounds, industrial areas, sand and gravel pits, and roads also have their particular threatened or near threatened species (246 species). About 20 of these species are found almost exclusively in such areas (Kålås et al., 2010).
b. abandonment of farming (grazing and haymaking) on more marginal farmland leading to forest succession has affected about 400 threatened and near threatened species (Kålås et al., 2010). Over the last fifty years agriculture has undergone a transition from combined plant- and livestock production practiced all over the country to more specialized productions, both at farm level and between different regions. In this process production-efficiency has increased by almost 70%, while the input of manpower has been reduced by almost 80%. The number of active farmers has declined steadily and less productive and inaccessible farmland is no longer actively managed. With the general economic development of the country, led by increasing oil-related activities, costs in other sectors of the economy such as agriculture have risen to unsustainable levels. This has led to farm exits, particularly of smaller farms. However, the abandonment of farming is also linked to other factors (Storm & Mittenzwei, 2013);
c. habitat fragmentation: when areas become overgrown due to the lack of grazing, there may be considerable distances between patches of adequate habitat for species that depend on semi-natural grassland. It makes exchange of genetic material between different habitat patches more difficult which, in turn, may have consequences for the genetic diversity within species. The distance between habitat patches is of great importance for reestablishment in an area if a population dies out; and
d. construction: farmland is taken over for urban expansion. The best farmland is often situated in the most fertile lowlands where population and development pressures are also the highest.

2. Pollution
Pollution is the second largest threatening factor to Norway's red-listed species. It includes:
a. indirect fertilisation through long-transported nutrients by both water and air, especially nitrogen (in certain cases, direct fertilisation of semi-natural grassland is avoided to preserve species-richness): enhanced nitrogen deposits leads to changes in the vegetation which are negative for species that depend upon habitats found on nitrogen-poor land; and
b. spraying of biocides has a negative impact on some threatened and near threatened species.
c. the application of pesticides is expected to have an impact on associated-biodiversity in agricultural habitats, such as pollinators. However, a thorough evaluation on the full extent of this impact is currently not available.

3. Climate change
Similar to pollution, climate change is thought to pose a risk to approximately 6% of Norway's red-listed agricultural habitat related species. Climate change is likely to become a more important threat in the future. Particularly, the variable onset of growing seasons, with periods of freezing and thawing, could cause problems both to crops and associated biodiversity.

4. Alien species
There is limited information on the extent to which alien affect native species in Norway, including associated biodiversity species that occur in agricultural habitats (Gederaas et al., 2012). However, with the expanding dispersal of alien species, the need to better understand their possible effects on biodiversity for food and agriculture is increasing. The main factors causing the enhanced dispersal of alien species include:
a. increasing international trade (globalization). This has lead, inter alia, to the extension of road and water networks, resulting in an increased transportation of people and goods over national borders. Changes in trade regulation regime might also contribute to an increasing dispersal of alien species: In line with the European Economic Area (EEA)-agreement, Norwegian food legislation is harmonized with the European Union and Norway is obliged to follow the EU legislation on the food and veterinary area;
b. uncritical planting, leading to the dispersal of undesirable species;
c. the abandonment of farmland and subsequent succession processes in the agricultural landscape, giving alien species better opportunities to become established; and
e. changing climatic conditions (rising temperatures in particular) are expected to improve the survival rate of alien species.

5. Collecting:
- Collecting can be a threat to rare species of associated biodiversity that are relatively easy for collectors to find. This could contribute to the disappearance of small, residual populations of a species. Especially rare plants are at risk, as are butterflies, which are particular popular collecting items. Overall, most insects are relatively well protected from collecting, as they are often difficult to find. Moreover, insects may have large populations and thus the potential for reproduction, as long as their habitat remains intact (Schartau et al., 2010).
- Illegal egg-collecting: Egg collecting is an old tradition in Norway, both for supplementary food and for collecting as “scientific” material. This was also a relatively common hobby until the end of the 1960s. Although not necessarily harmless, this was hardly systematic, and was no great threat to most threatened bird species. Today’s illegal egg-collecting is far more systematic

and is a direct threat to many species, particularly to wading bird species. Norway, and especially Finnmark, is a popular target for Norwegian and foreign egg collectors. Eggs from bird species such as Lesser White-fronted Goose, Gyr Falcon, Broadbilled Sandpiper, Long-tailed Skua, White-tailed Eagle, Golden Eagle, Red-throated Pipit and Temminck's Stint, as well as from many common species, were among the confiscated eggs. Most eggs are taken between 10 to 25 June (http://www.bioforsk.no/ikbViewer/Content/109429/Fuglekriminalitet_Engelsk.pdf).

6. Policies: Some agricultural policies, such as those that aim to increase agricultural production at reduced costs, may not be favorable to the distribution of associated biodiversity components. Other policies, including subsidies for small-scale farming, are on the other hand promoting biological processes that exist in and around their production system.

[Indicators: wild bees are good indicators of valuable agricultural habitats due to their demand for both nesting sites and suitable pollen-producing plants].

FORESTS
About 1840 (50%) of the threatened and near threatened species on the Red List are considered to have at least 20% of their occurrences in forests. The development of Norwegian forests is therefore of great importance for such species as a whole.

1. Land-use change leading to habitat disturbance
Forestry can have negative effects on the extent and distribution of red-listed species of associated biodiversity, but such effects are usually at a local level. In recent years, action has been undertaken to reduce negative impacts on red-listed species, by for example, avoiding or customizing logging in areas that are of particular importance to them. While approximately half of the threatened and near threatened red-listed species in Norway live in forests, there is no indication that the status of these species has deteriorated between 2006 and 2010. As part of the country's sustainable forest management approach, many initiatives have been undertaken that have had/have a positive effect on the diversity of associated biodiversity components in forests (e.g. the increasing volume of standing and lying dead wood has contributed to securing the habitat for a number of associated biodiversity species, including for microorganisms such as saprophytes). There are also examples of species that are associated with managed forests. For example, several bird species depend on spruce plantations in areas that were not naturally colonized by spruce.

a. Felling:
- Generally speaking, felling trees and removing them changes the structure and composition of forests, as well as the local climatic conditions, thereby affecting the habitat of forest associated biodiversity. However, Norway's sustainable forest management aims to keep such effects localized and limited. The Norwegian forest environment is dynamic and the felling of trees is managed in such a way that the country has forests of all dimensions and age classes (e.g. a large share of today's "older" forests were newly planted following felling, storm felling or fire). Statistics from the National Forest Inventory show an increasing volume of trees in all dimensions and age classes for the main types of forest, spruce, pine and deciduous forests. The area of forests with trees of over 100 years old has, for example, increased between 5 to 10% over the past ten years.
- A large and specialised diversity of species, particularly insects and fungi, live by degrading dead wood and around a third of the red-listed species in forests are attached to dead trees. Various important environmental measures have been taken in forestry over the past twenty years and measurements in the last few years show that the amount of dead wood in Norwegian forests is steadily increasing. The National Forest Inventory estimates that the current volume of dead wood in Norway varies between 80 and 100 million m3. It also shows that the amount of dead wood is increasing by more than 3 million m3 per year. This could be of positive influence on the status of many red-listed species in forests.
b. Changing density of forests: where selection felling has shifted to clear felling (which is when nearly all the trees in the felled area are removed), the density of forests has increased. This might have a local impact on red-listed species that have a preference for open forests, including certain lichen and insects. However, the shift towards clear felling is not the only reason for denser Norwegian forests, nor is this phenomenon only taking place at the local level.
c. Changing grazing patterns: There has been a significant decline in domestic livestock grazing in forests in Norway in the past 50 years. At the same time, grazing by wild ungulates (red deer, moose and roe deer) increased. The new grazing regime, where leaf and twig eaters rather than grass eaters have become predominant, has changed the competitive relationships between species living on the forest floor. In addition, the rise in the populations of moose has enhanced pressure on the regeneration of deciduous trees, particular aspen, rowan and goat willow, which are important tree species for many red-listed species in coniferous forests. The grazing pressure of wild ungulates on the ground vegetation may also, in some places, affect the plant cover and the occurrence and diversity of animals that live there. A study of the effect of moose grazing revealed the largest diversity of ground beetles where grazing pressure was moderate.
d. Building of roads, along with housing and commercial and industrial developments affects a small proportion of the forest area. This includes the construction of (farm)roads for the transportation of timber. However, at the same time, such roads contribute to strengthening the use of renewable forest resources that are embedded in a sustainable forest management strategy.

2. Pollution
Pollution is reported to be a threat for around 5 % of the threatened and near threatened species in forests.
With respect to long-transported air pollution, concentrations of SO2 in the precipitation have decreased substantially in recent

years, but nitrogen input is still high. Mycorrhizal fungi in forests (not in agricultural habitats) are particularly sensitive to high nitrogen inputs.

3. Climate change
Knowledge on the effects of climate change on associated biodiversity in forests is still very limited, which may explain why only around 1 % of the threatened and near threatened species in forests are reported to be threatened by climate change. The impacts of climate change on both forest trees and associated biodiversity are likely to increase in the future due to the unstable onset of spring and better conditions for pest species.

4. Alien species
Species which are introduced into Norway by human activity are reported to threaten only eight of the threatened and near threatened species in forests. However, in the absence of an exhaustive assessment of alien species in forest habitats, these figures could be underestimated.

MARINE AND FRESHWATER ENVIRONMENT
Only about 3% (88 species) of all threatened and near threatened species occur in the marine environment. Most of these are molluscs (24 species), followed by fish (13), birds (13, or 25% of the 52 breeding species of birds present in the marine environment), algae (12) and crustaceans (8).

The impact factors on the majority of threatened or near threatened marine species are:

1. Land-use changes
- Human activities, like dredging in shore zones and construction of marinas, roads and leisure facilities alter the habitat of marine associated species, affecting recruitment, growth, food supply and the need for protection. Particularly algae and invertebrate species are affected by such interventions.
- Fishing with bottom otter trawls and the construction of seabed installations have an impact on the species rich seabed, which is, among other, important as feeding and growing up area for many species of dermal fish. Nevertheless, the effects on different types of habitats are often ambiguous.

2. Pollution
- Pollution and eutrophication (excessive input of nutrients) are considered to have an impact on 17 of the threatened and near threatened marine related species. Eutrophication is mostly a problem in isolated coastal and fjord areas close to densely populated areas or areas with intensive farming. These areas usually also have to deal with long-transported nutrients from the Baltic Sea and the southern North Sea. Norway's northern areas have problems with pollutants that are transported over long distances by air and with ocean currents. These pollutants enter the Arctic food chains, ending up in seabirds, seals (Phocidae) and polar bears.
- Natural acidification of freshwater has been taking place since the last ice age. Over the last century, mainly as the result of industrial and power generation activities across Europe, the acidification rate of many of the lakes and rivers has considerably increased. Some of the factors affecting freshwater acidity are related to changing land-use practices, such as the use of nitrogen fertiliser, increased drainage and the wet deposition of sulphuric and nitric acids. As a result of freshwater acidification, many algal, as well as soft-bodied species, such as leeches, snails and crayfish disappear, while other species such as dragonfly larvae, water beetle and bloodworms can grow abnormally large in population size in the absence of their competitors. As to freshwater fish, while pike and eel have shown to be relatively resistant, salmon, trout and roach at all life stages are very much at risk from freshwater acidification.
- “New” pollutants with potentially severe and complex impacts are also continuously being discovered.

3. Harvesting
Harvesting is of direct significance to fish and mammals. While excessive harvesting is no longer a problem for commercially exploited species, overfishing may have a significant effect on fish-eating seabirds. In addition, seabirds may drown in nets and inflict other injuries caused by fishing gear. An inadvertent effect of fishing is what is called ”ghost fishing”, where gear that is lost continues to fish for months or years.

4. Climate change
Climate change is considered to be a threat to just a few marine associated species. However, great uncertainty is attached to the scale and extent of climatic effects on marine ecosystems. British scientists suggest that a rise of about 4°C in the summer temperature will cause all the major species of seaweed to go extinct from large parts of southern Norway, which would have fatal consequences for the kelp forest. Sugar kelp is already declining in the Skagerrak due to rising temperatures.

5. Alien species
Over the past 30 years, the introduction and spread of alien species increased considerably, mainly due to the steady increase in shipping between different harbours, using faster and more ships that empty their ballast water with reduced time intervals. In Norway, problems related to the spreading of alien species have so far been limited on the whole, but several species have significantly increased their range. One example is the Japanese wireweed (Sargassum muticum) in southern Norway and

another is the red king crab (Paralithodes camtschaticus) in Finnmark. Both these species have spread from neighbouring countries to which they were originally introduced.

DIVERSITY OF WILD FOODS AND RECREATIONAL USE
In the past 10 to 20 years, several programmes have been established by the Ministry of Agriculture and Food to enhance the development and production of niche food products. Especially among women trying to create supplementary farm income, the interest in using wild food resources available in- and around farmland for commercial small-scale production (i.e. through the production of regional food specialties) has grown. (White paper Nr.9). At the Nordic level, niche products promoting programmes have also been developed.

REFERENCES:
- Schartau et al. (2010)
The Norwegian Biodiversity Information Centre began to compile information on environmental conditions and impacts on Red List species in different types of environment in 2007. This material was published as web articles from 2008 to 2010, which were updated with data derived from The 2010 Norwegian Red List for Species.
- CBD (2009)
- Ministry of Trade, Industry and Fisheries, 2014

10. Where associated biodiversity is believed to be affected by climate change, please provide additional information on the nature, severity and frequency of the climate threat and the production systems impacted.

Climate change has already had effects in Norway. As temperatures rise on land, in freshwater and in the sea, production and reproduction rates have increased (the growing season is already two to three weeks longer than it was in the 1980s, leading, inter alia, to an increase in the abundance of certain types of mosses and lichens in Norwegian forests); trees are coming into leaf earlier; salmonids leaving rivers for the sea are younger; and the spawning areas used by fish in the sea are changing (Norwegian Environment Agency, 2013).

The Norwegian Biodiversity Information Centre (NBIC) estimates that climate change is affecting 117 or 3% of the threatened and near threatened species listed on Norway's 2010 Red List, the majority of which are vascular plants, followed by bryophytes and lichens. Half of these species are found in arctic and alpine habitats. Only a relatively small number of associated biodiversity species present in agricultural land, forests and marine environments is believed to be affected by climate change. In agricultural habitats, for example, approximately 6% of Norway's red-listed species are thought to be at risk of climate change. At present, as the information on climate change and on its possible impacts on different habitats and species is limited, any relevant figures and data should be interpreted with caution.

With the annual mean temperature in Norway being estimated to rise between 2.3 to 4.6 degrees by the end of this century, ecological transformations of an unprecedented scale since the end of the last ice age are expected to bring a wide range of changes to species and ecosystems (Norwegian Ministry of Climate and Environment, 2014). According to regional and local climate scenarios developed for Norway, future climate change is expected to have an effect on all habitat types, including on the species they shelter. Such scenarios, inter alia, assume that rising temperatures will increase the length of growing seasons by one to two months in most lowland areas, and by two to four months in most high-mountain areas. Changes like these could be favorable to Norway's agricultural productivity. However, the precise effects will be determined by complex ecological interactions (e.g. milder climates are at the same time expected to create more suitable conditions for a number of alien species, which are an important threat to biodiversity), as well as by the combination of climate change with other factors, such as overgrowing of open habitats, construction and development, and pollution (Norwegian Environment Agency, 2013).

With a milder climate and longer growing season, the volume of standing wood in Norwegian forests is expected to increase more rapidly. The total area of forest is also expected to rise, and there will be a larger proportion of tree species that thrive well in warmer climates. Trees may become more vulnerable to insect and fungal pests as the mean temperature rises and rainfall and snowfall patterns change (Norwegian Environment Agency, 2013). In forests, many species with a southerly and south-westerly distribution are expected to get better conditions, whereas the few that are confined to the northernmost forests in Norway will get poorer conditions.
The northern birch forests are not particularly rich in associated species, nor do they have many Red List species, but they are a characteristic type of forest for the Nordic countries. These forests are attacked by the larvae of Geometrid moths at a 10-year interval approximately. Serious attacks lead to the forest dying and being renewed over large areas. Climate change may increase the frequency and location of these attacks, which could significantly affect birch tree populations and their associated biodiversity.

With respect to pollinators, climate change could have an impact on population densities and species composition, as well as phenological or spatial mismatches, which could be of influence on the interaction between plants and pollinators (Hegland et al., 2009).

Increasingly humid autumns, milder winters and longer growing seasons could also result into a rising number of pests and diseases. The expected changing climatic and environmental conditions could be suitable for the establishment of "new" pests, as well as of pests that might have been present in Norway previously, but did not find the appropriate conditions to establish themselves at the time. In more general terms, a milder climate is expected to make conditions more suitable for a number of alien species, making it easier for them to survive, spread and become established in Norway. Worldwide, invasive alien species are considered to be the second most important threat to biodiversity, behind land-use change. Steps to prevent the spread of such species will therefore be vital as the Norwegian climate changes (Norwegian Environment Agency, 2013).

In marine areas, rising temperatures may cause ”threshold species” (species that have been introduced into neighbouring countries and are causing problems there) to spread to Norway. An alien species that has recently reached the Skagerrak coast of Norway is the Pacific cupped oyster (Crassostrea gigas), which has spread rapidly and out of control in the Wadden Sea, and Danish and Swedish west-coast waters in recent years.

Effects of drivers of change on biodiversity for food and agriculture

This section applies to all biodiversity for food and agriculture. Countries that previously presented or are currently preparing a Country Report on Forest, Aquatic, Animal or Plant Genetic Resources, may wish to use these reports as reference.

11. For each production system present in your country as indicated in Table 1, fill in the code and name of each production system in Table 4 (repeat Table for each production system). For each production system indicate which drivers have been influencing biodiversity for food and agriculture, disaggregated by sector, during the past 10 years (description of drivers can be found in Annex 3). Drivers may have a strongly positive (2), positive (1), negative (-1), and strongly negative effect (-2), or no effect at all (0) on biodiversity for food and agriculture. If the effect of the driver is unknown or not applicable, please indicate not known (NK) or not applicable (NA).

Table 4. Effect of drivers on sector biodiversity within production systems in the country, by animal (AnGR), plant (PGR), aquatic (AqGR) and forest (FGR) genetic resources.

Production systems	**Drivers**	**Effect of drivers on sector biodiversity for food and agriculture** (2, 1, 0,-1, -2, NK, NA)			
	(Place pointer on the driver name for a detailed description)	PGR	FGR	AnGR	AqGR
Livestock grassland-based systems: Boreal and /or highlands	Changes in land and water use and management	-1	-1	-1	NA
	Pollution and external inputs	-1	-1	NK	NA
	Over-exploitation and overharvesting	NA	NA	NA	NA
	Climate change	0/+1	0	0	NA
	Natural disasters	-1/0	0	-1/0	NA
	Pests, diseases, alien invasive species	0	-1	0	NA
	Markets, trade and the private sector	0	0	-1/0	NA
	Policies	1	1	1	NA
	Population growth and urbanization	-1/0	-1/0	-1/0	NA
	Changing economic, socio-political, and cultural factors	-1	-1	-1	NA
	Advancements and innovations in science and technology	1	1	1	NA
	Other [*please specify*]: "indirect" policies favouring the protection of wildlife, including predators of sheep grazing in outlying pastures	0	0	-1	NA

Self-recruiting capture fisheries: Boreal and /or highlands	Changes in land and water use and management	NA	NA	NA	-1
	Pollution and external inputs	NA	NA	NA	-1
	Over-exploitation and overharvesting	NA	NA	NA	0
	Climate change	NA	NA	NA	-1
	Natural disasters	NA	NA	NA	0/-1
	Pests, diseases, alien invasive species	NA	NA	NA	-1
	Markets, trade and the private sector	NA	NA	NA	-1/0
	Policies	NA	NA	NA	-1/1
	Population growth and urbanization	NA	NA	NA	-1/0
	Changing economic, socio-political, and cultural factors	NA	NA	NA	-1
	Advancements and innovations in science and technology	NA	NA	NA	1
	Other [*please specify*]:	NA	NA	NA	NA
Fed aquaculture: Boreal and / or highlands	Changes in land and water use and management	NA	NA	NA	-1
	Pollution and external inputs	NA	NA	NA	-1
	Over-exploitation and overharvesting	NA	NA	NA	0
	Climate change	NA	NA	NA	-1
	Natural disasters	0	0	0	0
	Pests, diseases, alien invasive species	NA	NA	NA	-1
	Markets, trade and the private sector	NA	NA	NA	1
	Policies	NA	NA	NA	1
	Population growth and urbanization	NA	NA	NA	0
	Changing economic, socio-political, and cultural factors	NA	NA	NA	-1
	Advancements and innovations in science and technology	NA	NA	NA	1
	Other [*please specify*]: farmed fish (in particular salmon) that escapes and mates with wild fish	NA	NA	NA	-1
Rainfed crops : Boreal and /or highlands	Changes in land and water use and management	-1	NA	NA	NA
	Pollution and external inputs	-1	NA	NA	NA
	Over-exploitation and overharvesting	0	NA	NA	NA
	Climate change	-1/1	NA	NA	NA
	Natural disasters	0	NA	NA	NA
	Pests, diseases, alien invasive species	-1	NA	NA	NA
	Markets, trade and the private sector	-1	NA	NA	NA

	Policies	1	NA	NA	NA
	Population growth and urbanization	-1	NA	NA	NA
	Changing economic, socio-political, and cultural factors	-1	NA	NA	NA
	Advancements and innovations in science and technology	1	NA	NA	NA
	Other [*please specify*]: Declining number of pollinators (in particular bumble bees and honey bees, the latter decreased by 40% over the last decade)	-1	NA	NA	NA
Mixed systems (livestock, crop, forest and /or aquatic and fisheries): Boreal and /or highlands	Changes in land and water use and management	0	1	0	NA
	Pollution and external inputs	-1	0	0	NA
	Over-exploitation and overharvesting	0	0	0	NA
	Climate change	0	0	0	NA
	Natural disasters	0	0	0	0
	Pests, diseases, alien invasive species	-1	0	0	NA
	Markets, trade and the private sector	0	0	0	NA
	Policies	1	1	1	NA
	Population growth and urbanization	0	0	0	NA
	Changing economic, socio-political, and cultural factors	0	0	0	NA
	Advancements and innovations in science and technology	1	1	1	NA
	Other [*please specify*]:				
Semi-natural forests: Boreal	Changes in land and water use and management	NA	1	NA	NA
	Pollution and external inputs	NA	-1	NA	NA
	Over-exploitation and overharvesting	NA	0	NA	NA
	Climate change	NA	-1/0	NA	NA
	Natural disasters	0	0	0	0
	Pests, diseases, alien invasive species	NA	-1	NA	NA
	Markets, trade and the private sector	NA	0	NA	NA
	Policies	NA	1	NA	NA
	Population growth and urbanization	NA	0	NA	NA
	Changing economic, socio-political, and cultural factors	NA	1	NA	NA
	Advancements and innovations in science and technology	NA	1	NA	NA

	Other [*please specify*]:	- The building of roads (-1; affects a small proportion of the forest area) - Overgrowing of abandoned cultivated land results in new forest (+1 effect) NOTE: Additional information is provided in Annex I to this questionnaire	NA	-1/1	NA	NA

Effects of drivers of change on associated biodiversity

12. What have been the main drivers affecting regulating and supporting ecosystem services in the country during the last 10 years? Describe, for each production system, the major driver(s) affecting ecosystem services and indicate the effect on ecosystem services as being strongly positive (2), positive (1), negative (-), strongly negative (-2), no effect (0), not known (NK), or not applicable (NA) in Table 5 (repeat table for each production system). Place pointer on the ecosystem service name for a detailed description.

Table 5. Major drivers and their effect on ecosystem services in production systems.

Production systems	**Drivers**	**Effect of drivers on ecosystem services** (2, 1, 0,-1, -2, NK, NA) (Place pointer on the ecosystem service name for a detailed description)								
	(Place pointer on the driver name for a detailed description)	Pollination	Pest and disease regulation	Water purification and waste treatment	Natural hazard regulation	Nutrient cycling	Soil formation and protection	Water cycling	Habitat provisioning	Production of oxygen/ Gas regulation
Livestock grassland-based systems: Boreal and /or highlands	Changes in land and water use and management	-1	NK	NK	NK	NK	-1	NK	-1	NK
	Pollution and external inputs	-1	0	0	NK	NK	NK	NK	-1	NK
	Over-exploitation and overharvesting	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Climate change	-1	NK	NK	NK	NK	NK	NK	0	NK
	Natural disasters	NK	NK	NK	NK	NK	NK	NK	-1	NK
	Pests, diseases, alien invasive species	-1	NA	0	0	0	0	0	0	0
	Markets, trade and the private sector	NK	0	NK	NK	NK	NK	NK	NK	NK
	Policies	-1	0	0	1	0	0	0	1	0
	Population growth and urbanization	-1	0	0	0	0	0	0	0	0
	Changing economic, socio-political, and cultural factors	-1	0	0	0	0	0	0	0	0
	Advancements and innovations in science and technology	1	NK	NK	NK	NK	NK	NK	1	NK

	Other [*please specify*]:									
Self-recruiting capture fisheries: Boreal and /or highlands	Changes in land and water use and management	NA	NK	NK	NK	NK	NA	NK	-1	NK
	Pollution and external inputs	NA	NK	-1	NK	NK	NA	NK	NK	NK
	Over-exploitation and overharvesting	NA	NK	NK	NK	NK	NA	NK	NK	NK
	Climate change	NA	-1	NK	NK	NK	NA	NK	-1	NK
	Natural disasters	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Pests, diseases, alien invasive species	NA	NA	NK	NK	NK	NA	NK	NK	NK
	Markets, trade and the private sector	NA	NK	NK	NK	NK	NA	NK	NK	NK
	Policies	NA	NK	NK	NA	NK	NA	NK	+1	NK
	Population growth and urbanization	NA	NK	NK	NK	NK	NA	NK	NK	NK
	Changing economic, socio-political, and cultural factors	NA	NK	NK	NK	NK	NA	NK	NK	NK
	Advancements and innovations in science and technology	NA	NK	NK	NA	NK	NA	NK	+1	+1
	Other [*please specify*]: Acidification	NA	-1	-1	-1	NA	NA	-1	-1	-1
Fed aquaculture: Boreal and /or highlands	Changes in land and water use and management	NA	-1	NK	NK	-1	NA	NK	-1	NK
	Pollution and external inputs	NA	NK	-1	NK	NK	NA	NK	NA	NK
	Over-exploitation and overharvesting	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Climate change	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Natural disasters	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Pests, diseases, alien invasive species	NA	NA	-1	NA	NK	NA	NK	NA	NK
	Markets, trade and the private sector	NA	-1	-1	NA	NA	NA	NA	NA	NA
	Policies	NA	-1/1	-1/1	NA	NA	NA	NA	-1	NK
	Population growth and urbanization	NA	NK	NK	NK	NK	NA	NK	NK	NK
	Changing economic, socio-political, and cultural factors	NA	NK	NK	NK	NK	NA	NK	NK	NK
	Advancements and innovations in science and technology	NA	1	1	NA	1	NA	1	1	1
	Other [*please specify*]: Acidification	NA	-1	-1	-1	NA	NA	-1	-1	-1
Rainfed crops : Boreal and /or highlands	Changes in land and water use and management	-1	-1	0	0/-1	-1	-1	-1	-1	0
	Pollution and external inputs	-1	-1	-1	0	-1	-1	-1	-1	0
	Over-exploitation and overharvesting	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Climate change	-1	-1	0	0	0	0	0	0	0
	Natural disasters	0	0	0	0	0	0	0	0	0
	Pests, diseases, alien invasive species	-1	NA	0	0	0	0	0	0	0
	Markets, trade and the private sector	0	-1	0	0	0	0	0	0	0

	Policies	-1/0	1	0	0	0	0	0/1	1	0
	Population growth and urbanization	0	0	0	0	0	0	0	0	0
	Changing economic, socio-political, and cultural factors	0	0	0	0	0	0	0	0	0
	Advancements and innovations in science and technology	1	1	1	0	0	0/1	1	1	0
	Other [*please specify*]:									
Mixed systems (livestock, crop, forest and /or aquatic and fisheries): Boreal and /or highlands	Changes in land and water use and management	-1	-1	-1/1	NA	-1	-1	NK	-1	NA
	Pollution and external inputs	-1	-1	0	NA	-1	-1	-1	-1	-1
	Over-exploitation and overharvesting	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Climate change	NK	-1	0	NA	1	NK	NK	NK	NA
	Natural disasters	0	0	0	NA	0	0	0	0	0
	Pests, diseases, alien invasive species	-1	NA	0	NA	0	0	0	0	0
	Markets, trade and the private sector	-1/0	-1	0	NA	NK	-1	-1	-1	NA
	Policies	-1/0	-1/1	-1/1	NA	-1/1	-1/0	-1/1	-1/1	NA
	Population growth and urbanization	NK	NK	0	NA	NK	-1	-1	-1	NA
	Changing economic, socio-political, and cultural factors	-1	-1/1	-1/1	NA	-1/1	-1/0	-1/1	-1/1	NA
	Advancements and innovations in science and technology	NK	1	1	NA	1	1	1	NA	NA
	Other [*please specify*]:									
Semi-natural forests: Borea	Changes in land and water use and management	0/1	0/1	0/1	1	0/1	0/1	1	1	1
	Pollution and external inputs	0	0	0	0	0	0	0	0	0
	Over-exploitation and overharvesting	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Climate change	-1	-1	0	0	0	0	0	0	0
	Natural disasters	0	0	0	0	0	0	0	0	0
	Pests, diseases, alien invasive species	-1	NA	0	0	0	0	0	-1	0
	Markets, trade and the private sector	0	-1	0	0	0	0	0	0	0
	Policies	-1/0	1	0	0/1	1	1	1	1	1
	Population growth and urbanization	0	0	0	0	0	0	0	0	0
	Changing economic, socio-political, and cultural factors	0	0	0	0	0	0	0	0	0
	Advancements and innovations in science and technology	1	1	1	0	0	0/1	1	1	1
	Other [*please specify*]:									

13. Briefly describe the main driver(s) affecting ecosystem services in each production system, as identified in Table 5. Include where possible a description of the components of associated biodiversity that are affected, the indicators used to measure change, and the source of information.

This text box is non-expandable. Relevant information is provided in Annex I to this questionnaire.

Effects of drivers of change on wild foods

14. What were the main drivers affecting the availability, knowledge and diversity of wild foods during the last ten years in the country? In Table 6, indicate the major drivers affecting availability, knowledge and diversity of wild foods, and if the effects are strongly positive (2), positive (1), negative (-1), strongly negative (-2), no effect (0), not known (NK), or not applicable (NA).

Table 6. Drivers affecting availability, knowledge and diversity of wild foods.

Drivers	**Effect of drivers** (2, 1, 0,-1, -2, NK, NA)		
(Place pointer on the driver name for a detailed description)	Availability of wild foods	Knowledge of wild foods	Diversity of wild food
Changes in land and water use and management	-1	0	-1
Pollution and external inputs	-1	0	-1
Over-exploitation and overharvesting	-2	1	-2
Climate change	-1	0	-1
Natural disasters	0	0	0
Pests, diseases, alien invasive species	-1	0	0
Markets, trade and the private sector	0	0	0
Policies	1	1	0
Population growth and urbanization	1	-1	0
Changing economic, socio-political, and cultural factors	1	-1	0
Advancements and innovations in science and technology	0	0	0
Other [*please specify*]: Poor management of fish stocks in lakes have led to suboptimal harvesting (too many small fish were captured)	-1	1	-1

15. Briefly describe the main drivers affecting the availability, diversity and knowledge of wild foods in your country, as identified in Table 6. Include where possible indicators used to measure change, along with the source of information.

Overall, the availability and diversity of wild foods in Norway are not estimated to be under any major threat. Over-harvesting, for example, is believed to affect only a few very rare wild food types. There are however a few examples of wild food species that are threatened by pests and diseases. E.g. The European crayfish (Astacus astacus) is threatened by an introduced disease-causing fungus (Aphanomyces astaci); and, in the future, the canine tapeworm, that is spread by foxes and is quite dangerous to humans, may affect wild berry harvesting.

More common species like wild Atlantic salmon, lobsters, freshwater crayfish and deep water shrimp are in danger of over-exploitation from commercial and/or recreational harvesting.

With less (particularly younger) people being interested in harvesting wild foods, the knowledge of wild foods is believed to be declining, especially with respect to berry picking. The harvesting of fungi and medicinal and aromatic plants seems to be experiencing a rising trend. Hunting and fishing remain popular activities, even if the average age of hunters is increasing (SSB,

2012).

Effects of drivers of change on traditional knowledge, gender and rural livelihoods

In answering questions 16 to 18, describe the major drivers that have had an impact in the last 10 years and include where possible indicators used to measure change, and sources of information.

16. Which drivers have had the most significant effect on the involvement of women in the maintenance and use of biodiversity for food and agriculture?

CHANGING ECONOMIC, SOCIO-POLITICAL AND CULTURAL FACTORS:
Family farms of modest size are the backbone of Norwegian agriculture, resulting from a combination of regulations, unfavorable natural conditions that inhibit farm growth, concentrated farm ownership and support schemes that help keep smaller farms into business. Family farming is more than a simple profession, it's a way of life where both women and men are involved in decision making, as well as in undertaking practical tasks, including in relation to the maintenance and use of genetic resources. Family farming and distributed ownership also contribute to upkeep traditions and maintain knowledge of herbs, fruits and vegetables, domains in which women tend to play a prominent role.

To avoid the partitioning of agricultural land and preserve Norwegian farm culture, the inheritance of farms is regulated through the "Odelsrett", an ancient right in Norway by which the eldest child (whether a son or daughter) inherits the farm after his or her parent with the obligation to pay the other siblings their share of the estate. For children born before 1965, the eldest son would inherit the farm (only if there were no sons, the eldest surviving daughter would be the farm's heir). With the "Odelsrett" having become gender neutral (as of 1965), the number of women farmers slightly increased.

In the 20th Century, Norwegian agriculture was dominated by owner-occupied family farms, with full-time farmers getting their main income from combined dairy/sheep- and plant-production, often with forestry as an important part of the total farm income - or fisheries along the coast.
Historically the tendency over the last 50-60 years has been a ”masculinization” of larger family holdings, the wife seeking salaried employment outside the farm, while the husband ran the farm at an increased level of mechanization. Among small-holders, women were responsible for running the farm and tending the animals while the husband would work part-time outside the farm (forestry, fisheries, industry - including oil rigs.) While the number of small-holdings has been dramatically reduced, the proportion of women farmers is still the highest in smaller farm units, which have had the most to gain from agricultural policy measures promoting upkeep of rural areas. In the past decades, with rising education levels, there seems to be a tendency for men farmers to increase the share of time allocated to off-farm work (Bjørnsen & Johansen, 2006), possibly transferring the management of some of the daily farm activities to women in both small and larger holdings. In other words, with expanding job-opportunities, the ”small-holder pattern” seems to have become more common on larger holdings.

The rising interest of women in nature, the environment, animal welfare and life in the village might have contributed to an increase of women running farms, in particular organic farms (only half of the women organic farmers in Norway actually grew up on a farm). This trend is believed to be beneficial to the use and conservation of biodiversity for food and agriculture. In addition, research has shown that approximately 20% of the farmers selling products at farmer markets (Bondens Marked) are organic farmers (Flaten et al., 2007), 50% of which are women (Bjørkhaug, 2009).

POLICIES:
The government aims to increase the involvement of women in farming, and, as laid out in the Annual Agricultural Agreement, provisions are made to reach this goal. Until very recently, for example, special funds were allotted through the reindeer agreement to secure and increase the participation of women in reindeer farming activities and to ensure they have the opportunity to preserve and maintain traditional knowledge related to Sámi reindeer herding.

Generally speaking, the maintenance and use of biodiversity for food and agriculture is highly institutionalized with women having a strong position in this formalized system.

17. Which drivers have had the most significant effect on the maintenance and use of traditional knowledge relating to biodiversity for food and agriculture?

TRADITIONAL KNOWLEDGE

The Sámi are the indigenous people of Finland, Norway, Sweden and the Kola Peninsula in the north-western part of Russia. The Sámi settlement in Norway stretches from Finnmark County in the north to Hedmark County in the south with a total estimated Sámi population of around 50-65,000 (Nordisk ekspertgruppe, 2005). In the county of Finnmark the Sámi constitute a significant part of the total population, in particular in Inner-Finnmark, where they are in majority. The Sámi have been recognized as an indigenous people in Norway since 1990 (ILO Convention 169), and hence, according to international law, the

Sámi people in Norway are entitled special protection and rights. In addition, through the adoption of Article 110a of the Norwegian Constitution in 1988, the Norwegian authorities took on the responsibility to create the conditions enabling the Sámi people to preserve and develop their language, culture and way of life. In this respect, for example, Norwegian Nomadic Sámi are exempt from the requirement to pay a fishing fee as per Section 14 of Act No.14 of 9 June 1978 relating to reindeer husbandry.

As a Contracting Party to the Convention on Biological Diversity (CBD), Norway has taken on the responsibility to facilitate, as far as possible and as appropriate, the implementation of Article 8(j), pertaining to the preservation and maintenance of knowledge, innovations and practices of indigenous communities embodying traditional lifestyles relevant for the conservation and sustainable use of biological diversity, including biodiversity for food and agriculture.

In addition, Norway ratified the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization to the Convention on Biological Diversity (Nagoya Protocol) on October 1, 2013. The Norwegian delegation, including representatives from the Sámi Parliament, actively participated in the negotiations of the Nagoya Protocol until its adoption in October 2010. The Nagoya Protocol, which has entered into force on 12 October 2014, is a significant step in mainstreaming indigenous rights as a cross-cutting issue in international negotiations. Next to Article 12 of the Protocol, that specifically relates to traditional knowledge associated with genetic resources, Article 11 on transboundary cooperation is also highly relevant to the Sámi, whose population lives across four adjacent states.

White paper nr.42 (2000-2001) specifically addresses matters pertaining to biological diversity and it includes a specific section on biological diversity and Sámi. In section 8.3 of the paper, the government recognizes the importance to preserve and document traditional knowledge to maintain and provide the opportunity to develop Sámi culture. This knowledge, which is essentially held by older people and traditionally passed on to the next generation orally and through "learning by doing", can easily be lost during the rapid modernization that Sámi society is undergoing. Examples of such knowledge include the use of resources such as berries and plants in the outlying fields, as well as fish.
Municipal and regional authorities consider the preservation of traditional knowledge as a priority. They closely follow the work that is being undertaken by several projects to document and preserve traditional Sámi knowledge.

In addition, the Sámi Parliament (established in 1989), whose main objective is to protect Sámi cultural heritage and cultural environment to contribute to strengthening and continuing Sámi culture, the Sámi Act (stipulating the responsibilities and powers of the Sámi Parliament), Article 110a of the Norwegian Constitution (1988), as well as the Finnmark Act* (2005) all contribute to the maintenance and use of Sámi traditions.

*Finnmark Act: In 2005, Norway adopted the Finnmark Act, transferring about 95% of the area in Finnmark county to the inhabitants of Finnmark. The Act attempts to strengthen the Sámi rights by giving the entire population of Finnmark greater influence on the property in the county. While the Act does not cover fishing rights in saltwater, mining or oil rights, it has contributed to maintaining certain Sámi traditions, including reindeer herding.

TRADITIONAL FARMING

Traditional farming is not based on traditional knowledge as described in Article 8(j) of the CBD. It relates to less intensive and often small-scale (family) farms that promote the maintenance and use of traditional farming practices. Such farming practices tend to support the maintenance of soil fertility and of structural habitat complexity, thereby favoring species richness and the stable delivery of ecosystem services. Examples of traditional farming include, inter alia, the maintenance of coastal heathlands, species-rich meadows and a range of other semi-natural nature types that depends on traditional forms of harvesting and management.

With respect to traditional farming, there has been a trend in the past decades toward women farmers taking a leading role. While not documented, women farmers are perceived to favour traditional over "modern" farming, which is believed to be beneficial to the conservation and use of biodiversity for food and agriculture.

18. Which drivers have had the most significant effect on the role of biodiversity for food and agriculture in improving food security and sustainability?

Policies and programmes have been the main driver both behind promoting and negatively affecting the role of biodiversity for food and agriculture in improving food security and sustainability.

Agro-environmental policies and programmes mostly contribute to improving the maintenance and use of biodiversity for food and agriculture. In this respect, particularly the Regional Environment Programme (RMP), that is managed by the Norwegian Agricultural Authority* and was established in 2005 (White paper nr.70 (2002-2003), has been very effective. RMP is a central component in the national environmental efforts in agriculture. Through the provision of grants, the programme contributes to

increasing the sustainable performance of agriculture. Interesting provisions in this respect include agricultural grants for maintaining native livestock breeds (e.g. Telemark cattle; the old Norwegian spæl sheep and the Fjord horse) and for projects to prevent nutrient runoff from agricultural areas. Regarding the latter, USD 28 million was spent on projects like these in 2011 (Norwegian Ministry of Climate and Environment, 2014). While the decisions on the content of the RMP are taken at the County level, the priorities that have been set by the Ministry of Climate and Environment, such as those with respect to the species and habitats to conserve, are also taken into account. Support provided through the RMP has contributed, inter alia, to the conservation of unique cultural landscapes, including biodiverse pastures and the range of different species they are hosting, like for example salamanders.

Other examples of positive drivers with respect to biodiversity for food and agriculture, include, inter alia, subsidies in favour of organic farming and farm ponds establishing projects. Environmental subsidy schemes, such as those that promote the conservation of grasslands, of lichen pastures (reindeer farming) and of harvested forests, also contribute to safeguarding biodiversity of for food and agriculture.

* The Norwegian Agriculture Authority is the agency of the Norwegian Ministry of Agriculture and Food that is responsible of ensuring that all subsidy schemes and regulations are administered uniformly across the country and throughout the value chain. At present, Norway has about 100 different subsidy arrangements related to agriculture, including subsidies that are favorable to traditional farming and rural settlements (i.e. grazing related subsidies, livestock subsidies per farm and per head, including for farmers with small livestock populations). To receive subsidy payments, farmers have to meet well-defined requirements set forth by the government (i.e. fencing criteria, quality prerequisites for the area under their ownership, as well as obligations regarding their own contribution).

Countermeasures addressing current and emerging drivers of change, best practices and lessons learned

19. Referring to the information provided in this Chapter, identify countermeasures planned or in place to reduce adverse consequences of drivers on a) associated biodiversity, b) ecosystem services and c) wild foods. Provide any expected outcomes, lessons learned and best practices.

Countermeasures to reduce adverse consequences of drivers include targeted actions as well as monitoring programmes to guide such actions.

POLICIES/TOOLS
- A number of agri-environmental measures exist to reduce adverse consequences on, and promote the conservation and restoration of, valuable species and habitats in agricultural landscapes. Direct measures include environmental subsidies, such as those granted through the Regional Environment Programme (RMP) as mentioned in question 18. While the Species Map Service, Norway's Red lists for both species and habitat types and the Nature Index are examples of indirect measures, raising awareness on the need to conserve biodiversity through monitoring and evaluation. A more detailed description of these tools and instruments is provided in question 28.

The Nature Diversity Act also includes a significant number of provisions that are of great importance when it comes to reducing adverse impacts on biological, geological and landscape diversity. Among others, the Act contains a series of principles for official decision-making, such as the precautionary principle (i.e. if there is a risk of serious damage to biological, geological or landscape diversity, lack of knowledge shall not be used as a reason for postponing or not introducing management measures) and the user-pays principle (i.e. the costs associated with preventing or limiting any damage caused by a project to biological, geological and landscape diversity shall be borne by the project owner). The Act also includes a principle for species management, whereby harvesting and other removal of terrestrial invertebrates, plants and fungi occurring in the wild are permitted to the extent that they do not jeopardise the survival of the population concerned. A similar principle exists for marine organisms in the Marine Resources Act (Act of 6 June 2008 No. 37), as well as for the harvesting of wildlife (Act of 29 May 1981 No.38) and of salmonids and freshwater fish (Act of 15 May 1992 No.47) in the Wildlife Act.

In addition the Nature Diversity Act introduced two new important tools:
- Priority Species. Under this provision, the Government can among the most threatened species designate 'priority species' which then are given particular protection along with the habitat it lives in. The proper authorities can also initiate necessary management in its habitat; and
- Selected Habitat types. Endangered and vulnerable habitats can be designated as 'selected', to safeguard them through protection and sustainable use. The provisions function as governmental guidelines for priorities and coordination, and target both central government and local authorities and the private sector – regulating what can and what cannot be done within such habitat types. Also here, the proper authorities can initiate necessary management.
The County Governor contributes by ensuring that municipalities comply with the Nature Diversity Act and ensuring that

environmental considerations form the basis of municipal decision-making. In every municipality, surveys are carried out to establish the areas that are of most importance for preserving natural diversity.

- Acreage subsidies:
In line with current agricultural policy objectives, one of the main goals of acreage subsidies are to stimulate active farming throughout the country to upkeep, maintain and develop the cultural landscape, including its biodiversity.

- Forests: measures taken that contribute to reducing adverse effects on associated biodiversity, ecosystem services and wild foods, include:
a. The establishment of protective forest areas under the Forestry Act: protective forests are forests that should be treated with special care due to their location and characteristics. Timber harvesting is allowed, although with some restrictions. Protective forest areas mostly involve mountain forests that are located in a climatically vulnerable position. About 34% of the country's total forest area, and 22% of its productive forest area are classified as protective forest.
b. The establishment of protected forests as national parks, nature reserves and landscape protected areas under the Nature Conservation Act (2008): Approximately 6.1% of Norway’s total forest area, or 4.3% of its productive forest area, is classified as protected forest with forestry activities being more limited in landscape protected areas. When excluding landscape protected areas, these percentages are 4.1% and 2.8%, respectively (Tomter & Dalen, 2014; Miljødirektoratet, 2014; Skjeggedal et al., 2010).
c. Processes that have been developed to actively involve landowners in decision making processes related to the protection of forests. Under the so-called voluntary protection scheme (frivillig vern), a share of the 4.3% of Norway’s productive forest area that is classified as protected forest area is voluntarily proposed for protection by forest owners as a contribution to the conservation of biodiversity in Norwegian forests.
d. The inclusion of environmental measures in forestry related policies. It is acknowledged that forest ecosystems provide habitats to a large share of the country's diverse species and also recognizes that forestry activities can have negative effects on the environment. Therefore, different environmental considerations have been part of Norwegian forest policies for many years, including rules and regulations in the Forestry Act, provisions in subsidy regulations, environmental registration schemes and capacity building measure to ensure appropriate environmental knowledge in the forestry sector. In addition, the forestry sector had a national standard for sustainable forest management in Norway called Living Forests. The Living Forests Standard includes specific environmental requirements and actions that are of importance for forest management. This Standard is built into and maintained as part of Norway's Programme for the Endorsement of Forest Certification scheme (PEFC).

- The Svalbard Global Seed Vault preserves a wide variety of plant seeds that are duplicate samples, or "spare" copies, of seeds held in depositing gene banks worldwide. There are many national, regional and international seed collections and gene banks around the world whose primary function is to ensure genetic diversity in the agriculture sector. The Svalbard Seed Vault is a safety stock for these local deposits, which can be used to recreate valuable plant varieties whose seed collections in a local gene bank are lost.

- Water Management Regulations:
Under Norway's Water Management Regulations, which incorporate the EU Water Framework Directive into Norwegian law, targeted actions (through the environmental programmes) and assessments of the ecological status of inland waters (fresh waters) and coastal waters are being undertaken.

MONITORING PROGRAMMES/MAPPING

- In 1998, a programme was established to monitor the conditions and the performance of agricultural landscapes across the country. The so-called 3Q programme systematically monitors changes in agricultural landscapes and analyzes their effects on, for example, the distribution and number of habitat types that are of importance to biodiversity, including associated biodiversity for food and agriculture. In the framework of the 3Q programme ponds in agricultural landscapes were monitored. Many associated biodiversity species, including a variety of insects, amphibians and birds are associated with farm ponds. Maintaining and/or establishing farm ponds therefore directly contributes to their conservation. Farm ponds also provide support in the prevention of soil erosion, protect water quality by collecting and storing runoff water, provide water for livestock, fish, wildlife, and recreational activities, and add aesthetic value to the agricultural landscape. Through the 3Q programme, farm ponds and streams/rivers are being registered for approximately 1400 plots of 1km2 spread across the country. Hedmark, Oppland, Østfold, Akershus and South Trøndelag are among the counties with the greatest incidence of farm ponds recorded in the 3Q system. Analysis has shown that over the past five years, the number of farm ponds significantly increased in the Hedmark and Oppland counties. There is however a decline in the number of farm ponds in Østfold and Akershus (Norwegian Forest and Landscape Institute, 2011).

- Forests:
a. The "Environmental inventories in forests" project (Miljøregistrering i skog, MiS) is the response by Norway’s forestry sector to the conservation of environmental values in forests. The main target of this project, that is funded by the Ministry of Agriculture and Food, is to improve knowledge about the environmental values of forests, including in relation to biological diversity and cultural heritage, and to develop registration systems to identify and monitor forest areas that are particularly

valuable in this respect. In 2000, a registration tool was established to inform forest owners on areas of particular interest. In these areas, forest owners have voluntarily integrated the necessary environmental considerations into their management plans, mainly by ruling out logging. To date, MiS has mapped 80% of the forestry management planning area in Norway, 2 to 3% of which are classified as “particularly valuable” forest areas. The same habitats recorded in the forest planning process in managed forest, conducted by the Complementary Hotspot Inventory (CHI) method (Gjerde et al. 2007), are also monitored on all productive forest land by means of more than 9000 permanent plots of the National Forest Inventory. The MiS project also includes a dynamic mapping system with information on important biological areas in different districts across the country. More information on the project can be found (in Norwegian) at: http://www.skogoglandskap.no/temaer/miljoregistrering_i_skog
b. Since 1919, the National Forest Inventory has been undertaking forest resource assessments, measuring, inter alia, the amount of dead wood in Norwegian forests. The measurements in the last few years have shown that the amount of dead wood in Norwegian forests, which provide habitats to a broad range of forest associated species, is increasing.

- Soil mapping:
The Norwegian forest and landscape institute initiated soil surveys to document soil properties, including soil texture and the amount of organic matter, with the aim to securing arable land for food production, provide data to facilitate climate related planning and undertake risk assessments related to erosion and runoff from agricultural land. About 40km2 is surveyed annually, indicating the extent to which this process is time consuming. Soil surveys are also being undertaken in predetermined areas of the country to support the formulation of relevant policies and business strategies. Soil mapping provides the basis needed to identify trends in soil texture and health. At the same time, it contributes to raising awareness on the importance of soils as a fundamental natural resource that sustains life on earth.

- Terrestrial Ecosystems Monitoring Programme (TOV):
The main aim of the Monitoring Programme for Terrestrial Ecosystems is to detect both short- and long-term effects of climate change, long-range pollutants and other natural and anthropogenic impact factors on vegetation and fauna in common boreal and low alpine ecosystems (Framstad (red.), 2013).This program covers, inter alia, several biodiversity components in selected sites in high-elevation birch forests.

- CORINE Land Cover: The Norwegian Forest and Landscape Institute has produced land cover data covering Norway. The data sets are part of the European program called "CORINE Land Cover (CLC)" and are freely accessible at: http://www.skogoglandskap.no/kart/corine_landcover/map_view.

- Mapping of pollinators and their preferred plant species:
Owing to the relatively modest research activity on pollination ecology in Norway, the currently available knowledge is limited and fragmentary. To develop and implement pollination management strategies and activities there is a need to know which species should be regarded as pollinators in Norway, which plants they visit and, ultimately, how far these various species contribute to pollination. An expert assessment made for the Norwegian Biodiversity Information Centre proposes to establish a platform of knowledge that can function as a starting point to generate hypotheses and gather data on more specific problems within pollination ecology that are relevant for managing ecosystems in Norway.

- Macromycetes mapping project:
The main aim of this project is to document the species diversity of macromycetes in Norway. More knowledge on this diversity is needed to identify vulnerable and threatened species, to determine the natural or man-made factors that affect them, to monitor their status and to develop activities for their conservation. In the context of this project, a central database for fungi has been developed at the Botanical Museum in Oslo. This database, which is continuously being updated, reflects the richness of macromycetes across the country and is a valuable tool for both national and local authorities.

- Nature types in Norway (NiN):
NiN is a long-term project that was established in 2005 by the Norwegian Biodiversity Information Centre to summarize knowledge of nature-type variation in Norway. NiN is based on the definitions that are used in the Nature Diversity Act. The NiN system is increasingly used for mapping natural variation, monitoring nature types and for different research activities.

- Norwegian Nature Index:
The Norwegian Nature Index provides an assessment tool for the state of biodiversity in major ecosystems, including freshwater, forests and several marine systems. At present, it is not used to assess the state of biodiversity in actively managed agricultural systems.

- Mapping of biodiversity living on or in soft-bottom areas in the marine environment:
NIVA'S SOFTMOD (soft bottom modelling) PROJECT aims to map the diversity of animal species living on or in soft bottom areas in the marine environment, including polychaetes, bivalves, echinoderms, crustaceans and snails. In Skagerrak, Softmod has contributed, among others, to an increased understanding on the linkages between environmental conditions such as water depth, as well as the exposure to currents and waves, and the variation of species composition.

- EU Water Framework Directive:

There are a series of freshwater monitoring programmes that are partly linked to the needs of the EU Water Framework Directive.

CHAPTER 3: The state and trends of biodiversity for food and agriculture

Proposed structure of the chapter and information to be included in the Country Reports

The main objective of this Chapter is to describe the state of biodiversity for food and agriculture in the country, with an emphasis on associated biodiversity and wild foods, and to identify current trends. The Chapter should also indicate current gaps and future needs and priorities. Where possible, countries should identify interventions required to support maintenance of associated biodiversity and indicate whether action is required at local, national, regional or global levels.

This Chapter will seek information on the following topics:

- The state of diversity between and (where any information exists) within species with respect to associated biodiversity and wild foods;
- The importance of the different components of associated biodiversity in relation to ecosystem services;
- The main factors influencing the state of genetic diversity with an emphasis on threatened and endangered species and resources;
- The state of activities and of the development of monitoring and information systems on the state of biodiversity for food and agriculture;
- The state of any specific conservation actions that target associated biodiversity and wild foods;
- Major gaps in the information available and opportunities and priorities for improving knowledge of state and trends of biodiversity for food and agriculture.

Where possible, indicate whether the information systems are gender-sensitive, specifying to what extent the different types and levels of knowledge of women and men are taken into account.

I*MPORTANT: Throughout these guidelines, questions on production systems will refer to the production systems identified in Table 1 as present in your country.*

One of the main objectives of this report is to identify knowledge gaps and to provide baseline information for future assessments. Thus please indicate where information is unavailable.

Overall synthesized assessment of forest, aquatic, animal or plant genetic resources

Countries that previously presented or are currently preparing a Country Report on Forest, Aquatic, Animal or Plant Genetic Resources may have important information on genetic diversity in these various reports. Therefore, Countries may wish to take full advantage of their different sector reports to develop a comprehensive description and comparison of the state, trends, and state of conservation of forest, aquatic, animal or plant genetic resources. The following indications are designed to provide guidance on the topics that could be addressed.

20. Describe the overall 1) state, 2) trends and 3) state of conservation of diversity of forest, aquatic, animal or plant genetic resources in your country with respect to:

a) common characteristics shared by all sectors;
b) major differences between sectors;
c) synergies or trade-offs in the state of diversity between sectors.

The responses should include relevant information on socio-economic, political and cultural dimensions as well as biological ones. Information on the significance of common characteristics, differences, synergies and trade-offs with respect to achieving food security and nutrition, sustainable production or the provision of ecosystem services should also be provided.

In 2006, the Ministry of Agriculture and Food established the Norwegian Genetic Resource Centre as a department of the Norwegian Forest and Landscape Institute to ensure the conservation and monitor the development of all national genetic resources for food and agriculture, increase their use in a sustainable manner, raise awareness of their importance and

strengthen relevant knowledge. To implement its broad programme of work, the Centre developed a strategic plan, laying out the main outputs it aims to achieve in the conservation and use of animal, forest and plant genetic resources. The strategic plan was published in 2013.

With the support of the genetic resource committees on animal, forest and plant genetic resources, respectively, the Centre also develops action plans to implement its activities on a sectoral basis. Every four years, these plans are reviewed and updated. The committee on animal genetic resources was established in 1986 and the other two committees in 2001. As of the late 1970's and up until the establishment of the national genetic resource committees for respectively plant and forest genetic resources, the Nordic network also included Norway's national work in these two sectors.

The preparation of Norway's reports on the state of respectively animal, plant and forest genetic resources, has revealed how the three sectors relate to each other and how they differ.

a) The national reports on the state of animal, plant and forest genetic resources have shown that the three sectors have quite a few features in common:
- In Norway, as in the rest of the world, commercial production in agriculture and forestry is based on relatively few species, varieties and breeds.
- Commercial breeding and breed improvement is usually dominated by a single (i.e. Graminor for the commercial breeding of plants) or a small number of mostly Norwegian, partly private, companies. In the case of Graminor, for example, the Norwegian government owns approximately 35% of the company and the breeding programme for a majority of crops is government-funded. In the livestock sector, the national breeding companies for dairy and beef cattle, slaughtering pigs, sheep and dairy goats are cooperatives owned by the Norwegian farmers. It should however be noted that there is no commercial breeding of poultry in Norway and that all breeding material is thus supplied by international breeding companies.
- Common objectives in the breed improvement work of animals, plants and forests are to:
1. obtain genetic improvement through advanced trait selection;
2. conserve genetic variation to secure future breeding work.
The three sectors have different strategies to achieve these goals.

b) The different sectors work with different databases. For the livestock sector there are quite a few sector-specific databases, including the Husdyrregistret (a national registration system for all production animals, except llama and domesticated deer, that is managed by the Norwegian Food Safety Authority), Kukontrollen and Geitkontrollen (dairy recording systems for cows and goats managed by Norway's main dairy company Tine), Storfekjøttkontrollen (beef cattle recording system), Sauekontrollen (sheep recording systems), Ingris (pig recording system) and Ammegeitkontrollen (meat goat recording system), all four of which are managed by Animalia. All the livestock recording systems include pedigree and preformance that are used in breeding programmes. Norway also has a cow registration system called Kuregisteret. This is a pedigree database for the country's endangered native cattle breeds and is managed by the Norwegian Genetic Resource Centre. The participation rate in these different recording systems varies between 30 to 95%. The National Forest Inventory (landsskogtakseringen) focuses on the assessment of forest resources. It monitors the growing tree stock, including the distribution of tree species. Other databases include the fruit species database (fruktsortsdatabasen) and the database for protected areas in forests (http://www.skogoglandskap.no/seksjoner/skogverndatabase). The latter includes information from the database "Naturbase" and from other background material. It is the only database to provide an overview of all the main and associated tree species that are present in protected areas in forests.
The information of some databases can be integrated. This is for example the case for the cow registration system of the Norwegian Genetic Resource Centre and the vegetation geographic information system (GIS) of the Norwegian Forest and Landscape Institute, or the Institute's land type maps (AR5) and its protected areas GIS.

c) Having a common centre monitor the country's animal, forest and plant genetic resources for food and agriculture, Norway is in a privileged position to both identify and take advantage of the synergies between the different sectors and to weigh the trade-offs, of which there are few. Regular meetings between the different "sectoral experts" have contributed, inter alia, to the development of the strategic plan of the Norwegian Genetic Resource Centre, to joint inputs on national policies of relevance to genetic resources for food and agriculture (e.g. environmental related policies) and has led to interesting exchanges of knowledge and expertise on issues such as the characterization of genetic resources, in situ and ex situ conservation and the development of indicators.

State and trends of associated biodiversity and ecosystem services

This section seeks information on the state of associated biodiversity in different production systems and in relation to the provision of ecosystem regulating and supporting services.

21. Have any changes been detected in your country for the different production systems over the last 10 years in components of associated biodiversity? If so, indicate if trends are strongly increasing (2), increasing (1), stable (0), decreasing (-1) or strongly decreasing (-2) in Table 7. If no information is available, indicate not known (NK). If not applicable, (NA).

Table 7. Trends in the state of components of associated biodiversity within production systems.

Production systems	**Trends in last 10 years (2,1,0,-1,-2, NK, NA)** (Place pointer on the component of associated diversity name for a description)			
	Micro-organisms	Invertebrates	Vertebrates	Plants
Livestock grassland-based systems: Boreal and /or highlands	NK	0	0	0
Self-recruiting capture fisheries: Boreal and /or highlands	NK	0	-2/+2	-1
Fed aquaculture: Boreal and /or highlands	NK	0	-1	-1
Rainfed crops : Boreal and /or highlands	NK	0	0	0
Mixed systems (livestock, crop, forest and /or aquatic and fisheries): Boreal and /or highlands	NK	0	0	0
Semi-natural forests: Boreal	-1/+1	0	0	0

22. Briefly describe the changes or trends in diversity recorded in Table 7. Where possible provide information on: baseline levels (last 10 years, indicate if otherwise), measurements and indicators used, the extent of change, and the likely cause(s). Include references to the sources of information.

Since 2005, the Norwegian Biodiversity Information Centre (NBIC) has been assessing the status as well as the changes and trends in diversity of different species in the agricultural landscape, forests and marine environments. NBIC has recorded the species following the categories and criteria used by the International Union for Conservation of Nature (IUCN) to list species on the Red List. Norway's first Red List was published in 1999 by the Norwegian Directorate for Nature Management and was updated in 2006 and 2010. NBIC aims to revise the Red List for Species and perform new evaluations of individual species at regular intervals.

Associated biodiversity in fisheries and aquaculture:
Regarding the state of vertebrates in capture fisheries, several sea birds show a severe negative trend, whereas most fish species seem in good or even excellent state (-2/+2). The state of invertebrates has probably not changed that much in the last ten years (0), although some species are known to have suffered from overfishing in certain regions of the country (e.g. lobster, deep-water shrimp). As to associated plant species, large areas of seaweed/kelp are suffering from down-grazing by sea urchins or from pollution in the southern North Sea) (-1). Similar trends have been observed in aquaculture, although associated biodiversity species in this type of system have also been exposed to the negative effects of the industry, such as parasites, diseases and (locally) excessive nutrients, as well as the reduction in quantity and quality of coastal habitats due to the expansion of aquaculture related facilities.

Associated biodiversity in semi-natural forests:
While approximately half of the threatened and near threatened red-listed species in Norway live in forests, there is no indication that the status of these species has deteriorated between 2006 and 2010. As part of the country's sustainable forest management approach, many initiatives have been undertaken that have had/have a positive effect on the diversity of associated biodiversity components in forests (e.g. the increasing volume of standing and lying dead wood has contributed to securing the habitat for a number of associated biodiversity species, including for microorganisms such as saprophytes). Clear-felling, on the other hand, is believed to be of negative effect on mycorrhizae (-1/+1).
There are also examples of species that are associated with managed forests. For example, several bird species depend on spruce plantations in areas that were not naturally colonized by spruce.

Sources of information:
- The Norwegian Biodiversity Information Centre: http://www.biodiversity.no
- The Norwegian Nature Index 2010: http://www.nina.no/ninaenglish/TheNorwegianNatureIndex.aspx

23. Have any changes been detected in your country for the different production systems over the last 10 years in regulating and supporting ecosystem services? If so, indicate if trends are strongly increasing (2), increasing (1), stable (0), decreasing (-1) or strongly decreasing (-2) in Table 8. If no information is available, indicate not known (NK). If not applicable, (NA).

Table 8. Trends in the state of regulating and supporting ecosystem services within production systems.

Production systems	**Trends in last 10 years (2,1,0,-1,-2, NK, NA)** (Place pointer on the ecosystem service name for a description)								
	Pollination	Pest and disease regulation	Water purification and waste treatment	Natural hazard regulation	Nutrient cycling	Soil formation and protection	Water cycling	Habitat provisioning	Production of oxygen/ Gas regulation
Livestock grassland-based systems: Boreal and /or highlands	-1	-1	NK	NK	NK	NK	NK	-1	NK
Self-recruiting capture fisheries: Boreal and /or highlands	NA	-1	NK	NK	NK	NA	NK	-1	NK
Fed aquaculture: Boreal and /or highlands	NA	-1/-2	NK	NA	NK	NA	NK	-1	NK
Rainfed crops : Boreal and /or highlands	-1	-1	NK	NK	NK	NK	NK	-1	NK
Mixed systems (livestock, crop, forest and /or aquatic and fisheries): Boreal and /or highlands	-1	-1	NK	NK	NK	NK	NK	-1	NK
Semi-natural forests: Boreal	NK	-1/0	0	0	0	0	0	+1	+1

24. Briefly describe the changes or trends in diversity recorded in Table 8. Where possible provide information on: baseline levels (last 10 years, indicate if otherwise), measurements and indicators used, the extent of change, and the likely cause(s). Include references to the sources of information.

This text box is non-expandable. Relevant information is provided in Annex I to this questionnaire.

25. Is there evidence that changes in biodiversity for food and agriculture have impacted ecosystem services in your country? Indicate if strongly increasing (2), increasing (1), stable (0), decreasing (-1) or strongly decreasing (-2) in Table 9 and provide a description of specific situations and documentation where available.

Table 9. Impact of changes in biodiversity for food and agriculture on ecosystem services.

Production systems	**Changes**	**Impact of changes in biodiversity for food and agriculture on ecosystem services** (2, 1, 0,-1, -2, NK, NA) (Place pointer on the ecosystem service name for a description)

		Pollination	Pest and disease regulation	Water purification and waste treatment	Natural hazard regulation	Nutrient cycling	Soil formation and protection	Water cycling	Habitat provisioning	Production of oxygen/ Gas regulation
Livestock grassland-based systems: Boreal and /or highlands	Changes in animal genetic resources	NK	NK	NK	NK	NK	NK	NK	-1	NK
	Changes in crop genetic resources	NK	NK	NK	NK	NK	NK	NK	NK	NK
	Changes in forest genetic resources	NK	NK	NK	NK	NK	NK	NK	NK	NK
	Changes in aquatic genetic resources	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Changes in invertebrates genetic resources (associated biodiversity)	-1	NK	NK	NK	NK	NK	NK	NK	NK
	Changes in vertebrates genetic resources (associated biodiversity)	NK	NK	NK	NK	NK	NK	NK	NK	NK
	Changes in plants genetic resources (associated biodiversity)	NK	NK	NK	NK	NK	NK	NK	NK	NK
	Changes in plants genetic resources (associated biodiversity)	NK	NK	NK	NK	NK	NK	NK	NK	NK
Self-recruiting capture fisheries: Boreal and /or highlands	Changes in animal genetic resources	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Changes in crop genetic resources	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Changes in forest genetic resources	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Changes in aquatic genetic resources	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Changes in micro-organism genetic resources (associated biodiversity)	NA	NK	NK	NK	NK	NA	NK	NK	NK
	Changes in invertebrates genetic resources (associated biodiversity)	NA	NK	NK	NK	-1	NA	NK	-1	NK
	Changes in vertebrates genetic resources (associated biodiversity)	NA	NK	NK	NK	NK	NA	NK	NK	NK
	Changes in plants genetic resources (associated biodiversity)	NA	NK	NK	NK	NK	NA	NK	NK	NK
Fed aquaculture: Boreal and /or highlands	Changes in animal genetic resources	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Changes in crop genetic resources	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Changes in forest genetic resources	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Changes in aquatic genetic resources	NA	NA	NA	NA	NA	NA	NA	-1	NA
	Changes in micro-organism genetic resources (associated biodiversity)	NA	-1 (in	NK	0	-1	0	0	-1	-1
	Changes in invertebrates genetic resources (associated biodiversity)	NA	-1 (se	NK	NK	NK	NK	NK	NK	NK

	Changes in vertebrates genetic resources (associated biodiversity)	NA	NK	NK	NK	NK	NK	NK	NK	NK
	Changes in plants genetic resources (associated biodiversity)	NA	NK	NK	NK	NK	NK	NK	-1 (re	NK
Rainfed crops : Boreal and /or highlands	Changes in animal genetic resources	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Changes in crop genetic resources	NK	NK	NK	NK	NK	NK	NK	-1	NK
	Changes in forest genetic resources	NK	NK	NK	NK	NK	NK	NK	NK	NK
	Changes in aquatic genetic resources	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Changes in micro-organism genetic resources (associated biodiversity)	NK	NK	NK	NK	NK	NK	NK	NK	NK
	Changes in invertebrates genetic resources (associated biodiversity)	-1	NK	NK	NK	NK	NK	NK	NK	NK
	Changes in vertebrates genetic resources (associated biodiversity)	NK	NK	NK	NK	NK	NK	NK	NK	NK
	Changes in plants genetic resources (associated biodiversity)	-1	NK	NK	NK	NK	NK	NK	NK	NK
Mixed systems (livestock, crop, forest and /or aquatic and fisheries): Boreal and /or highlands	Changes in animal genetic resources	NK	NK	NK	NK	NK	NK	NK	NK	NK
	Changes in crop genetic resources	NK	NK	NK	NK	NK	NK	NK	NK	NK
	Changes in forest genetic resources	NK	NK	NK	NK	NK	NK	NK	NK	NK
	Changes in aquatic genetic resources	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Changes in micro-organism genetic resources (associated biodiversity)	NK	NK	NK	NK	NK	NK	NK	NK	NK
	Changes in invertebrates genetic resources (associated biodiversity)	NK	NK	NK	NK	NK	NK	NK	NK	NK
	Changes in vertebrates genetic resources (associated biodiversity)	NK	NK	NK	NK	NK	NK	NK	NK	NK
	Changes in plants genetic resources (associated biodiversity)	NK	NK	NK	NK	NK	NK	NK	NK	NK
Semi-natural forests: Borea	Changes in animal genetic resources	NA	NA	NA	NA	NA	NA	NA	-1	NA
	Changes in crop genetic resources	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Changes in forest genetic resources	0	0	0	0	0	0	0	0	+1
	Changes in aquatic genetic resources	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Changes in micro-organism genetic resources (associated biodiversity)	NK	-2/-1	NK	NK	NK	NK	NK	NK	NK
	Changes in invertebrates genetic resources (associated biodiversity)	-1	NK	NK	NK	NK	NK	NK	NK	NK
	Changes in vertebrates genetic resources (associated biodiversity)	0	NK	NK	NK	NK	NK	NK	NK	NK
	Changes in plants genetic resources (associated biodiversity)	NK	NK	NK	NK	NK	NK	NK	NK	NK

26. Briefly describe the impacts on ecosystem services recorded in Table 9. Where possible provide information on: baseline levels (last 10 years, indicate if otherwise), measurements and indicators used, the extent of change, and the likely cause(s).

Include references to the sources of information.

Table 9. is rather complex and extensive and information of this kind is not systematically being monitored or evaluated in the different production systems in Norway. Several of the entries were filled in based on expert views and/or assumptions and the provided data should therefore be treated with caution. Due to the large number of table entries, please note that only a limited number of issues are addressed in this text box.

Summer farming, i.e. the seasonal movement of livestock to outlying land, often mountain pastures, is a very old Norwegian tradition (Kvamme et al., 1992; Norderhaug et al., 1999). This form of livestock keeping is characterised by long continuity of traditional and low-intensive use, without cultivation of the grasslands, creating some extremely species rich semi-natural grasslands. Since the middle of the 20th century, the transition to modern livestock production systems in Norway has led to a strong decline in the utilisation of outlying land, with extensive landscape changes as a result (Norderhaug & Ihse, 2003; Bryn et al., 2001). The area of semi-natural grasslands has been reduced and their characteristic vegetation types are now highly threatened as large herbs invade them, succeeded by shrubs and at last forests (Emanuelsson & Johansson, 1987, Direktoratet for naturforvaltning, 1994; Austrheim, 1998; Ihse & Blom, 2000; Ekstam & Forshed, 2000; Fremstad & Moen, 2001). In Norway about 30% of the red list (threatened) plant species depend on semi-natural vegetation types, especially old grasslands (Direktoratet for naturforvaltning, 1999). The former widespread open grasslands remain, today, mostly as fragments, which still may be very species-rich (Sickel et al., 2004). Their existence and conservation value depend upon further traditional use or special management. It is therefore necessary to develop management methods, which can maintain the semi-natural vegetation types and the species connected to them (Norderhaug et al. 1999).The presence of oilseed rape, red clover, fruit trees, strawberries and raspberries is believed to positively influence the pollination of plants outside tilled land.

Changes in livestock keeping practices are having an impact on the provision of habitats for tree species such as Sorbus and wild apple. Such tree species depend on open landscapes, that are under threat of reduced grazing of livestock on outlying fields. The same is true for coastal heathlands and for a range of grasses, plants and associated species in semi-natural pastures.

Changes of fish genetic resources, due to alterations in migration patterns of fish species such as herring, is affecting the survival of sea bird species, including several species of auks, such as the puffin bird, for whom these fish species are the main source of food.

Large seaweed/kelp forests are suffering from down-grazing by sea urchins. Kelp forests represent some of the most diverse and productive habitats on earth. They are important biodiversity repositories and contribute, inter alia, to nutrient cycling, energy capture and flow and coastal defense.

In forest areas, changes in micro-organism genetic resources can have detrimental effects on the genetic resources of specific tree species, affecting pest and disease regulation. An example in this respect is the spread of the ash dieback disease in the southern parts of Norway.

On the western coastline, the large-scale plantation and replantation of spruce (in particular sitka spruce) from the 1950s is believed to positively affect today's carbon sequestration and oxygen production. Generally speaking, the increasing forest area in Norway is having such effects. Tree planting in open land along the coast might at the same time affect habitats of open landscape-dependent biodiversity, including semi-natural habitats of high biodiversity value.

27. List any associated biodiversity species or sub-species (if information is available) that are in some way actively managed in your country to help provide regulating or supporting ecosystem services in Table 10. Indicate in which production systems they occur and indicate if diversity information is available. Provide any available sources of information.

Table 10. Associated biodiversity species that are in some way actively managed in your country to help provide regulating or supporting ecosystem services.

Ecosystem service provided (Place pointer on the ecosystem service name for a detailed description)	**Actively managed species (name) and sub-species (where available)**	**Production systems (code or name)**	**Availability of diversity information (Y/N)**	**Source of information**

Ecosystem service provided (Place pointer on the ecosystem service name for a detailed description)	**Actively managed species (name) and sub-species (where available)**	**Production systems (code or name)**	**Availability of diversity information (Y/N)**	**Source of information**
Pollination	Semi-domesticated honey bees are actively managed for the pollination of agricultural crops. The growers can rent colonies for about USD 75 per colony and crop. This form of pollination service is especially important for the production of cherries, apples, pears, plums, raspberries, strawberries and black currant, as well as rapeseed, especially in areas with a low density of honey bee colonies. In Norway, wild bumble bee (Bombus terrestris) queens are collected and the colonies are used both for the production of greenhouse vegetables and for the production of berries.	Rainfed crops (C12)	Y	Norwegian Beekeepers Association / Bioforsk

Ecosystem service provided (Place pointer on the ecosystem service name for a detailed description)	**Actively managed species (name) and sub-species (where available)**	**Production systems (code or name)**	**Availability of diversity information (Y/N)**	**Source of information**
Pest and disease regulation	In organic farming and in private gardens, companion planting is sometimes used to repel or confuse pests and/or provide key resources to beneficial organisms. A well-known and documented example is the co-planting of onions and carrots to repel the carrot fly. The plants used for co-planting (e.g. onion, Tagetes, etc) are usually non native crop plants. In organic farming, other measures to help organisms beneficial to pest and disease regulation are recommended, but their use is somewhat limited. An example is the provision of nesting boxes, stimulating the presence of caterpillar and other insect eating birds in orchards. A good proportion of fruit crop growing farmers (especially top fruit) avoid using pesticides, to the extent possible, both to protect predators and to avoid subsequent problems with spider mites, psyllids, etc. Certain species of wrasses (Labridae) are used to reduce the burden of sea lice parasites in aquaculture.	Rainfed crops (C12) Fed aquaculture: Boreal and/or highlands (A12)	N	Bioforsk / the Norwegian Institute for Nature Research (NINA)

Ecosystem service provided (Place pointer on the ecosystem service name for a detailed description)	**Actively managed species (name) and sub-species (where available)**	**Production systems (code or name)**	**Availability of diversity information (Y/N)**	**Source of information**
Water purification and waste treatment	The Government agreed to put together and integrated policy instrument package for the development of biogas, including the handling of food waste and animal manure, the effect of which should become visible in 2020. It also agreed to support technological developments and knowledge production concerning second-generation biofuel from sources such as waste and timber. Fish processing wastes could also be a signifcant source for bioenergy production.	Rainfed crops (C12) Livestock grassland-based systems (L4) Semi-natural forests (O1) Self-recruiting capture fisheries (A4) Fed aquaculture (A12)	N	White paper nr.39 (2008-2009) (Ward & Løes, 2014)
Natural hazard regulation	Management of vegetation bordering rivers: By binding soil particles, roots of bushes and trees at the edge of rivers contribute to reducing surface runoff and soil erosion. This also helps to increase resilience of production systems to natural hazards.	Rainfed crops (C12) Semi-natural forests (O1)	N	Regional plans for water management
Nutrient cycling	Active management of vegetation bordering rivers: Vegetation on the edge of rivers intercepts nutrient runoff from agriculture, blocking nutrients such as phosphorus and nitrogen from polluting waterways. The re-establishment and maintenance of such buffer zones is an effective tool against nutrient runoff, while it also enhances denitrification. In organice farming, clovers are being used to stimulate the binding of nitrogen by crops.	Semi-natural forests (O1) Rainfed crops (C12)	N	Regional plans for water management (Henrikson, L., 2000) Bioforsk

Ecosystem service provided (Place pointer on the ecosystem service name for a detailed description)	**Actively managed species (name) and sub-species (where available)**	**Production systems (code or name)**	**Availability of diversity information (Y/N)**	**Source of information**
Soil formation and protection	At present, no soil associated species are being actively managed. Bioforsk Økologisk is undertaking experiments on soil quality and soil resources (including earth worms, which are a useful soil health indicator). These experiments do however not aim at the active management of soil associated species, neither do they provide a systematic overview of the extent and diversity of soil organisms in the studied areas. Management of vegetation bordering rivers: By binding soil particles, roots of bushes and trees at the edge of rivers contribute to reducing surface runoff and soil erosion.	Rainfed crops (C12) Semi-natural forests (O1)	N N	Bioforsk Økologisk Regional plans for water management
Water cycling	Sustainable forest management contributes to having healthy forests that are essential to water cycling. Healthy forest soils provide natural filtration resulting in high-quality source water that requires minimal treatment.	Semi-natural forests (O1)	N	(Henrikson, L., 2000)
Habitat provisioning	Management of buffer zones: Buffer zones (e.g. between cultivated land and forests, vegetation bordering rivers, etc.) provide unique habitats for a broad range of living organisms, including micro-organisms, invertebrates, vertebrates and plants.	Semi-natural forests (O1)	N	Regional plans for water management (Henrikson, L., 2000)
Production of oxygen/ Gas regulation	Increased planting of forests in new areas enhances carbon sequestration and the production of oxygen, thereby positively contributing to the mitigation of climate change.	Semi-natural forests (O1)	N	(Haugland et al., 2013)

Ecosystem service provided (Place pointer on the ecosystem service name for a detailed description)	**Actively managed species (name) and sub-species (where available)**	**Production systems (code or name)**	**Availability of diversity information (Y/N)**	**Source of information**
Other [*please specify*]:				

28. Does your country have monitoring activities related to associated biodiversity? If yes, describe these. Where possible provide information on the components of associated biodiversity that are monitored and on the geographical coverage of the monitoring system (local, regional, national, global). Include references to the sources of information, if possible.

1. The Norwegian Biodiversity Information Centre, Norway's national knowledge bank for natural biodiversity, makes risk assessments and provides updated information on species and different types of habitats and ecosystems present in the country:
- Species Observation System (Artsobservasjoner): In 2008, in cooperation with the joint council for biological diversity (SABIMA), the Norwegian Biodiversity Information Centre launched a reporting system called the Species Observation System, giving those with relevant knowledge the opportunity to contribute to the documentation of the country's species diversity. Selected parts of the provided data are submitted to a quality check. Since its establishment, the system has registered over 10 million observations, which were reported on by more than 8,500 people. The system has a national coverage, but information is also provided at county level (19 in total). Reference: http://www.artsdatabanken.no/Article/Article/133693
- The Species Map Service (Artskart) provides digital information on the presence of species in Norway, using the database of the Species Observation System. While the Species Map Service is being used as a tool in natural resource management by research and industry, it could become more important in the future if standardized approaches of habitat classification were used (similar to the approach followed in the Nature types in Norway (NiN)-system). This would improve the knowledge of species and their habitats and facilitate the identification of habitats that could be selected for the conservation of biodiversity. However, it is not advisable to exclusively use species mapping data for direct site selection and prioritisation. Reference: http://artskart.artsdatabanken.no/default.aspx
- Red lists for both species and habitat types: the Norwegian Biodiversity Information Centre also manages Norway's Red lists for both species and habitat types. In 2010, 4600 species were red-listed for Norway's mainland and 70 for Svalbard. In 2011, half of the 80 habitat types covered by the Red List for Ecosystems and Habitat types were regarded as being threatened. Both red lists have a national coverage. Information on the red-listed species and habitat types can be found at county level, and is also put into perspective with relevant information provided at the European and at the global level. The most important factors of influence and the preferred habitats of the species are also provided.
- Alien species in Norway – with the Norwegian Black List 2012: in total, 2320 alien species have been identified on Norwegian territory. 1180 of these have been assessed by the Norwegian Biodiversity Information Centre on whether they pose an ecological risk to native species and habitats or not. The Norwegian Black List 2012 indicates that 217 alien species either have a severe or high ecological impact.
The Alien species in Norway– with the Norwegian Black List 2012 was based on a new generation of ecological impact assessments of alien species and using an entirely new set of criteria.

2. The Norwegian Forest and Landscape Institute

- 3Q programme:
The 3Q programme monitors land cover and land use in agricultural landscapes in Norway. This includes a number of landscape elements important to biodiversity (e.g. solitary trees, hedge rows, rocky outcrops, etc.). One element of particular interest is farm ponds, as many associated biodiversity species, including a variety of insects, amphibians and birds are associated with them. Maintaining and/or establishing farm ponds directly contributes to the conservation of associated biodiversity. Farm ponds also provide support in the prevention of soil erosion, protect water quality by collecting and storing runoff water, provide water for livestock, fish, wildlife, and recreational activities, and add aesthetic value to the agricultural landscape. Through the so-called 3Q programme, approximately 1400 plots of 1km2 spread across the country are monitored. Hedmark, Oppland, Østfold, Akershus and South Trøndelag are among the counties with the greatest incidence of farm ponds recorded in the 3Q system. Analysis has shown that over the past five years, the number of farm ponds significantly increased in the Hedmark and Oppland counties. There is however a decline in the number of farm ponds in Østfold and Akershus (Norwegian Forest and Landscape Institute, 2011). The 3Q programme also monitors vascular plant species and farmland birds.

- The Norwegian National Forest Inventory (NNFI) provides estimates of forest parameters on national and regional scales by means of a systematic network of permanent sample plots. The Inventory covers several variables relevant for associated biodiversity in forests (e.g. coverage of bilberries and of areas that provide important habitats for red-listed species) and also includes Environmental Inventories in Forests (MiS). MiS has two interdependent objectives: i. to improve knowledge of environmental values in forests, in terms of biodiversity and cultural heritage; and ii. to develop methods for recording and

monitoring these values.

3. At present, there are no systematic monitoring activities related to soil associated biodiversity. However, through the "Living topsoil" project*, soil health, including the occurrence of associated soil biodiversity, is being assessed on agricultural land of both conventional and organic farmers. Following such assessments, farmers are given advice on possible ways to bring back "life" into the soil. Farmers participating in this project are from the counties of Buskerud, Østfold, Vestfold and Rogaland. Both farmers, in particular the conventional ones, and decision makers at county (fylkesmannen) and national (Norsk Landbruksrådgiving) levels have shown great interest in this project.
Bioforsk Økologisk made a series of thematic sheets on life in soils in the context of this project (http://www.agropub.no/id/10808.0).

* This project came about through a partnership between county representatives of Buskerud, Lindum AS, VitalAnalyse and Bioforsk Økologisk

4. Terrestrial Ecosystems Monitoring Programme (TOV): The main aim of the Monitoring Programme for Terrestrial Ecosystems is to detect both short- and long-term effects of climate change, long-range pollutants and other natural and anthropogenic impact factors on vegetation and fauna in common boreal and low alpine ecosystems. Many observed changes in TOV sites are due to natural variations in northern ecosystems subject to extensive inter-annual changes in physical and biological conditions. In addition to variations in climate, snow cover, and storms, changes in rodent populations and the amount of birch-defoliating moths are important causes of changes in other parts of the ecosystems (Framstad (red.), 2013).

5. Wild foods related databases managed by the Norwegian Environment Agency:
- Naturbase: provides spatial data on biodiversity. It gives an overview of the protected areas and the state-funded outdoor recreational areas and provides maps indicating selected habitats and ecologically functional areas for priority species (http://www.miljodirektoratet.no/no/Tjenester-og-verktoy/Database/Naturbase/).
- Wild reindeer database (villreinbasen): provides information on the habitats of wild reindeer by municipality and on wild reindeer committees and relevant decision making at county level. It offers a map service to facilitate the management of the habitat of wild reindeer (http://www.miljodirektoratet.no/no/Tjenester-og-verktoy/Database/Villreinbase/).
- Wild salmon registry (Lakseregisteret): contains information on salmon, trout and char populations in 1300 rivers across the country (http://www.miljodirektoratet.no/no/Tjenester-og-verktoy/Database/Lakseregisteret1/).
- Sea environment (havmiljø): is an analytical system that, during different periods of the year, undertakes environmental valuations and measures the vulnerability of marine species and habitats to oil pollution (http://havmiljø.no/).

6. The Norwegian Nature Index: documents overall trends for biodiversity in different ecosystems in Norway relative to a state of reference. The Nature Index uses 309 indicators split between nine major ecosystems. The state of reference being defined differently for different indicators and ecosystems, one must be cautious when comparing the state of the various ecosystems based on the index number. At present, a large share of the Nature Index work is based on assessments conducted by experts and agricultural areas, Arctic ecosystems and green urban spaces are not yet included. However, the Nature Index is still work in progress and its methodology and indicators are continuously being improved. The next version of the Nature Index should be based on more factual data and on the development of measures that might need to be undertaken.

7. Norwegian Marine Data Centre (Norsk marint datasenter-NMD): is a national data center for the management of Norway's marine environment and fish data. The Center maintains the country's largest collection of marine environmental and fish data and is managed by the Norwegian Institute of Marine Research (Havforskningsinstituttet) (http://www.imr.no/forskning/faggrupper/norsk_marint_datasenter_nmd/nb-no).

8. MAREANO: is Norway's floor mapping programme that records new species, in mainly the Barents Sea and the north-eastern shelf of the Norwegian Sea.

9. Norway's Water Management Regulations:
Norway's Water Management Regulations have incorporated the EU Water Framework Directive into Norwegian law. To enforce these Regulations assessments of the ecological status of inland waters (fresh waters) and coastal waters are being undertaken, using biological indicators and chemical parameters. For these assessments, Norway has been divided into 11 river basin districts that are managed by river basin district authorities. By the end of 2015, all water bodies should have been assessed and given an environmental status (good, moderate,poor), following the criteria of the EU Water Framework Directive.

Species of associated biodiversity at risk of loss

In this section the objective is to identify species of associated biodiversity within the country that are at significant risk of loss, degradation or extinction.

29. List in Table 11 any components of associated biodiversity for which there is evidence of a significant threat of extinction or of the loss of a number of important populations in your country. Specify the degree of the threat according to the classification in use in your country or following the IUCN Red List Categories and Criteria. Include a description of the threat and list references or sources of information if available.

Table 11. Main threats to associated biodiversity identified as at risk.

Associated biodiversity species	Degree of threat	Main threat	References or sources of information if available
LIVESTOCK GRASSLAND-BASED SYSTEMS ARTHROPODS: 552 - INSECTS: 516 - SPIDERS: 35 - CRUSTACEAN: 1 VERTEBRATES: 24 (18 birds, 4 amphibians/reptiles, 2 mammals) MOLLUSKS: 2 FUNGI: 156 VASCULAR PLANTS: 83 MOSSES: 47 LICHEN: 35	ARTHROPODS: - INSECTS RE=45; CR=23; EN=117; VU=141; NT=131; DD=59 - SPIDERS EN=3; VU=25; NT=5; DD=2 - CRUSTACEAN NT=1 VERTEBRATES RE=1; CR=3; EN=1; VU=6 NT=13 MOLLUSCS EN=1; DD=1 FUNGI RE=2; CR=4; EN=23; VU=52; NT=41; DD=34 VASCULAR PLANTS: CR=6; EN=16; VU=25; NT=32 ; DD=4 MOSSES CR=5; EN= 12; VU=13; NT=6 ; DD=11 LICHEN CR=7; EN=10; VU=12; NT=6	ARTHROPODS: habitat loss due to changing land use is by far the largest threat, followed by pollution VERTEBRATES: changes in the breeding population in neighbouring countries, followed by habitat loss MOLLUSCS: habitat loss FUNGI: habitat loss, followed by pollution VASCULAR PLANTS: habitat loss	Norwegian Red List Species (2010), Norwegian Biodiversity Information Centre

Associated biodiversity species	Degree of threat	Main threat	References or sources of information if available
RAINFED CROP SYSTEMS ARTHROPODS: 90 - INSECTS:79 - SPIDERS: 11 VERTEBRATES: 8 (7 birds and 1 mammal) FUNGI: 1 VASCULAR PLANTS: 29 MOSSES: 14 ALGAE: 1	ARTHROPODS: - INSECTS RE=8; CR=1; EN=26; VU=27; NT=13; DD=4 - SPIDERS VU=8; NT=2; DD=1 VERTEBRATES CR=1; VU=2; NT=5 FUNGI NT=1 VASCULAR PLANTS RE=2; CR=1; EN=8; VU=8; NT=9; DD=1 MOSSES VU=4; NT=2; DD=8 ALGAE VU=1	ARTHROPODS: habitat disappearance due to changing land use is by far the main threat, followed by pollution VERTEBRATES: - Birds: habitat loss - Mammals: habitat loss - FUNGI: habitat loss - VASCULAR PLANTS: habitat loss	Norwegian Red List Species (2010), Norwegian Biodiversity Information Centre
SEMI-NATURAL FORESTS ARTHROPODS: 1049 - INSECTS: 985 - SPIDERS: 45 - SPRINGTAILS: 10 - MYRIAPODA: 7 - CRUSTACEAN: 2 VERTEBRATES: 29 (17 birds and 12 mammal) MOLLUSKS: 8 FUNGI: 742 VASCULAR PLANTS: 89 LICHEN: 154 MOSSES: 61	ARTHROPODS: - INSECTS RE=27; CR=43; EN=205; VU=288; NT=312; DD=110 - SPIDERS EN=3; VU=23; NT=17; DD=2 - SPRINGTAILS RE=8; CR=1; EN=26; VU=27; NT=13; DD=4 - MYRIAPODA VU=5; DD=5 - CRUSTACEAN NT=2 VERTEBRATES CR=3; EN=5; VU=12; NT=8; DD=1 MOLLUSCS EN=2; NT=2; DD=44 FUNGI CR=35; EN=109; VU=196; NT=273; DD=129 VASCULAR PLANTS RE=2; CR=6; EN=10; VU=27; NT=42; DD=2 LICHEN CR=23; EN=42; VU=53; NT=36 MOSSES CR=6; EN=15; VU=22; NT=12; DD=6	- ARTHROPODS: habitat disappearance due to changing land use is by far the main threat - VERTEBRATES: Birds: habitat loss Mammals: habitat loss, followed by human disturbance - MOLLUSCS: habitat loss - FUNGI: habitat loss by far, followed by pollution - VASCULAR PLANTS: habitat loss by far	Norwegian Red List Species (2010), Norwegian Biodiversity Information Centre

Associated biodiversity species	Degree of threat	Main threat	References or sources of information if available
MARINE ENVIRONMENT MOLLUSCS: 133 CRUSTACEANS: 90 SPONGES/POLYPUS: 47 VERTEBRATES: 38 (13 birds, 8 mammals, 17 fish) RINGWORMS: 19 ALGAE: 18 VASCULAR PLANTS: 5 INSECTS: 1 The majority of the threatened and near threatened fish are cartilaginous fish (sharks and skates), but commercially exploited and common species like European eel (Anguilla anguilla) (CR), blue ling (Molva dypterygia) (EN) and red fish (Sebastes marinus) (EN) are Red Listed because the stocks have been declining in recent years. Among the algae, it is especially the stoneworts (charophytic algae) which have many species on the Red List. All the brackishwater stoneworts (10 species) are Red Listed. Two of the other three threatened or near threatened algae are found in the littoral zone.	MOLLUSCS CR=2; EN=3; VU=3; NT=16; DD=109 CRUSTACEANS EN=1; VU=2; NT=5; DD=82 SPONGES/POLYPUS NT=5; DD=42 VERTEBRATES RE=1; CR=5; EN=6; VU=9; NT=11; DD=6 RINGWORMS EN=1; VU=1; NT=1; DD=16 ALGAE CR=1; EN=8; NT=3; DD=6 VASCULAR PLANTS EN=3; NT=2 INSECTS DD=1	Land-use changes, excessive input of nutrients (eutrophication) and harvesting	Environmental conditions and impacts for Red List species (2010), Norwegian Biodiversity Information Centre
One third of Norwegian bee species	Different degrees of threat	Habitat disappearance due to changing land use (removal of edge zones, fragmentation); introduction of alien species (i.e. honey bee (Apis mellifera), the buff-tailed bumblebee (Bombus terrestris), plant species, as well as exotic pests and pathogens*); pesticides; climate change. *Pests and pathogens might be introduced by honey bees or imported buff-tailed bumblebees (pathogen spillover)	Norwegian Red List (2010) and State of knowledge regarding insect pollination in Norway– the importance of the complex interaction between plants and insects (2013), Norwegian Biodiversity Information Centre. B. Dahle, personal comments

Associated biodiversity species	Degree of threat	Main threat	References or sources of information if available
Notes: RE=regionally extinct CR=critically endangered EN=endangered VU=vulnerable NT=near threatened DD=data deficient Species in the categories CR, EN, VU, NT, DD are at risk of becoming extinct			

Add row

Delete row

Conservation of associated biodiversity

This section collects information on the state of conservation of components of associated biodiversity providing ecosystem services within production systems in your country.

30. Does your country currently have any *ex situ* conservation or management activities or programmes for associated biodiversity for food and agriculture? These may include, for example, culture collections, collections of pollinators, etc. If so, list these in Table 12.

Table 12. *Ex situ* conservation or management activities or programmes for associated biodiversity for food and agriculture.

Components of associated biodiversity	Organisms, species and sub-species (where available) conserved	Size of collection	Conservation conditions	Objective(s)	Characterization and evaluation status
Plants	Wild plant varieties: NordGen: - keeps accessions of forage plant species that have been collected from cultivated fields and from wild habitats; and - conserves seed samples of other wild flora species, like medicinal and aromatic plants, crop wild relatives, etc. The botanical garden in Oslo/ University of Oslo manages Norway's gene bank for endangered plant species.	See: NordGen's genebank management tool SESTO and the two databases for grasses of the ECPGR at: http://www.nordgen.org/index.php/en/content/view/full/2607l.pdf?epslanguage=no	In NordGen's seed collections, seeds are kept in welded bags consisting of alternate layers of aluminium- and plastic-foil to prevent moisture and other harmful substances from affecting the quality of the seeds, which in combination with low temperatures ensures good viability.	NordGen: organized preservation of pgrfa to enable future generations to breed crop varieties and face new challenges. Botanical garden: contribute to the conservation of Norway's red-listed plant species in well documented collections.	Plant varieties preserved at NordGen are accompanied by information on their characteristics and provenance, which can be found in the institution's publicly accessible genetic database. The comprehensiveness of the data varies among the different plant varieties.
Invertebrates	Honey bees		cryo-preservation	conserve endangered honey bee subspecies	This project was unfortunately not successful

Components of associated biodiversity	Organisms, species and sub-species (where available) conserved	Size of collection	Conservation conditions	Objective(s)	Characterization and evaluation status
Micro-organisms	The Norwegian Institute for Water Research (NIVA), Norway's leading institute for basic and applied research on marine and fresh waters, manages a culture collection of Algae.	>900 different strains of algae	cryo-conservation	Promote algal experiments and hold a national reference collection for algae	Since the establishment of the algae culture collection in 1964, NIVA has done extensive research on algae characteristics, growth conditions and applications.
Micro-organisms	The mycological herbarium at the Botanical Museum in Oslo houses a Nordic herbarium with about 230,000 specimens and a foreign herbarium containing approximately 45,000 specimens. The fungi collection includes different groups of fungi (e.g. ascomycetes and micromycetes), most of which have their origin in Norway and the Arctic. At present, more than 106,000 Norwegian specimens have been recorded in a public database, which is electronically available.	230,000 specimens		This collection is not meant to preserve specimens to propagate new individuals. It aims to establish a national reference collection for fungi for comparison and identification with unknown samples and for documenting species distribution and variation within species. This collection could therefore be useful for characterizati on work.	The database of the herbarium contains almost 30,000 records of observations, notes and literature accounts, as well as nearly 15,000 field notes.
	SEE ANNEX I TO THIS QUESTIONNAIRE FOR ADDITIONAL INFORMATION				

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31. Does your country currently have any *in situ* conservation and management activities or programmes in your country that support the maintenance of associated biodiversity? If so provide any available information on organisms and species managed or conserved, site name and location, production system(s) involved, conservation objective and specific actions that secure associated biodiversity or ecosystem services (if any).

Table 13. *In situ* conservation or management activities or programmes for associated biodiversity for food and agriculture.

Components of associated biodiversity	Organisms, species and sub-species (where available) conserved	Site name and location	Production system(s) involved (code or name)	Conservation objective(s)	Specific actions that secure associated biodiversity or ecosystem services
	Components of associated biodiversity include, micro-organisms, invertebrates, vertebrates (e.g. deer and moose) and wild plants (e.g. grasses, lichens and shrubs).	In different areas of the country	Semi-natural forests (O1)	One of the objectives of the Sustainable Forest Management approach is the conservation of forest-associated biodiversity	Specific actions, include: - Increasing the volume of standing and lying dead wood that provide a habitat for a large number of associated biodiversity species. - Reduced impact logging, which is the general policy in Norway. - Establishment of protected and protective forest areas. - Management of buffer zones bordering waterways and marshland.
Plants		In different areas of the country	Livestock grassland-based systems (L4)	Conservation of native and endangered cattle breeds, habitats and of associated biodiversity	Conservation programmes for native and endangered cattle breeds tend to promote grazing in outlying fields. This practice is favorable to maintaining and enhancing the diversity of grasses, wild plants, invertebrates and micro-organisms in open landscapes.
	Components of associated biodiversity, as well as functional ecosystems	In different areas of the country	Livestock grassland-based systems (L4) Self-recruiting capture fisheries (A4) Semi-natural forests (O1)	Conservation of biodiversity in different landscapes	A wide network of protected areas provides home range and habitat both for different associated biodiversity species and for functional ecosystems. This particularly applies to protected areas in forests, traditionally managed agricultural landscapes, and marine protected areas.
Micro-organisms	Annex I to this questionnaire provides some information on the status of microbial culture collections in Norway.				

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32. What activities are undertaken in your country to maintain traditional knowledge of associated biodiversity? Has traditional knowledge of associated biodiversity been used to inform conservation and use decisions in your country? Please share best practices and lessons learned.

TRADITIONAL KNOWLEDGE OF ASSOCIATED BIODIVERSITY

As a Contracting Party to the Convention on Biological Diversity (CBD), Norway has taken on the responsibility to facilitate, as far as possible and as appropriate, the implementation of Article 8(j), pertaining to the preservation and maintenance of knowledge, innovations and practices of indigenous communities embodying traditional lifestyles relevant for the conservation and sustainable use of biological diversity, including biodiversity for food and agriculture.

White paper nr.42 (2000-2001) specifically addresses matters pertaining to biological diversity and it includes a specific section on biological diversity and Sámi. In section 8.3 of the paper, the government recognizes the importance to preserve and document traditional knowledge to maintain and provide the opportunity to develop Sámi culture. This knowledge, which is essentially held by older people and traditionally passed on to the next generation orally and through "learning by doing", can easily be lost during the rapid modernization that Sámi society is undergoing. Examples of such knowledge include the use of resources that are picked and harvested in outlying fields, such as berries and plants, as well as fish.
Municipal and regional authorities consider the preservation of traditional knowledge as a priority. They closely follow the work that is being undertaken by several projects to document and preserve traditional Sámi knowledge.

In addition, the Sámi Parliament (established in 1989), whose main objective is to protect Sámi cultural heritage and cultural environment to contribute to strengthening and continuing Sámi culture, the Sámi Act (stipulating the responsibilities and powers of the Sámi Parliament), Article 110a of the Norwegian Constitution (1988), as well as the Finnmark Act (2005) all contribute to the maintenance and use of Sámi traditions.

KNOWLEDGE OF TRADITIONAL FARMING PRACTICES INVOLVING COMPOMENTS OF ASSOCIATED BIODIVERSITY

During the 20th century, a series of ethnological registration projects documenting knowledge of traditional practices were carried out on national government support programmes. Among others, the history of traditional plants used in Norwegian cuisine and medicine were mapped for some of the approximately 107 plant species in the Norwegian wild flora (e.g. the history of Garden Angelica (Angelica archangelica) was documented dating back to the 11th century).The results of these projects are reflected in monographs and short publications and are stored in museum- and archive-collections.

More recently, similar type of registration/collection activities have been carried out at the local level by interested individuals, who transfer the knowledge they document by developing niche products. An interesting example in this respect is the successful commercialization of "tjukkmjølk", a thick sour milk and traditional summer drink from mountain areas in Norway. Tjukkmilk is produced by using butterworth ((Pinguicula vulgaris), which is a special plant that grows on the moors. In the early season the leaves were picked and washed before they were put in a little wooden bowl with lukewarm milk. The milk thickened into a milk culture that could be used over again to produce more tjukkmilk. Tjukkmilk had never been commercially distributed until the dairy at Røros (Rørosmeieriet) started to produce it in 1995, using a collection of cultures derived from butterworth. Today, six different local and traditional products, including tjukkmilk, are exclusively processed at and sold by Rørosmeieriet. In 2004, tjukkmilk was the first Norwegian food product to be granted a Protected Geographical Indication (PGI)* (Amilien, Torjusen & Vittersø, 2005).

In the 1990s, the Sogn og Fjordane University College initiated a local project studying commonly used pollard trees in the county. This included documenting traditional techniques to use pollard trees as fodder. At present, restoring and maintaining pollard trees is a state supported activity under the environment measures of the agricultural agreement.

The Lyngheisenter in Lindås municipality north of Bergen is a living museum exploring and teaching old management techniques for the maintenance of coastal heathlands. The maintenance of coastal heathlands is also supported in the Regional Environment Programme.

There are also examples where knowledge of traditional practices have been translated into practical measures for landscape management. Bioforsk Midt-Norge, Kvithamar uses pertinent information from historic literature in the preparation of field guides for the maintenance of cultural landscapes, such as «Bondens kulturmarksflora» (Bele & Norderhaug, 2008).
The "Man and natural heritage" project (Mennesket og naturarven) aims to collect knowledge on how natural resources were used by Norwegians in the past, at the time when fishermen, farmers and forest-dwellers were living closer to nature. This knowledge contributes to improve the management of, inter alia, protected areas and threatened species, as well as of selected nature types and cultural landscapes. The "Man and natural heritage" project is led by the Norwegian Environment Agency and the Norwegian Nature Inspectorate in close cooperation with relevant institutes and organisations, including the Sámi University

College that is responsible for the Arbediehtu ("inherited knowledge") project. The latter project is described in more detail in question 38.

Additional knowledge about the maintenance of traditionally managed agricultural landscapes can be found in Norderhaug, A., Austad, I., Hauge, L. and Kvamme, M. (1999). Skjøtselshåndboka for kulturlandskap og gamle norske kulturmarker. Landbruksforlaget.

*PGI is one of three European Union schemes to promote and protect names of quality agricultural products and foodstuffs. It is based on the legal framework provided by the EU Regulation No 1151/2012 on quality schemes for agricultural products and foodstuffs. This Regulation ensures that only products genuinely originating in that region are allowed to be identified as such in commerce. The PGI scheme protects the reputation of the regional foods, promotes rural and agricultural activity, helps producers obtain a premium price for their authentic products, and eliminates the unfair competition and misleading of consumers by non-genuine products, which may be of inferior quality or of different flavour.

33. Provide any available information on gender dimensions with respect to the maintenance of and knowledge about associated biodiversity. These may include differences in the roles and insights of women and men with respect to maintaining particular resources, monitoring their state, overseeing their management at different stages of production or ecosystem management.

The eider tradition on the Vega archipelago

The Vega archipelago is the area of the eider duck. For more than 1000 years, the islanders have made nests for hundreds of birds during spring, using seaweed, driftwood shelters and building small houses of stones. While the men were out fishing, the women looked after the eiders on their property, ensuring they got the peace and quiet they needed to nest. They helped themselves to half of the fresh eggs and collected the eider down once the birds had left the nest for the last time. Once cleaned and processed, they sold the down, which was an outstanding and valuable export commodity from Norway to Europe, giving them around half of their annual income.

The eider population declined significantly when the inhabitants abandoned the islands from the 1960s onwards. American mink ravaged most of the former down sites during the 1980s and -90s, and only a few eiders nested in the houses the islanders had built for them. When the Vega Archipelago was awarded the World Heritage status in 2004, the eider tradition was revived on more and more islands. In 2009, 1271 birds nested at seven of the old down-collecting sites and nearly 3000 houses and nests were made. Eighteen bird tenders are now preserving the tradition, as opposed to six or seven in 2000.

The annual global production of cleaned eider down is approximately 2000 kg. The people of Vega and the surrounding district, particularly women, still manually clean the down. It takes a couple of weeks to clean one kilogram of down, as the down needs to be dried, shaken, rough-cleaned and then fine-cleaned.

Source: Verdensarv Vegaøyan

State and trends of wild resources used for food

34. **Provide in Table 14 a list of wild food species known to be harvested, hunted, captured or gathered for food in your country, and that are not already included in a completed or ongoing Country Report on Forest, Aquatic, Animal or Plant Genetic Resources. Indicate in or around which production system the species is present and harvested, and the change in state of the species over the last 10 years (strongly increasing (2), increasing (1), stable (0), decreasing (-1), or strongly decreasing (-2), or not known (NK)). Indicate where differences within species have been identified and characterized.**

Table 14. Wild species used for food in the country.

Species (local name)	Species (scientific name)	Production systems or other environments in which present and harvested	Change in state (2,1,0,-1,-2, NK)	Differences within species identified and characterized (Y/N)	Source of information

Species (local name)	Species (scientific name)	Production systems or other environments in which present and harvested	Change in state (2,1,0,-1,-2, NK)	Differences within species identified and characterized (Y/N)	Source of information
Moose (elg)	Alces alces	O1	0/-1 34,939 felled in 2012/2013 hunting season. Number of felled moose decreased by 2.9% between 2009 and 2013	N	SSB
Grouse (Rype)	Lagopus sp. (two species are hunted in Norway: Lagopus lagopus and Lagopus muta)	Lagopus lagopus mainly lives in the birch forest below the tree line (O1) Lagopus muta lives north of the Polar circle and in mountainous areas above the tree line.	-2 119,900 felled in 2012/2013 hunting season. Number of felled grouse decreased by 61.7% between 2007 and 2013	N	SSB
Red deer (hjort)	Cervus elaphus	O1	0/+1 36,141 felled in 2012/2013 hunting season. Number of felled red deer decreased by 4.2% between 2009 and 2013	N	SSB
Roedeer (rådyr)	Capreolus capreolus	O1	+1 26,690 felled in 2012/2013 hunting season. Number of felled roedeer decreased by 10.6% between 2007 and 2013	N	SSB
Wild reindeer (villrein)	Rangifer tarandus	Mainly live in the mountains above the tree line, but may use birch forests (O1)	0 7,140 felled in 2012/2013 hunting season. Number of felled wild reindeer increased by 40.1% between 2009 and 2013	N	SSB

Species (local name)	Species (scientific name)	Production systems or other environments in which present and harvested	Change in state (2,1,0,-1,-2, NK)	Differences within species identified and characterized (Y/N)	Source of information
Wild boar (blacklisted) (villsvin)	Sus scrofa	C12/L4/M12/O1 Is present in the southeastern part of Norway, in a few municipalities of Østfold county	1	N	Norwegian Biodiversity Information Centre
Arctic raspberry (åkerbær)	Rubus arcticus	O1/at the edges of cleared fields and in old pastures	NK	NK	Norwegian Genetic Resource Centre
Blackberry (bjørnebær)	Rubus fructicosus	O1 / heather It mostly occurs on the islands in the Oslo fjord and along the southern coast towards the fjords of the western part of the country.	NK 16 out of the 40 identified blackberry varieties are red-listed	Y (40 different varieties identified)	Norwegian Genetic Resource Centre
Blackcurrant (solbær)	Ribes nigrum	O1	NK	NK	Norwegian Genetic Resource Centre
Blackthorn (slåpetorn)	Prunus spinosa	O1 It particularly grows along Norway's southern coast.	NK	NK	Norwegian Genetic Resource Centre
Cranberry (tranebær)	Oxycoccus vaccinium	O1	NK	NK	Norwegian Genetic Resource Centre
Cloudberry (molte)	Rubus chamaemorus	O1 Is found on mires, in forests and in mountain areas	0 (period 2006-2010)	NK	Norwegian Genetic Resource Centre / Artsdatabanken
Crowberry (krekling/krøkebær)	Empetrum nigrum	O1 Is found both in forests and mountains	NK	NK	Norwegian Genetic Resource Centre
European Black Elderberry (svarthyll)	Sambucus nigra	At the edge of forests (O1)	NK	NK	Norwegian Genetic Resource Centre
Bilberry (blåbær)	Vaccinium myrtillus	O1	-1/0 The Northern bilberry (Vaccinium uliginosum) is not on the Red List. It is quite common and its population does not seem to be declining	Y	Norwegian Genetic Resource Centre / the state of bilberries is monitored by the Norwegian National Forest Inventory (Landskogtakseringen)

Species (local name)	Species (scientific name)	Production systems or other environments in which present and harvested	Change in state (2,1,0,-1,-2, NK)	Differences within species identified and characterized (Y/N)	Source of information
Lingonberry (tyttebær)	Vaccinium vitis-idaea	O1	NK	NK	Norwegian Genetic Resource Centre
Northern bilberry (blokkebær)	Vaccinium uliginosum	O1	-1 (had vulnerable status on red list in 2006 and became critically endangered on the 2010 red list)	NK	Norwegian Genetic Resource Centre / Norwegian Biodiversity Information Centre
Raspberry (bringebær)	Rubus idaeus	O1	0 (period 2006-2010)	NK	Norwegian Genetic Resource Centre / Artsdatabanken
Redcurrant (hagerips)	Ribes rubrum	O1	NK	NK	Norwegian Genetic Resource Centre
Sea buckthorn (tindved)	Hippophae rhamnoides	Seashore	NK	NK	Norwegian Genetic Resource Centre
Wild cherry (morell)	Prunus avium	O1	NK	NK	Norwegian Genetic Resource Centre
Wild strawberries (markjordbær)	Fragaria vesca / Fragaria vesca sempervirens	O1	NK	NK	Norwegian Genetic Resource Centre
Hedgehog mushroom (Blek piggsopp)	Hydnum repandum	O1	NK	NK	Norwegian Association of Fungi and Useful Plants
Saffron Milk Cap mushroom (Furumatriske)	Lactarius deliciosus	O1	NK	NK	Norwegian Association of Fungi and Useful Plants
Forest Lamb mushroom (Fåresopp)	Abatrellus ovinus	O1	NK	NK	Norwegian Association of Fungi and Useful Plants
False Saffron Milk Cap mushroom (Granmatriske)	Lacatarius deterrimus	O1	NK	NK	Norwegian Association of Fungi and Useful Plants
Russula decolorans (Gulrød kremle)	Russula decolorans	O1	NK	NK	Norwegian Association of Fungi and Useful Plants
Yellow Foot mushroom (Gul trompetskantarell)	Craterellus lutescens	O1	NK	NK	Norwegian Association of Fungi and Useful Plants

Species (local name)	Species (scientific name)	Production systems or other environments in which present and harvested	Change in state (2,1,0,-1,-2, NK)	Differences within species identified and characterized (Y/N)	Source of information
Grass-green Russula (Grønnkremle)	Russula aeruginea	O1	NK	NK	Norwegian Association of Fungi and Useful Plants
Chanterelle (Kantarell)	Cantharellus cibarius	O1	NK	NK	Norwegian Association of Fungi and Useful Plants
Gypsy mushroom (Rimsopp)	Cortinarius (Rozites) caperata	O1 / heather/ bilberry	NK	NK	Norwegian Association of Fungi and Useful Plants
Terracotta Hedgehog mushroom (Rødgull piggsopp)	Hydnum rufescens	O1	NK	NK	Norwegian Association of Fungi and Useful Plants
Orange Birch Bolete mushroom (Rødskrubb)	Leccinum versipelle	O1	NK	NK	Norwegian Association of Fungi and Useful Plants
Velvet Bolete mushroom (Sandsopp)	Suillus variegatus	O1	NK	NK	Norwegian Association of Fungi and Useful Plants
Slimy Spike-cap mushroom (Sleipsopp)	Gomphidius glutinosus	O1	NK	NK	Norwegian Association of Fungi and Useful Plants
Penny Bun/Porcino/ Cep (Steinsopp)	Boletus edulis	O1	NK	NK	Norwegian Association of Fungi and Useful Plants
Sheathed Woodtuft (Stubbeskjellsopp)	Kuehneromyces mutabilis	O1	NK	NK	Norwegian Association of Fungi and Useful Plants
Black Trompet mushroom (Svart trompetsopp)	Craterellus cornucopioides	O1	NK	NK	Norwegian Association of Fungi and Useful Plants
Funnel Chanterelle (Traktkantarell)	Craterellus tubaeformis	O1	NK	NK	Norwegian Association of Fungi and Useful Plants
Rowan (Rogn)	Sorbus aucuparia	L4/O1 (often at the edge of forests and open landscapes)	0	Y	(Grundt & Salvesen, ,2011)
Other Sorbus species (Rogn og Asal)	S. hybrida, S. subarranensis, S. sognensis and S. meinichii	L4/O1(often at the edge of forests and open landscapes)	0	Y	(Grundt & Salvesen, ,2011)

Species (local name)	Species (scientific name)	Production systems or other environments in which present and harvested	Change in state (2,1,0,-1,-2, NK)	Differences within species identified and characterized (Y/N)	Source of information
Stone bramble (Teiebær)	Rubus saxatilis	O1	NK	NK	Norwegian Genetic Resource Centre
Hackberry (Heggebær)	Prunus padus	O1	NK	NK	Store Norske Leksikon (https://snl.no)
Common Juniper (Einerbær)	Juniperus communis	L4	NK	NK	Store Norske Leksikon (https://snl.no)
Shaggy ink cap (Matblekksopp)	Coprinus comatus	L4	NK	NK	Norwegian Association of Fungi and Useful Plants
Black grouse (Orrfugl)	Tetrao	L4/O1	-1 14,620 felled in the 2013/2014 hunting season. Number of felled Black grouse decreased by 46.6% between the 2008/2009 and the 2013/2014 hunting season	NK	SSB
Capercaillie (Storfugl)	Tertao urogallus	L4/O1	NK 7,400 felled in the 2013/2014 hunting season. Number of felled capercaillie decreased by 37.5% between the 2008/2009 and the 2013/2014 hunting season	NK	SSB
Hare / European hare	Lepus timidus / Lepus europeaus	L4/O1	0 15,490 felled in the 2013/2014 hunting season. Number of felled hare decreased by 33.5% between the 2008/2009 and the 2013/2014 hunting season	NK	SSB

Species (local name)	Species (scientific name)	Production systems or other environments in which present and harvested	Change in state (2,1,0,-1,-2, NK)	Differences within species identified and characterized (Y/N)	Source of information
Beaver (Bever)	Castor fiber	L4/O1 (wetlands)	+1 3,200 felled in the 2000/2001 hunting season. Number of felled bevers decreased by 36% between the 1992/1993 and the 2000/2001 hunting season	NK	SSB
Wild goose			NK	NK	
RECREATIONAL FISHING					NOTE: the fish species listed below were extracted from a brochure published by the Directorate of Fisheries to inform recreational fishers on the minimum fish size regulations (http://www.fiskeridir.no/english/recreational-fishing/minimum-sizes)
Cod	Gadus morhua	A4 (marine environment)	2		Directorate of Fisheries / Institute of Marine Research
Haddock	Melanogrammus aeglefinus	A4 (marine environment)	2		Directorate of Fisheries / Institute of Marine Research
Hake	Merluccius merluccius	A4 (marine environment)	1		Directorate of Fisheries / Institute of Marine Research
Halibut / Greenland halibut	Hippoglossus hippoglossus / Reinhardtius hippoglossoides	A4 (marine environment)	1 / NK (available data not conclusive enough)		Directorate of Fisheries / Institute of Marine Research
Plaice	Pleuronectes platessa	A4 (marine environment)	1		Directorate of Fisheries / Institute of Marine Research

Species (local name)	Species (scientific name)	Production systems or other environments in which present and harvested	Change in state (2,1,0,-1,-2, NK)	Differences within species identified and characterized (Y/N)	Source of information
Grey sole / Lemon sole / Dover sole	Glyptocephalus cynoglossus / Microstomus kitt / Solea solea	A4 (marine environment)			Directorate of Fisheries
Common dab	Limanda limanda	A4 (marine environment)			Directorate of Fisheries
Turbot	Scophthalmus maximus	A4 (marine environment)			Directorate of Fisheries
Brill	Scophthalmus rhombus	A4 (marine environment)			Directorate of Fisheries
Sailfluke	Lepidorhombus whiffiagonis	A4 (marine environment)			Directorate of Fisheries
Whiting	Merlangius merlangus	A4 (marine environment)	NK (available data not conclusive enough)		Directorate of Fisheries / Institute of Marine Research
Flounder	Platichthys flesus	A4 (marine environment)			Directorate of Fisheries
Redfish	Sebastes marinus / Sebastes mentella	A4 (marine environment)	-1 / +1		Directorate of Fisheries / Institute of Marine Research
North Sea herring/ Norwegian spring spawning herring, Herring fished in Skagerrak	Claupea harengus / Clupea harengus	A4 (marine environment)	+1 / -1		Directorate of Fisheries / Institute of Marine Research
Crayfish	Homarus gammarus	A4 (marine environment)			Directorate of Fisheries
Crab	Pleocyemata	A4 (marine environment)			Directorate of Fisheries
Iceland scallop / Large scallop	Chlamys islandica / Placopecten magellanicus	A4 (marine environment)			Directorate of Fisheries
ADDITIONAL INFORMATION IS PROVIDED IN ANNEX I TO THIS QUESTIONNAIRE					

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Wild food resources at risk

In this section the objective is to identify uncultivated and wild species used for food within the country that are at significant risk of loss.

35. **List in Table 15 any wild food species for which there is evidence of a significant threat of extinction or of the loss of a number of important populations in your country. Specify the degree of threat according to the classification in use in your country or following the IUCN Red List Categories And Criteria. Include a description of the threat and list references or sources of information if available.**

Table 15. Main threats to wild food species identified as at risk.

Wild food species (scientific name)	Degree of threat	Main threat	References or sources of information if available
Wild plants, berries and edible fungi varieties	SEE NOTE IN TEXT BOX BELOW The degree of threat seems to be relatively stable as there have been few actual changes in the populations of threatened and near threatened species in Norwegian territory between 2006 and 2010. (NB: as there are few population data to rely upon for many groups of species, the 2010 Red List may not give a representative picture of the actual changes over this 4-year time period).	- Land-use changes (discontinued grazing, discontinued haymaking, discontinued burning of heather) - forestry (clearfelling can also have a positive effect on certain berry species, such as raspberry, bilberry and lingonberry), selective felling, changing tree species, forestry roads, extinguishing forest fires (can also have a positive effect)) - associated land use change: housing construction, infrastructure, felling special trees, business development, sand and gravel extraction/ dumping - pollution (fertilisation both terrestrial and aquatic, biocides, organic and inorganic pollutants, acid precipitation) - climate change - harvesting - invasive alien species, such as wild boar (Sus scrofa) and raccoon dogs ((Nyctereutes procyonoides)	The 2006 and 2010 Norwegian Red Lists for Species More information on the impact of raccoon dogs on Norway's flora and fauna is available (in Norwegian) at: http://www.miljodirektoratet.no/old/dirnat/attachment/502/M%C3%A5rhund-hefte.pdf
Marine species	The degree of threat seems to be relatively stable as there have been few actual changes in the populations of threatened and near threatened species in Norwegian territory between 2006 and 2010. (NB: as there are few population data to rely upon for many groups of species, the 2010 Red List may not give a representative picture of the actual changes over this 4-year time period).	Destruction of habitat, changing sea temperature (CC), other forms of commercial exploitation, use of environmental pollutants, filling in and draining (and also overgrowing) of small lakes, ponds and streams	The 2010 Norwegian Red List for Species

Wild food species (scientific name)	Degree of threat	Main threat	References or sources of information if available
Wild mammals and birds	Hunting is highly regulated and closely monitored and is therefore a "stable threat". Unregulated hunting is illegal and forms a threat to some species of wild mammals and birds. The number of traffic killed individuals is available for only a few species. Traffic killed moose and deer increased from 2007 to the winter of 2009, reaching almost 7,500 animals (with the total number of individuals being close to 450,000) (Solberg et al., 2009).	Illegal hunting and traffic	- SSB - National monitoring program for wild cervids (moose, red deer, wild reindeer) of the Norwegian Institute for Nature Research (NINA)

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Provide information, where available, as to how the loss of wild food species affects the livelihoods of those that depend on them and on the general impact of their loss on food security and nutrition. Include references to the sources of information, if possible.

This text box is non-expandable. Relevant information is provided in Annex I to this questionnaire.

Conservation of wild resources used for food

36. **Are any *ex situ* conservation or management activities or programmes established in your country for wild food species? These may include, for example, culture collections, collections of insects, fungi, etc. If so, list these in Table 16.**

Table 16. *Ex situ* conservation or management activities or programmes for wild food species.

Wild food species conserved (scientific name)	Size of collection (number of accessions and quantities)	Conservation conditions	Objective(s)	Characterization and evaluation status
Onion/leek (Allium sp.)	40 (approx.)	Seed and field gene bank	Conservation and use	Sparse C&E data
Angelica, Holy Ghost (Angelica archangelica ssp. archangelica)	8	Seed and field gene bank	Conservation and use	Sparse C&E data
Common Caraway (Carum carvi)	62	Seed gene bank	Conservation and use	Some C&E data available
Blackberry (Rubus fructicosus)	21	Field gene bank	Conservation and use	Botanical data available
Red currants (Ribes spicatum and Ribes rubrum)	18	Field gene bank	Conservation and use	Some C&E data available
Plums (prunus sp.)	about 40	Field gene bank	Conservation and use	Ongoing C&E project

Wild food species conserved (scientific name)	Size of collection (number of accessions and quantities)	Conservation conditions	Objective(s)	Characterization and evaluation status
Rowan (Sorbus spp.) The most relevant species (traditionally) used as sources of food, include: Sorbus aucuparia, Sorbus hybrida, S. subarranensis, S. sognensis, and S. meinichii. A particular form of S. meinichii called "Faegriana" is being promoted for the production of jam and other preserves.	231 accessions (2014) (This figure is extracted from a database from the Arboretum and Botanical Garden, Milde, including a list of all Sorbus spp. accessions; it is unclear how many of them are under cultivation in the arboretum)	The Sorbus accessions are conserved at the Arboretum and Botanical Garden, Milde, mostly as seeds, some as plants. In average, 2 or 3 trees are planted per accession. The low number can be explained by the Sorbus' predominant apomictic mode of reproduction.	Research (species delimitation, phylogeny and evolution), ex situ conservation, and evaluation for use in horticulture and other purposes	The Sorbus spp. are phenotypically and phylogenetically characterized
HERBS, MEDECINAL AND AROMATIC PLANTS				
Oregano (Origanum vulgare)	36 clones	Field gene bank	Conservation and use	Some C&E data available
Common hop (Humulus lupulus)	39	Field gene bank	Conservation and use	Some C&E data available
Common tansy (Tanacetum vulgare)	44	Field gene bank	Conservation and use	Some C&E data available
Ostrich fern (Matteuccia struthiopteris)	19	Field gene bank	Conservation and use	Some C&E data available
Rose root (Rodiola rosea)	97 clones			
Blackberry (Rubus fruticosus)	30 blackberry varieties are conserved in a field genebank by Bioforsk Landvik in Grimstad		- for future plant breeding - as a back-up for threatened varieties in nature	
Comments: - conservation conditions of wild fruit shrubs/trees and of herbs, medicinal and aromatic plants are generally good. The level of safety duplication could however be improved. - there is no common database available including information on the characterization and evaluation status of these collections. Some species have been investigated quite thoroughly in the institutions that keep them. - more information on ex situ conservation of wild plants will become available later in 2014.				

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37. **Are any *in situ* conservation and management activities or programmes established in your country that supports maintenance of wild food species? If so list these in Table 17 provide the following information for each activity or program: site name and location, production system(s) involved, conservation objective and specific actions that secure wild food species (if any).**

Table 17. *In situ* conservation or management activities or programmes for wild food species.

Wild food species conserved (scientific name)	Site name and location	Size and environment	Conservation objective(s)	Actions taken
European crab apple (Malus sylvestris)			The European crab apple (or wild apple) is a relatively rare species in Norway, which is under threat of hybridisation with cultivars. Both in situ and ex situ conservation activities could ensure the conservation of the species' genetic diversity.	Research to develop a conservation strategy for Malus Sylvestris has been finalized in December 2014. Reference: Norwegian Genetic Resource Centre
200 crop wild relative (CWR) species have been prioritized for in situ conservation (Project: Establishment of PGR in situ conservation in protected areas in Norway)	The Project is ongoing. It aims to: 1. identify the optimum number of in situ conservation sites to conserve a maximum part of the genetic diversity within the most important CWR in Norway; and 2. clarify how many in situ conservation sites are needed to conserve 99% of the alleles coding for adaptive traits of the 5 most important CWR in Norway.	Research activities are taking place in protected areas	Sustained genetic diversity within crops and their wild growing relatives (Aichi target 13)	By March 2014, 200 CRW species were identified as prioritized species for in situ conservation. Reference: Norwegian Genetic Resource Centre
			Population and habitat management	
			Population and habitat management	

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38. What activities are undertaken in your country to maintain traditional knowledge of wild food species (indicate if the extent to which these have already been described in sector reports)? How can traditional knowledge of wild food species be accessed and used to inform conservation and use decisions?

While traditional knowledge of wild food species, such as of wild fruits, wild plants and edible fungi, is in general reducing, initiatives are being undertaken to reverse this trend.

TRADITIONAL KNOWLEDGE
The Árbediehtu ("inherited knowledge") project was developed and is being carried out by the Sámi University College. It aims to collect, document and systematize the traditional knowledge and methods Sámi have been utilizing for generations to manage the natural resources, including wild food species, that are key to their livelihood (birgejupmi). This knowledge has so far mainly been transferred from one generation to the next through verbal communication and by practice. The Project's work

is aligned with the conventions and declarations that were ratified by Norway and are of relevance to Indigenous Peoples and Local Communities.
The Project's long-term goal is to support Sámi communities in developing a sustainable livelihood, through: (i) the preservation of traditional knowledge; (ii) the inclusion of traditional knowledge in educational programmes; and (iii) the use of traditional knowledge in decision making processes on the conservation and sustainable use of biological diversity.

TRADITIONAL FARMING PRACTICES
During the 20th century, a series of government supported ethnological registration projects were carried out to document traditional farming practices and their related knowledge. The results of these projects, reflected in monographs and short publications, are stored in museum- and archive-collections. In this context, the history of traditional plants used in Norwegian cuisine and medicine were mapped for some of the approximately 107 plant species in the Norwegian wild flora (e.g. the history of Garden Angelica (Angelica archangelica) has been documented back to the 11th century). Interested individuals also contribute to maintain knowledge on the traditional use of wild food species (http://jaersoppen.org/Sopp_og_nyttevekster/Siste_nytt/Innlegg/2013/10/4_Hstmte_17._oktober_kl._19.00_i_Rogaland_arboretet..html).

The "Man and natural heritage" project (Mennesket og naturarven) aims to collect knowledge on how natural resources were used by Norwegians in the past, at the time when fishermen, farmers and forest-dwellers were living closer to nature. This knowledge contributes to improve the management of, inter alia, protected areas and threatened species, as well as of selected nature types and cultural landscapes. The "Man and natural heritage" project is led by the Norwegian Environment Agency and the Norwegian Nature Inspectorate in close cooperation with relevant institutes and organisations, including the Sámi University College that is responsible for the Árbediehtu ("inherited knowledge") project.

Similar to other farming systems, herding and range management involve traditional practices. With more than 50% of Norway's agricultural land being rented out, the knowledge of such practices has had a declining tendency. The government has been implementing economic and political measures, including grant systems to maintain and enhance traditional farming methods, such as, for example, small-scale transhumance. The main objective of such measures is to preserve certain fields, farmland and landscapes and conserve their richness and diversity in grasses and legume species (Asdal, 2008).

To a certain extent, hunting and fishermen's associations have also undertaken efforts to maintain and disseminate traditional hunting and fishing practices.

39. Provide any available information on gender dimensions with respect to the maintenance of and knowledge about wild food species. These may include differences in the roles and insights of women and men with respect to harvesting particular resources, monitoring their state, overseeing their ecosystem management.

For the documentation of Sámi traditional knowledge in the context of the Árbediehtu project (described in question above), ethical guidelines were prepared (Nordin Jonsson, 2011). The guidelines include a section on "male and female traditional knowledge" to acknowledge the fact that Sámi "male and female traditional knowledge" differs because women and men have/had different responsibilities, tasks and roles in life. The traditional knowledge of Sámi women can be linked to family life (include the preparation of food), the home/hut and the vicinity of the settlement(s), since they tended/tend to be more stationary. Female traditional knowledge has generally been documented to a lesser extent than male traditional knowledge (Grenier, 1998).

Hunting, fishing, berry picking and mushrooming

In terms of hunting on wild animals, a total of 137,240 hunters participated in the 2012/2013 hunting season, 5.9% (about 8,000) of which were women. While this percentage slightly decreased in the 2013/2014 hunting season, it had shown a rising trend for five consecutive hunting seasons between 2008 and 2013 (SSB).

Salmon fishing in Norway is still a male-dominated activity. In 2008, only 5% of the Norwegian salmon anglers were women (Tangeland et al., 2008).

In 2012, Statistics Norway estimated that there were 1,6 million annual berry pickers in Norway, men in age groups 16 to 24 being the least involved. In Northern Norway, about 51% of the population is estimated to pick berries on an annual basis, followed by 50% in Trønderlag, 39% in Østlandet (excluding the inhabitants of Oslo and Akershus), 29% in Vestlandet and 28% in Agder and Rogaland. In the northern part of the country, cloudberry is the most harvested berry species, in other regions, billberry, lingonberry and raspberry are the most commonly picked species. Regarding the gender distribution of berry pickers, more women than men seem to identify themselves as berry pickers (http://www.nationen.no/tunmedia/helt-hekta-pa-baerplukking/). Between 2002 and 2012, the total number of berry pickers declined by slightly less than 3% (http://www.ringblad.no/kultur/article6827286.ece).

Contrary to most other outdoor activities, berry and mushroom picking is especially popular among the older share of the

population. In 2012, 36% of adults aged 67 and over were engaged in either of these two activities at least once over a twelve months period. Together with horseback riding, berry and mushroom picking are the only outdoor activities where women are more active than men (http://www.hegnar.no/kvinner/artikkel15985.ece).

Natural or human-made disasters and biodiversity for food and agriculture

This section collects information on natural or human-made disasters and their impact on and response from biodiversity for food and agriculture as a whole.

40. **Has your country experienced any natural or human-made disaster(s) that has had a significant effect on biodiversity for food and agriculture and/or on ecosystem services in the past 10 years? List in Table 18 those for which any information exists on their effect on biodiversity for food and agriculture and/or ecosystem services. Indicate the effect on different components or services as significant increase (2), increase (1), no change (0), some loss (-1), significant loss (-2), or not known (NK).**

Table 18. Natural or human-made disasters that has had a significant effect on biodiversity for food and agriculture in the past 10 years in the country.

Disaster description	Production system(s) affected (code or name)	Effect on overall biodiversity for food and agriculture (2, 1, 0, -1, -2, NK)	Effect on ecosystem services (2, 1, 0, -1, -2, NK)
THE CHERNOBYL DISASTER significantly affected human use of wild foods. Three decades onwards, Norway still feels the effects of the 1986 nuclear accident at Chernobyl, Ukraine. The accident has led to the contamination of mountainous and grazing areas, particularly in the central part of the country, affecting both sheep and Sámi reindeer pastures. Major quantities of meat had to be destroyed in the years following Chernobyl, and even today, mushroom and grass-eating sheep are being measured for radioactivity and treated if necessary. Trout fishing was also affected by local fall-out of radioactive cesium after Chernobyl.	L4	0	-1

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41. Briefly summarize any available information, including the year of the disaster, a description of the effects of the disaster on the different components of biodiversity for food and agriculture and/or on the effects on ecosystem services, and references to the supporting documentation.

The Chernobyl disaster, that occurred in 1986 at the Chernobyl nuclear power plant in Ukraine, has had a significant impact on different components of biodiversity for food and agriculture in Norway. As a result of this accident and unfavorable rain patterns, reindeer pastures south of Saltfjellet (Nordland) were significantly contaminated by large amounts of radioactive cesium (134Cs and 137Cs). In the autumn of 1986, the average cesium concentration in reindeer in the hardest hit areas was of 50,000 becquerels per kilogram. Large amounts of reindeer in the southern grazing lands could no longer be used for human

consumption. The first year after the Chernobyl accident in 1986, the reindeer industry received USD 3.7 million in compensation for the reindeer meat it had not been able to sell. From 1986 to 1987 a method for measuring radioactive cesium in living reindeer was developed and two years after the accident special feeding schemes and early slaughter were introduced to avoid having to dispose of large quantities of meat. Despite such measures, compensation was granted to affected reindeer herders until 1990. Even if the contamination degree of pastures has been reducing naturally, still today measures need to be taken to reduce cesium levels in reindeer to avoid having to discard meat. Parallel to the decreasing effects of Chernobyl, the government reduced its payments into radioactivity schemes. In recent years, the government invested approximately USD 430,000 per year to this end.

Particularly In the central part of the country, the disaster has led to the contamination of mountainous and grazing areas, affecting both sheep and Sámi reindeer pastures south of Saltfjellet (Nordland). In addition, the accident particularly affected the domestic reindeer herding sector. Major quantities of meat had to be destroyed in the years following Chernobyl, and even today, mushroom and grass-eating sheep are being measured for radioactivity on a regular basis. If necessary, sheep and reindeer are treated using the “foddering down” method. *The "foddering down" process involves feeding the animals a controlled cesium-free diet, sometimes laced with a cesium binder (normally ferrocyanides of iron, also known as Prussian blue) six weeks prior to slaughtering.

In 2014, several places in the central areas of Valdres and Gudbrandsdalen have seen measurements as high as 4,500 becquerels per kilo of sheep meat, which is seven times higher than the 600 Becquerel allowed for sheep by the Norwegian Radiation Protection Authority (NRPA). The exceptionally good summer and autumn mushroom seasons are believed to be the main cause behind these exceptionally high measurements. Sheep are particularly fond of mushrooms, which are known to accumulate cesium.

Combatting the effects of Chernobyl has cost Norway over 650 million kroner.

LOCAL POLLUTION
In Table 18. no reference is made to the long term and significant pollution of several fjords, rivers and harbor areas, as these are human-made, but may not be considered a disaster. However, such local pollution has led to eating restrictions in terms of sea- and river food.

Sources: The Foreigner (Norwegian news in English), 17 September 2009, 21 February 2012, 20 October 2014.

42. **Provide any available evidence from your country that changes in biodiversity for food and agriculture caused by natural or human-made disasters have had an effect on livelihoods, food security and nutrition.**

As described in the previous question, the Chernobyl disaster clearly had an impact on he livelihoods of the Sámi. The contamination of their reindeer affected both their food supply and their economic situation.

Cesium permeated freshwater lakes and inland forests, contaminating fish, wild game, berries and other plants (Stephens, 1995). Most detrimental was the contamination of lichen, the main winter staple of reindeer. Having no root system, lichens extract nutrients directly from the air, thereby acting as virtual radioactive sponges, absorbing incredible amounts of airborne cesium and passing it straight onto the deer. The effects of the contaminated lichen were not fully realized until after the first post-Chernobyl autumn slaughter season, when scientists began to measure levels of radioactivity in slaughtered reindeer. The Norwegian government then quickly took action, regulating the meat industry by instituting bequerel safety levels and offering compensation to affected herders.

“There is no clear evidence, at this point, of significant health or reproductive problems in post-Chernobyl Sámi areas” (Stephens, 1995.) It would however be a fallacy to say that health damage has not occurred simply because of lack of conclusive proof.

Chernobyl has also affected Sámi cultural and traditional practices. Sámi reindeer herders have traditionally eaten meat and used remains of deer taken from their family herd. Encouraged by the government, many Sámi herders continued to herd and slaughter as normal, even if many of the reindeer they raised were disposed of due to their radioactivity levels. The destruction of herds did interrupt the sharing of traditional herding (Stephens, 1995).

The Sámi managed to overcome the devastating effects of the nuclear explosion as a result of the many arduous measures taken (i.e. governmental subsidies to compensate for contaminated deer; the introduction of artificial fodder and the importation of lichen by herders to feed their herds and combat the use of contaminated lichen; and scientists pioneering with radionuclide-bonding pellets to mix with fodder).

43. **Provide any available evidence that the enhanced use of biodiversity for food and agriculture has contributed to improving livelihoods, food security and nutrition in the context of a natural or human-made disasters. Describe and**

provide source of information.

Not relevant.

Invasive alien species and biodiversity for food and agriculture

44. **Are there invasive alien species identified in your country that have had a significant effect on biodiversity for food and agriculture in the past 10 years? List in Table 19 those for which any information exists on their effect on biodiversity for food and agriculture and/or ecosystem services. Indicate the effect on different components or services as strong increase (2), increase (1), no effect (0), some loss (-1), significant loss (-2), or not known (NK).**

Table 19. Invasive alien species that have had a significant effect on biodiversity for food and agriculture in the past 10 years.

Invasive alien species (scientific name)	Production system(s) affected (code or name)	Effect on components of biodiversity for food and agriculture (2,1,0,-1,-2, NK)	Effect on ecosystem services (2,1,0,-1,-2, NK)
Harmonia axyridis	C12	-2	-1
Honey bee (Apis Mellifera)	C12	-1 competition with native pollinators, including endangered wild bees like Andrena hattorfiana	-1
Varroa destructor	C12	-1 Parasite on honey bees that leads to increased winter losses of honey bee colonies (Dahle, 2009)	-1 reduces pollination by honey bees
Buff-tailed bumblebee (Bombus terrestris)	C12	-1 competes for resources with other bumblebees and may thus lead to a decline in their populations	-1
There might be several alien microsporidia and viruses affecting bumblebees negatively (e.g. Nosema ceranae)	C12	is not systematically monitored in Norway	is not systematically monitored in Norway
Spanish slug (Arion vulgaris)	C12	-1	-1
71 vascular plants, including the Himalayan balsam (Impatiens glandulifera)	C12	-1 Are attractive to many groups of pollinators, negatively affecting the pollinating success of native plant species by attracting individual pollinators, which would otherwise visit the native species, and by transporting pollen grains from the alien species to stigmas in native species, thus perhaps blocking the stigmas for correct pollen. Many studies have shown that this competition may have negative effects on the reproductive success of native plants (Bjerknes, Totland, Hegland & Nielsen, 2007).	-1

Invasive alien species (scientific name)	Production system(s) affected (code or name)	Effect on components of biodiversity for food and agriculture (2,1,0,-1,-2, NK)	Effect on ecosystem services (2,1,0,-1,-2, NK)
Himalayan balsam (Impatiens glandulifera)	C12	1	1 attracts pollinators, particularly the long-tongued garden bumblebee-Bombus hortorum, which increase the pollination of native species locally) (Vila et al., 2009). Alien species may also be sources of nectar to replace other plants that have declined due to changes in farming practices, for example.
Ash dieback fungus (Chalara fraxinea)	O1	-2	
Phytophthora spp.	C12/O1	-1	
Some 50 alien marine species are known in Norwegian waters, mostly microalgae, attached erect algae and invertebrates.	A4	-1	-1 Some plant plankton can have negative effects on fish, particularly in aquaculture.
Red elderberry (Sambucus racemosa)	O1	-1	Could have a negative effect on the regeneration of forest trees. Research on this species, that is not yet being systematically monitored, is ongoing.
European Edible Sea urchin (Echinus esculentus)	A4	-1	The importance of forests of the kelp Laminaria hyperborea along the Norwegian coast is related to the three dimensional structure that they create together with the associated macroalgae. Today, kelp forests have recovered in several areas after an extensive overgrazing by green sea urchins (Strongylocentrotus droebachiensis). However, red sea urchins (Echinus esculentus) have been observed grazing on kelp and algae in recently recovered kelp forests (Bekkby et al., 2014).

Invasive alien species (scientific name)	Production system(s) affected (code or name)	Effect on components of biodiversity for food and agriculture (2,1,0,-1,-2, NK)	Effect on ecosystem services (2,1,0,-1,-2, NK)
Snow crab (Chionoecetes opilio)	A4	-1	During the latest resource mission to the Barents Sea in 2013/2014, scientists found large amounts of young Snow crabs, which implies that the recruitment in the population is good. The Snow crab population in the Barents Sea exploded in 2012. The growth in the population of snow crab is enormous and will probably be an important part of the ecosystem in the Barents Sea. "Based on the experience we have form the king crab, we know that the snow crab can have a large impact on the bottom fauna. We hope to get more research on this field during this year's missions", Sundet says. The snow crab is a much more Arctic species than the king crab. They prefer much colder waters and have not spread to the southern parts of the Barents Sea where the king crabs have settled. http://barentsobserver.com/en/nature/2014/03/snow-crabs-have-found-niche-barents-sea-ecosystem-12-03

Invasive alien species (scientific name)	Production system(s) affected (code or name)	Effect on components of biodiversity for food and agriculture (2,1,0,-1,-2, NK)	Effect on ecosystem services (2,1,0,-1,-2, NK)
Red king crab (Paralithodes camtschaticus)	A4	-1	In 2002, the Institute of Marine Research launched a research programme on the impacts of the Red king crab on the Barents sea ecosystem. The programme focused on issues such as spreading, effects on bottom fauna, associated parasites etc. The investigations that were carried out in close co-operation with Russian scientists have shown that the crab feeds on a wide range of prey benthic animals, the preferred species being bivalves (Astarte spp), Mud starts (Ctenodiscus crispatus) and two species of Brittle starts (ophiuroids). Between 2001 to 2009, most probably due to the depletion of benthic prey, the king crab gradually moved from shallow to deeper waters .
This table is not exhaustive, it includes a selection of invasive alien species that are known to have an effect on biodiversity for food and agriculture in Norway. More information is provided in the publication "Alien species in Norway – with the Norwegian Black List 2012".			

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45. Briefly summarize any available information related to the invasive alien species listed in Table 19, including a description of the effects of the invasive alien species on the different components of biodiversity for food and agriculture and/or on the effects on ecosystem services, and references to the supporting documentation.

The document "Alien species in Norway-with the Norwegian Black List 2012" (the Norwegian Black List) provides an overview of a large number of alien species that are found in Norway (Gederaas et al., 2012). It also assesses the ecological impact of alien species that reproduce in Norwegian territories (how likely is a species to establish and spread and what is/could be its effect on biodiversity). Species with the greatest ecological impact form the 2012 Black List. The Norwegian Black List 2012 is supported by searchable databases containing more detailed information from the assessments, including the Species Map System (Artskart), Species Observation System (Artsobservasjoner) and Information system for Norwegian Habitat types (Naturtyper i Norge).

At present, the Norwegian Black List provides some information on the (possible) effects of individual alien species on ecosystems. This information is however not systematically documented in relation to the different components of biodiversity for food and agriculture and/or the delivery of related ecosystem services. Please see question 28. for other relevant aspects of the Norwegian Black List.

As an example, Harmonia axyridis, that is listed in Table 19 as an invasive alien species affecting rainfed crop production systems, the Norwegian Blacklist mentions that this Coccinellidae species originates from Asia and entered Norway as a stowaway with imported plants (Staverløkk, 2006). The species has established itself (eggs, larvae and pupae) in Oslo and Tvedestrand. It is an aggressive predator which very effectively eats almost all insect larvae and other Coccinellidae species,

irreversibly affecting ecological processes and becoming the dominating species. In a number of countries it has been deliberately introduced for biological control of animal and pests.

It is also important to note that Norway has a cross-sectoral strategy on invasive alien species, including the monitoring and combatting of invasive alien species. The operational and financial responsibilities for the implementation of this national strategy have been divided between the different ministries (Norwegian Ministry of the Environment, 2007).

46. Has biodiversity for food and agriculture contributed to managing the spread and proliferation or controlling established invasive alien species in your country? If yes, provide information on the invasive alien species involved, the components of biodiversity for food and agriculture and any indication on how the components of biodiversity contributed to managing the spread and proliferation or controlling established invasive alien species in your country. Provide references to the supporting documentation.

There are only very few examples of the possible contribution of biodiversity for food and agriculture to managing the spread and proliferation or controlling established alien species.

In 2008, Ash dieback disease, caused by the alien Ash dieback fungus (Chalara raxinea), spread to large areas in the southern part of Norway, affecting tree forests and nurseries, but also on roadside trees, and in gardens and parks. In 2009, the disease had spread to new areas in southwestern and southeastern Norway. However, some native forest tree types have shown to be genetically more resistant to the devastating disease. Identifying and breeding trees tolerant to the disease could significantly contribute to keeping the spread of the disease under control.

Similarities, differences and interactions

47. Comment on those aspects with respect to the state, trends and conservation of associated biodiversity or wild food biodiversity in relation to the state, trends and conservation of sector genetic resources. It would be helpful to provide your observations under the following headings:

a. main similarities between associated biodiversity, wild food diversity and the different sectors;
b. major differences between associated biodiversity, wild food diversity and the different sectors;
c. synergies or trade-offs between associated biodiversity, wild food diversity and the different sectors.

The responses should include relevant information on socio-economic, political and cultural dimensions as well as biological ones. Information on the significance of common characteristics, differences, synergies and trade-offs with respect to achieving food security and nutrition, sustainable production or the provision of ecosystem services should also be provided.

a. In situ conservation of genetic resources for food and agriculture, especially forest genetic resources, significantly contributes to the conservation of associated biodiversity and wild food diversity through the application of an ecosystem approach (conservation is one of the pillars of the sustainable forest management approach).
b. The status and trends of wild food diversity and the diversity within the different sectors has been better documented than the components of associated biodiversity. This is mainly due to the fact that the number of associated biodiversity species is much larger than the one in the other two categories.
c. Changing land use/agricultural practices (i.e. in the case of production intensification) can result in the loss of associated biodiversity in food production systems.

Gaps and priorities

48. With respect to the state, trends and conservation of associated biodiversity and ecosystem services:

a. What are the major gaps in information and knowledge?
b. What are the main capacity or resources limitations?
c. What are the main policy and institutional constraints?
d. What actions are required and what would be the priorities?

a.
In general, knowledge about most aspects of associated biodiversity and especially ecosystem services is grossly inadequate to reply to many of the questions in this report with any confidence.

With respect to pollination, in particular, due to the relatively modest research activity on pollination ecology, Norway's

knowledge on the whole is limited and fragmentary. Extrapolating knowledge from studies undertaken in other countries is often of limited use due to Norway's unique climatic and geographical conditions.
In particular, too little is known about:
1. how dependent plant species in Norway are on pollination for their seed production;
2. the distribution and density of important groups of pollinators and which species of plants they are dependent upon and which they pollinate;
3. how the population development of rare species of plants and pollinators is affected by pollination interactions; and
4. how pollinator communities have changed over time, and which pressure factors underlie any changes.
5. how climate change affects pollinators and pollination.
6. how honey bees interact with wild pollinators.

b.
In general, there is inadequate capacity on and knowledge of most components of associated biodiversity and ecosystem services. Overall, there is less interest from the general public for these components of biodiversity and therefore also less information. Moreover, with the declining number of taxonomists, relevant field knowledge, which cannot be replaced by innovative molecular techniques, is rapidly being lost.

The main capacity and resources limitations with respect to pollinators and pollination are listed below. Most of the listed limitations also apply to other components of associated biodiversity and ecosystem services.
- Acquiring information on which pollinator species are important for plants and the most important plants for pollinators requires mapping and research. Current mapping activities focus on identifying the insect species in some flower-visiting groups and determining their distribution. However, which species of flowers the various insects visit is not being mapped. This type of mapping must take place in a systematic and scientifically rigid manner. A major challenge for this mapping is linked with expertise in insect taxonomy.
- Few people in Norway have good taxonomic expertise on the most important groups of pollinators (especially hoverflies, solitary bees, bumblebees, and butterflies and moths), making it difficult to identify collected insect specimens.
- It will be time consuming to collect data on the insect fauna that pollinate the more than 1000 native insect-pollinated plant species in Norway (detailed information is currently available for no more than 50 of these plant species).
- Norwegian universities currently have no regular offer of education specifically directed at pollination ecology.

c.
- One institutional constraint is the sectoral fragmentation, that is leading to a lack both of comprehensive and coordinated data collection and of knowledge production.
- Limited knowledge of biological processes, such as the complex interactions that exist between the different components of associated biodiversity in and around production systems, can lead to political decisions with possibly unforeseen consequences. This could for example be the case of decisions related to the removal of topsoils from areas for building projects. Topsoil, subsoil and bedrock work in harmony to produce fertile soils. Topsoil removal or pollution, directly affects this complex relationship within the ground and it can take thousands of years for this relationship to rebuild (it takes between 30 to 1,000 years for the bedrock and subsoil to generate 25mm of fertile topsoil).

d. The following applies to pollinators and pollination in particular, but to a large extent also to most other components of associated biodiversity and ecosystem services (especially the regulating and supporting services):
- Because of the poor state of knowledge, it is difficult to give clear recommendations for how the gaps in knowledge can best be filled. As a starting point, the knowledge needed to generate hypotheses and gather data on more specific problems within pollination ecology that are relevant for managing ecosystems in Norway should be defined.
- It is important that the ongoing mapping of wild bee specialists continues and is supplemented, especially in view of the decline of many of their populations and their significance as pollinators. Compilations of knowledge about bees and which species of plants they visit and vice versa exist for Sweden (Pettersson, Cederberg & Nilsson, 2004). These lists largely agree with conditions in Norway and can be used as an indication of possible pollination links here. However, there are many regional differences which should be mapped.
- Ongoing mapping projects should be extended to include new groups of pollinators (especially flies and flower-visiting beetles).
- Mapping activities should take place on national, regional (counties) and local levels, depending upon the distribution pattern of the groups being investigated.
- The mapping of specialist plants and pollinators (which are particularly vulnerable to changes in the availability of partners) will be a valuable tool in the vulnerability analysis and preservation of such species.
- Norwegian universities may wish to cooperate to set up courses on pollination ecology at the Master and PhD levels. These courses should also be available to Master and PhD students from other Nordic countries who wish to take part. A possible way of organizing this might be to set up a Norwegian or Nordic research school or network in pollination ecology. Experts on pollination ecology in Norway should cooperate more on joint research projects which, in particular, help to train Master and PhD students.

- To determine which species should be prioritized in terms of monitoring/surveying/mapping one could start by:

1. identifying a selection criterion (e.g. food production, environmental, cultural,...)
2. selecting key functional groups (i.e. set of species co-existing in a given community with similar functional characteristics related to an ecosystem service) according to the selected criterion. Where functional groups have similar ecological roles, those with a single or only a few species (low or no redundancy) should be prioritized for conservation.

Source: Totland et al., 2013

49. With respect to the state, trends and conservation of wild resources used for food:

a. What are the major gaps in information and knowledge?
b. What are the main capacity or resources limitations?
c. What are the main policy and institutional constraints?
d. What actions are required and what would be the priorities?

a.
- In terms of harvesting data, hunting and fishing are well documented and monitored by Statistics Norway (SSB). SSB does however not provide any figures on the population size of important fish and game species. These are, among others, monitored on a regular basis by the Institute of Marine Research and the National monitoring program for wild cervids.
- Regarding wild berry plants, several species of the Fragaria, Rubus, and Ribes genera are distributed in the wild flora, some genuinely wild, but some escaped from cultivated fields. In addition a broad range of wild growing berry species is distributed throughout the country with representatives from the following genera: Vaccinium, Empetrum, Oxycoccus, Sambucus and Hippophae. About 20 rare blackberry (Rubus fruticosus) species have been collected and a long term collection was established in the first phase of the national plant genetic resources programme (2001-2005). The collection of specimens and establishment of a national variety collection for berries has however not yet been completed (Asdal, 2008).
- Population size and resource data is still lacking for quite a number of edible "wild" plants and fungi.

b./c.
- Population size and resource data is still lacking for edible "wild" plants and fungi, essentially as a result of political priorities regarding the allocation of resources for research and monitoring.
- The conservation of wild resources used for food is often closely connected to the use of these resources. However, in recent years, the harvesting and use of some wild resources that were traditionally used for food (e.g. sorbus for the production of jam and other preserves) significantly decreased, as did the knowledge on the the potential uses of these resources. The declining trend in the use and knowledge of wild edible resources is one of the constraints to the conservation of these resources.

d.
- To monitor and gain more knowledge of wild species that are edible more financial and human resources are needed. This particularly applies to a number of wild plant and fungi species. More knowledge is needed both on the potential use of these species as a source of food, and on the other ecosystem services they contribute to (e.g. certain fungi species facilitate the provision of nitrogen and phosphorus to trees, thereby contributing to the productivity of forests; other wild food species may be of particular cultural value).

50. With respect to the impact and response to natural or human-made disasters and biodiversity for food and agriculture:

a. What are the major gaps in information and knowledge?
b. What are the main capacity or resources limitations?
c. What are the main policy and institutional constraints?
d. What actions are required and what would be the priorities?

The fall-out of radioactive cesium after the Chernobyl disaster has had a major impact on the use of wild foods in the regions affected. The response to this disaster seems to have been quite efficient and there are not significant gaps, capacity or policy constraints to be reported on.

51. **With respect to the impact of invasive alien species on biodiversity for food and agriculture:**

a. **What are the major gaps in information and knowledge?**
b. **What are the main capacity or resources limitations?**
c. **What are the main policy and institutional constraints?**
d. **What actions are required and what would be the priorities?**

a. There is still quite an important lack of information on invasive alien species, which is limiting the use of quantitative methods for the assessment of the ecological impact posed by alien species. Risk assessments associated with "new" alien species (i.e. door knockers) and knowledge of their colonization and damage potential are also lacking.
Public awareness on the impact of invasive species, control measures and the unintentional introduction of invasive species is also lacking.

b. Financial and human resources allocated to authorities responsible for controlling the introduction of invasive alien species to Norway are too limited.

c.
- There seems to be a contradiction between the philosophies pertaining to alien species in nature conservation policies and those applying to agriculture, forestry and production systems in general. The former would be very restrictive with respect to aliens, whereas the latter tends to be open to test and use different species, varieties and breeds, including new ones, to enhance production system development across the different sectors.
- The unintentional introduction of invasive alien species is regulated through the Nature Diversity Act (Chapter IV Alien organisms, Section 28-32). Enforcing the Act in this area still seems to be challenging.

d. If Norway intends to continue to develop and expand its assessments of the ecological impact posed by alien species, efforts to strengthen the knowledge base are needed. Moreover, given the global scope of alien species, the need for further development of methodology to assess the impacts posed by alien species is also important. In this respect, an international process to develop a method that can be used across national boundaries would be required. In view of Norway's experience in preparing the Black List, the country is in a good position to promote and participate in the development of an international methodology.

To control the introduction of invasive alien species to Norway, more financial and human resources should be allocated to the responsible authorities, such as the Norwegian Food Safety Authority (Mattilsynet), that is responsible for plants, parts of plants and other regulated articles that may carry pests that are imported to or produced or sold in Norway.

To enhance public awareness on the impact of invasive species, control measures and the unintentional introduction of invasive species, targeted awareness raising activities, focusing on, for example, hobby gardeners or travellers, should be considered.

Source: Gederaas et al., 2012

CHAPTER 4: The state of use of biodiversity for food and agriculture

Proposed structure of the chapter and information to be included in the Country Reports

The questions in this chapter seek to obtain information on:

- The contribution of biodiversity for food and agriculture to:
  - production (or provisioning ecosystem services) and especially to food security and nutrition and to rural poverty reduction;
  - supporting and regulating ecosystem services;
  - sustainability and resilience;
- The application of an ecosystem approach;
- The state of the sustainable use of biodiversity for food and agriculture.

Since the sectoral State of the World reports already presented or in preparation provide information separately on the use of animal, aquatic, forest and plant genetic resources, the responses here should provide available information on:

- The combined use of genetic resources coming from different sectors;
- Synergies between genetic resources of the different sectors
- The use of all types of associated biodiversity, either as separate components or in combination;
- The use of wild foods and, where information exists, other important wild harvested products.

The uses of biodiversity for food and agriculture can include:

- The direct use of genetic resources from different sectors or of associated biodiversity and wild foods, individually or in combination;
- The indirect use through the provision of supporting and regulating ecosystem services;
- The support for land/water restoration or other land/water management objectives;
- The support of cultural ecosystem services including:
  - Use for cultural, amenity or social reasons;
  - Use in education or scientific research.

To help reporting and provide a common framework for analysis of Country Reports a set of biodiversity maintaining management practices and diversity based practices have been identified in Annex 5 and Annex 6. These provide a framework for a number of the questions in this Chapter.

The information provided for this Chapter should also cover the adoption of an ecosystem approach. One such approach has been developed under the Convention on Biological Diversity and comprises 12 principles.

A final section of this Chapter of the Country Report should address the sustainable use of different components of biodiversity for food and agriculture, wild foods and other wild harvested products.

Where information is available, comment on the different roles played by men and women in the use of genetic resources, use and consumption of wild foods and knowledge over local ecosystems.

The use of management practices or actions that favor or involve the use of biodiversity for food and agriculture

This section looks for information on the extent to which biodiversity maintaining management practices and diversity based practices are in use in your country.

52. **For each of the production systems present in your country indicate in Table 20 the extent of use of management practices that are considered to favor the maintenance and use of biodiversity for food and agriculture.**

In the table indicate the percent of total production area or quantity under the practice (where known), changes that have occurred over the last 10 years in the production area or quantity under the practice (significant increase (2), some increase (1), no change (0), some decrease (-1), significant decrease (-2), not known (NK), not applicable (NA)),

and any identified change in biodiversity for food and agriculture associated with the practice (strongly increasing (2) increasing (1), stable (0) decreasing (-1), strongly decreasing (-2), not known (NK), not applicable (NA)).

Table 20. Management practices that are considered to favor the maintenance and use of biodiversity for food and agriculture.

Production systems	**Management practices** (Place pointer on the management practice name for a description)	**Percent of production area or quantity under the practice (%)**	**Change in production area or quantity under the practice (2,1,0,-1,-2, NK, NA)**	**Effect on biodiversity for food and agriculture (2,1,0,-1,-2, NK, NA)**
Livestock grassland-based systems: Boreal and /or highlands	Integrated Plant Nutrient Management (IPNM)	*	*	*
	Integrated Pest Management (IPM)	NK	NK	NK
	Pollination management	*	*	*
	Landscape management	*	*	*
	Sustainable soil management practices	*	*	*
	Conservation agriculture	*	*	*
	Water management practices, water harvesting	NA	NA	NA
	Agroforestry	NA	NA	NA
	Organic agriculture	5%	0/1	2
	Low external input agriculture	100%	-1/0	1
	Home gardens	NA	NA	NA
	Areas designated by virtue of production features and approaches	NA	NA	NA
	Ecosystem approach to capture fisheries	NA	NA	NA
	Conservation hatcheries	NA	NA	NA
	Reduced-impact logging	NA	NA	NA
	Other [*please specify*]:			
Self-recruiting capture fisheries: Boreal and /or highlands	Integrated Plant Nutrient Management (IPNM)	NA	NA	NA
	Integrated Pest Management (IPM)	NA	NA	NA
	Pollination management	NA	NA	NA
	Landscape management	NA	NA	NA
	Sustainable soil management practices	NA	NA	NA
	Conservation agriculture	NA	NA	NA
	Water management practices, water harvesting	NK	NK	NK
	Agroforestry	NA	NA	NA
	Organic agriculture	NA	NA	NA

	Low external input agriculture	NA	NA	NA
	Home gardens	NA	NA	NA
	Areas designated by virtue of production features and approaches	NA	NA	NA
	Ecosystem approach to capture fisheries	general policy	NA	1
	Conservation hatcheries	NA	NA	NA
	Reduced-impact logging	NA	NA	NA
	Other [*please specify*]:			
Fed aquaculture: Boreal and / or highlands	Integrated Plant Nutrient Management (IPNM)	NA	NA	NA
	Integrated Pest Management (IPM)	NA	NA	NA
	Pollination management	NA	NA	NA
	Landscape management	NA	NA	NA
	Sustainable soil management practices	NA	NA	NA
	Conservation agriculture	NA	NA	NA
	Water management practices, water harvesting	NK	NK	NK
	Agroforestry	NA	NA	NA
	Organic agriculture	NA	NA	NA
	Low external input agriculture	NA	NA	NA
	Home gardens	NA	NA	NA
	Areas designated by virtue of production features and approaches	NA	NA	NA
	Ecosystem approach to capture fisheries	NA	NA	NA
	Conservation hatcheries	NK	NK	NK
	Reduced-impact logging	NA	NA	NA
	Other [*please specify*]:Organic aquaculture	NK	NK	NK
Rainfed crops : Boreal and /or highlands	Integrated Plant Nutrient Management (IPNM)	*	*	*
	Integrated Pest Management (IPM)	29% of Norway	NK*	NK*
	Pollination management	NK	NK	NK
	Landscape management	*	*	*
	Sustainable soil management practices	*	*	*
	Conservation agriculture	*	*	*
	Water management practices, water harvesting	*	*	*
	Agroforestry	NA	NA	NA
	Organic agriculture	5%: should be 1	0/1	2
	Low external input agriculture	95%	-1/0	1

	Home gardens	NK	NK	1
	Areas designated by virtue of production features and approaches	NA	NA	NA
	Ecosystem approach to capture fisheries	NA	NA	NA
	Conservation hatcheries	NA	NA	NA
	Reduced-impact logging	NA	NA	NA
	Other [*please specify*]:			
Mixed systems (livestock, crop, forest and /or aquatic and fisheries): Boreal and /or highlands	Integrated Plant Nutrient Management (IPNM)	*	*	*
	Integrated Pest Management (IPM)	29% of Norway	NK*	NK*
	Pollination management	*	*	*
	Landscape management	*	*	*
	Sustainable soil management practices	*	*	*
	Conservation agriculture	*	*	*
	Water management practices, water harvesting	*	*	*
	Agroforestry	NA	NA	NA
	Organic agriculture	5%: should be 1	0/1	2
	Low external input agriculture	95%	-1/0	1
	Home gardens	NK	NK	1
	Areas designated by virtue of production features and approaches	NA	NA	NA
	Ecosystem approach to capture fisheries	NA	NA	NA
	Conservation hatcheries	NA	NA	NA
	Reduced-impact logging	NK	2	1
	Other [*please specify*]:			
Semi-natural forests: Boreal	Integrated Plant Nutrient Management (IPNM)	**	**	**
	Integrated Pest Management (IPM)	**	**	**
	Pollination management	**	**	**
	Landscape management	NA	NA	NA
	Sustainable soil management practices	**	**	**
	Conservation agriculture	NA	NA	NA
	Water management practices, water harvesting	**	**	**
	Agroforestry	NA	NA	NA
	Organic agriculture	NA	NA	NA
	Low external input agriculture	NA	NA	NA
	Home gardens	NA	NA	NA

	Areas designated by virtue of production features and approaches	22% of product	1	1
	Ecosystem approach to capture fisheries	NA	NA	NA
	Conservation hatcheries	NA	NA	NA
	Reduced-impact logging	General policy*	2	1
	Sustainable Forest Management (SFM) Other [*please specify*]:Designation of protected areas in productive forests	SFM: General P	SFM: 0 / Protect	2

Provide or cite references to any documentary evidence that exists to support the evaluation given above. Indicate where practices used in a production system are affecting biodiversity for food and agriculture in another production system.

Where evidence exists of an effect of any of these practices on biodiversity for food and agriculture, provide a brief summary of the effect, the components of biodiversity for food and agriculture affected, and available indicators. Include any available references or reports.

*REGIONAL ENVIRONMENT PROGRAMME FOR AGRICULTURE (RMP)
This environment programme promotes specific environmental goals in agriculture, such as the:
- reduction of water and air pollution
- reduction in pesticide use
- maintenance of cultural landscapes and cultural heritage sites
- facilitation of outdoor life
- maintenance and increase of biological diversity

To reach these goals, a series of diverse specific actions are being promoted at regional level in favor of sustainable agricultural management practices. Such management practices include elements of Integrated Plant Nutrient Management (IPNM), Integrated Pest Management (IPM), Pollination management, Landscape management, Sustainable soil management practices, Conservation agriculture, Water management practices and water harvesting. In 2013, approximately 50%, or 22,000 Norwegian farm entities, participated in the RMP (Miljøstatus i landbruket for 2013, Norwegian Agricultural Authority). The area covered by practices such as those mentioned above has not been calculated as is requested for in this questionnaire.

SUSTAINABLE SOIL MANAGEMENT PRACTICES
At present, no sustainable soil management practices are systematically being implemented. However, with the raising awareness on the importance of soils as a fundament of sustainable food production and a sustainable society, the interest to implement sustainable soil management practices is increasing. Currently, some practices, such as vegetation cover, contribute to healthier and more sustainable soils, but their application is relatively inconsistent and does usually not cover large areas.

INTEGRATED PEST MANAGEMENT (IPM)
In a 2008 survey, 29 % of Norwegian growers indicated they had applied the IPM principles since 2003.
When Norway will start implementing the European Union's directive on sustainable use of pesticides, IPM will become compulsory.

At present, IPM is somewhat loosely defined and there is no IPM label or regular monitoring of IPM in Norway. However, all Norwegian growers learn about IPM when they take the course to either obtain or renew their licence to buy and use pesticides.

Most greenhouse vegetable growers in Norway use biological control, which is entirely based on IPM principles, in controlling pests and their damage. However, greenhouse vegetable growing represents only a small part of Norwegian agriculture.

Source: http://www.bioforsk.no/ikbViewer/page/prosjekt/tema?p_dimension_id=23995&p_menu_id=24011&p_sub_id=23996&p_dim2=23999

ORGANIC AGRICULTURE - RAINFED CROPS
There seems to be some debate about whether organic agriculture is more beneficial to biodiversity than conventional Norwegian agriculture. The assessment of organic farming that was published by the scientific committee for food safety in 2014 claims this is not the case (http://www.vkm.no/dav/7852b1a164.pdf).

CONSERVATION HATCHERIES
While several hatcheries in Norway release Atlantic salmon in an effort to compensate for loss of spawning and juvenile rearing areas (due to hydropower development, for example) the production and release of salmon reared in conservation or fishery enhancement hatcheries is small relative to other countries in the region (Jonsson et al., 1993; Naish, et al., 2008). Research has shown that in terms of the genetic effects of hatchery fish on wild fish, hatchery fish hybridized with wild fish, but the survival of hybrids was lower than that of wild fish (Skaala et al., 1996). According to scientists, hatchery has been of little impact on wild fish population structure, despite 40 years of stocking (Heggenes et al., 2002).

**SUSTAINABLE FOREST MANAGEMENT
Sustainable forest management is Norway's general forestry management regime. Many tools and instruments have been developed and are being used to ensure the successful implementation of this management approach, including certification schemes (i.e. the Norwegian Programme for the Endorsement of Forest Certification and the Forest Stewardship Council), subsidies enhancing sustainable forestry activities and the forest fund agreement, compelling forest owners to save some of their earnings for long term investments (Tomter & Dalen, 2014).

Reduced-impact logging: in all of Norwegian productive forests some kind of measure is applied to reduce the impact of forestry on the environment, including forest associated biodiversity. Such measures can consist of leaving strips of forest towards ponds, lakes, mires and rivers; leaving single selected trees, snags and logs on clear cuts; small set-aside areas called forest key habitats, restrictions on use of tree species in forestry; area with selective cutting of trees only; etc. Most of these retention measures were introduced in the late 1990s and have been applied on an increasingly larger area over the last decade. While they are expected to mitigate negative effects of forestry, their actual impact on the long-term remains to be measured. In this context, it is also important to note that harvesting in Norwegian forests has been less than 50% of the increment of trees for several decades. This has resulted in the aging of forests and the accumulation of dead wood and other structures associated with old forests, i.e. the environmental conditions and development opportunities for forest associated biodiversity is likely to be improving.

When looking at the different forest management categories, approximately 25% of Norway's productive forest area is managed with a focus on protection and environmental considerations rather than on wood production (2.3% of this share is protected under the Nature Diversity Act). In the remaining 75%, even if production is the main objective, environmental and cultural interests are also taken into account (Søgaard et al., 2012).

The area covered by forest-related practices, such as those mentioned in Table 20., has not been calculated separately for each practice, as is requested for in this questionnaire.

53. **For each of the production systems present in your country indicate in Table 21 the extent of use of diversity based practices that involve the use of biodiversity for food and agriculture.**

In each table indicate the percent of total production area or quantity under the practice (where known), changes in the production area or quantity under the practice that have occurred over the last 10 years (strongly increasing (2), increasing (1), stable (0) decreasing (-1), strongly decreasing (-2), not known (NK)) and any identified change in biodiversity for food and agriculture associated with the diversity based practice (strongly increasing (2) increasing (1), stable (0) decreasing (-1), strongly decreasing (-2), not known (NK)).

Table 21. Diversity based practices that involve the enhanced use of biodiversity for food and agriculture.

Production systems	**Diversity based practices** (Place pointer on the diversity based practice name for a description)	**Percent of production area or quantity under the practice (%)**	**Change in production area or quantity under the practice (2,1,0,-1,-2, NK, NA)**	**Effect on biodiversity for food and agriculture (2,1,0,-1,-2, NK, NA)**
Livestock grassland-based systems: Boreal and /or highlands	Diversification	0	0	0
	Base broadening	0	0	0
	Domestication	NA	NA	NA

	Maintenance or conservation of landcape complexity	*	*	*
	Restoration practices	*	*	*
	Management of microorganisms	0	0	0
	Polyculture/Aquaponics	NA	NA	NA
	Swidden and shifting cultivation agriculture	NA	NA	NA
	Enriched forests	NA	NA	NA
	Other [*please specify*]:			
Self-recruiting capture fisheries: Boreal and /or highlands	Diversification	0	0	0
	Base broadening	NA	NA	NA
	Domestication	NA	NA	NA
	Maintenance or conservation of landcape complexity	NA	NA	NA
	Restoration practices	NK	NK	NK
	Management of microorganisms	NA	NA	NA
	Polyculture/Aquaponics	NA	NA	NA
	Swidden and shifting cultivation agriculture	NA	NA	NA
	Enriched forests	NA	NA	NA
	Other [*please specify*]:			
Fed aquaculture: Boreal and / or highlands	Diversification	NK	NK	NK
	Base broadening	NA	NA	NA
	Domestication	NK	NK	NK
	Maintenance or conservation of landcape complexity	NA	NA	NA
	Restoration practices	NK	NK	NK
	Management of microorganisms	Use of probioti	NK	NK
	Polyculture/Aquaponics	NA	NA	NA
	Swidden and shifting cultivation agriculture	NA	NA	NA
	Enriched forests	NA	NA	NA
	Other [*please specify*]:			
Rainfed crops : Boreal and /or highlands	Diversification	0	0	0
	Base broadening	**	**	**
	Domestication	0	0	0
	Maintenance or conservation of landcape complexity	*	*	*
	Restoration practices	0	0	0

	Management of microorganisms	inoculation of r	1	1
	Polyculture/Aquaponics	NA	NA	NA
	Swidden and shifting cultivation agriculture	Systematically	1	1
	Enriched forests	NA	NA	NA
	Other [*please specify*]:			
Mixed systems (livestock, crop, forest and /or aquatic and fisheries): Boreal and /or highlands	Diversification	0	0	0
	Base broadening	**	**	**
	Domestication	0	0	0
	Maintenance or conservation of landcape complexity	*	*	*
	Restoration practices	0	0	0
	Management of microorganisms	inoculation of r	1	1
	Polyculture/Aquaponics	NA	NA	NA
	Swidden and shifting cultivation agriculture	Systematically	1	1
	Enriched forests	NA	NA	NA
	Other [*please specify*]:			
Semi-natural forests: Boreal	Diversification	0	0	0
	Base broadening	0	0	0
	Domestication	0	0	0
	Maintenance or conservation of landcape complexity	***	***	***
	Restoration practices	***	***	***
	Management of microorganisms	0	0	0
	Polyculture/Aquaponics	NA	NA	NA
	Swidden and shifting cultivation agriculture	NA	NA	NA
	Enriched forests	NK	1	1
	Other [*please specify*]:			

Briefly summarize the information that exists on the effect of the diversity based practice on different components of biodiversity for food and agriculture. Indicate where practices used in a production system are affecting biodiversity for food and agriculture in another production system. Include any available references or reports to support the evaluation given above.

This text box not expandable. Relevant information is provided in Annex I to this questionnaire.

54. **List and briefly describe any specific programmes or projects that have been undertaken in the country to support any of the practices listed in Table 20 and Table 21. Provide information where available on what types of activities were supported, areas and numbers of farmers, pastoralists, forest dwellers and fisherfolk involved, state and outcome with respect to components of biodiversity for food and agriculture.**

INCREASING SHARE OF ORGANIC AGRICULTURE

The Norwegian government is dedicated to increase Norway's share of organic agricultural production and consumption to 15% by 2020.

Among others, Bioforsk Økologisk actively promotes organic agriculture. The institute manages Agropub, a website on organic farming, that includes articles on cultivation, farm animals, soils, climate and the environment (http://www.agropub.no/id/1).

REGIONAL ENVIRONMENT PROGRAMME FOR AGRICULTURE (RMP)
This environment programme promotes specific environmental goals in agriculture, such as the:
- reduction of water and air pollution
- reduction in pesticide use
- maintenance of cultural landscapes and cultural heritage sites
- facilitation of outdoor life
- maintenance and increase of biological diversity

To reach these goals, a series of diverse specific actions are being promoted at regional level in favor of sustainable agriculture. As mentioned under questions 52. and 53., these actions include elements of some of the management and diversity based practices that are listed in Tables 20 and 21. In 2013, approximately 50%, or 22,000 Norwegian farm entities, participated in the RMP (Miljøstatus i landbruket for 2013, Norwegian Agricultural Authority).

PUBLIC PRIVATE PARTNERSHIP FOR PRE-BREEDING
Within plant breeding, a Public Private Partnership for Pre-breeding was established in 2011 at the regional level by the Nordic Council of Ministers to increase genetic diversity so as to enhance the development of new crop varieties (base broadening). The partnership supports Nordic plant breeding programmes for barley, rye grass and apple to meet long-term needs of the agricultural and horticultural industries, specifically regarding adaptation to climate change, setting targets for environmental policies, and responding to demands from consumers, markets, etc.

SUSTAINABLE FOREST MANAGEMENT IN SUPPORT OF FOREST RESTORATION AND ENRICHEMENT PLANTING
Sustainable forest management is Norway's general forestry management regime. Many tools and instruments have been developed and are being used to ensure the successful implementation of this management approach, including certification schemes (i.e. the Norwegian Programme for the Endorsement of Forest Certification and the Forest Stewardship Council), subsidies enhancing sustainable forestry activities and the forest fund agreement, compelling forest owners to save some of their earnings for long term investments (Tomter & Dalen, 2014). Such schemes contribute, inter alia, to the maintenance or conservation of landscape complexity and restoration practices. As part of its forest management strategy, Norway also maintains a percentage of at least 10% of broadleaved trees in coniferous stands (enriched forests).

Sustainable use of biodiversity for food and agriculture

Sustainable use of biodiversity for food and agriculture ensures its utilization in ways that do not compromise its continuing availability and its use by future generations. Sector reports will provide information on sustainable use of the different sector genetic resources. Here the focus is therefore on associated biodiversity and on wild foods.

55. **What are the major practices in your country that negatively impact associated biodiversity and/or wild foods? Answers can be provided in Table 22 where examples of general types of practices are listed.**

Table 22. Major practices that negatively impact associated biodiversity and/or wild foods in the country.

Types of practices	Major practice (Y/N)	Description	Reference
Over-use of artificial fertilizers or external inputs	Y	The application of fertilizers and external inputs is very regulated in Norway, but losses of for example phosphorus and nitrogen do exist, affecting water ways and soils.	Bioforsk
Over-use of chemical control mechanisms (e.g. disease control agents, pesticides, herbicides, veterinary drugs, etc.)	Y	The application of pesticides, etc. is very regulated in Norway (EU Framework Directive for Sustainable Use Pesticides), but losses do exist. The STRAPP-project (2013-2015) aims to develop strategies for the implementation of sound cereal production methods with low loss of pesticides and phosphorus.	Bioforsk

Inappropriate water management	N		
Practices leading to soil and water degradation	Y	In general, intensive cultivation of land and inappropriate soil and water management enhance the depletion of soil organic carbon and soil microbiota, as well as erosion. Over-use of artificial fertilizers (particularly nitrogen) is one of the main practices that is leading to soil and water degradation.	VitalAnalyse
Over-grazing	y	In West-Finnmark, the number of reindeer is still higher than what is actually allowed. This is believed to cause over-grazing and increased trampling of animals along the fences, leading to an imbalance and destruction of the resource base. While it is believed that lichens are worn in areas where the density of reindeer is high, research has shown that the overall lichen biomass is increasing. There is a decreasing trend in the live weight of adult reindeer, even if the situation varies between years and districts. Over-grazing is believed to have a negative impact on slaughter weights and also seems to contribute to reindeer losses in Finnmark, as well as in other "reindeer" counties in Norway.	Norwegian Agricultural Economics Research Institute (NILF) (Kvakkestad & Aalerud, 2012) Ministry of Agriculture and Food (White Paper Nr.12 (2002-2003))
Uncontrolled forest clearing	N		
Fishing in protected areas	N		
Overharvesting	N		
Other [*please specify*): Side effects industry (SO2)	Y	A lot has been done to reduce sulphur emissions in Norway and pollution has been substantially reduced as a result. Nevertheless, much of the southern half of Norway is still suffering from damage caused by acid rain. Acid rain is still a threat to biodiversity in rivers and lakes. More than 9000 fish stocks were lost and over 5000 were severely depleted due to acidification in 1990. Similar calculations have not been performed since, but in a study from 2008, it was estimated that the area with damage to fish stocks in Norway was reduced from around 20 000 km2 in 1990 to 13 000 km2 in 2006, a reduction of about 38 percent.	State of the Environment in Norway: http://www.environment.no/Topics/Air-pollution/Acid-rain/
Other [*please specify*): Market dynamics	Y	The low number of plant varieties available on the market is believed to affect the diversity of plant genetic resources and could thereby also have a negative impact on relevant components of associated biodiversity.	Åsmund Asdal (personal comments)

Add row

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Please comment on the reasons why the practices are in use and discuss if trade-offs are involved.

Relevant comments are included in Table 22.

56. **Briefly describe any actions and countermeasures taken to limit unsustainable use and/or support sustainable use of associated biodiversity and/or wild foods.**

Limiting the unsustainable use and/or support sustainable use of associated biodiversity and/or wild foods is intrinsic to sustainable forest management, as it is to the ecosystem approach applied to fisheries. Both these management regimes are general practice in Norway.

57. **Provide in Table 23 any information available that lack of biodiversity for food and agriculture is limiting food security and nutrition, and/or rural livelihoods in the different production systems in your country. Indicate the production systems affected together with any information on the extent of problem (significant lack (2), some lack (1)), describe the effects on livelihood, food security and nutrition, and the components of biodiversity for food and agriculture that are limited.**

Table 23. Effect of the lack of biodiversity for food and agriculture on production, food security and nutrition and livelihood.

Production system	Biodiversity component for which diversity is lacking	Extent of problem (2,1)	Effect on food security and nutrition	Effect on livelihood	Reference

Production system	Biodiversity component for which diversity is lacking	Extent of problem (2,1)	Effect on food security and nutrition	Effect on livelihood	Reference
M4	Poultry	2	None for the time being. However, Norway's poultry sector entirely depends on international poultry breeding companies for its breeding material. In critical situations (e.g. disease outbreaks) the country has no local commercial poultry breeds/ lines to fall back on. However, the Norwegian poultry genebank stores 5 of the commercial egg layer lines that were used in Norway until 1955, before the European Economic Agreement lifted the ban on importing live animals.	0	Norwegian Genetic Resource Centre
In general, the lack of biodiversity for food and agriculture is assumed to have a negative effect on sustainable food production.					

Add row

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The contribution of biodiversity for food and agriculture to improving productivity, food security and nutrition, livelihoods, ecosystem services, sustainability, resilience and sustainable intensification

This section looks for information on the direct contributions of biodiversity for food and agriculture to improving productivity, food security and nutrition, livelihoods, ecosystem services, sustainability, resilience and sustainable intensification. It is concerned specifically with the combined use of genetic resources coming from different sectors, the use of all types of associated biodiversity, the use of wild foods and, where information exists, other important wild products.

Note the ways in which biodiversity for food and agriculture contributes to food security and nutrition, livelihoods, ecosystem services, sustainability, resilience and sustainable intensification are often linked. Answers to the requests for information below may therefore be combined.

58. **Where available, provide information that increasing the amount of biodiversity for food and agriculture, including associated biodiversity, in production systems in your country have improved the following:**

a) productivity;
b) food security and nutrition;
c) rural livelihoods;
d) ecosystem services;
e) sustainability;
f) resilience;
g) sustainable intensification.

What specific actions have you undertake to strengthen the contribution of biodiversity for food and agriculture to improving these outcomes? For each of these aspects, briefly describe the nature and scale of the actions implemented, the production systems involved, and the outcomes, results obtained or lessons learned from these actions.

Where available provide information on the components of biodiversity for food and agriculture involved, the stakeholders involved and the gender aspects of these actions. Note that information on policies, legislation or regulations should be reported in Chapter 5 and your response here should be concerned with interventions at production system level.

Whether the increasing amount of biodiversity for food and agriculture in production systems has a noticeable effect on productivity (a), food security and nutrition (b), sustainability (e) and resilience (f) has not been documented and would be a difficult exercise to undertake. The assumption is that increasing biodiversity for food and agriculture contributes to sustainable agriculture.

Some examples that could be of relevance to this question are listed below:

a. b. e. Livestock breeding programmes focus on broad breeding goals, including bboth production and functional traits, and aim to minimize inbreeding. This has contributed to uphold breed diversity within different livestock species and has resulted, at the same time, into increasing production figures and improved animal health. Having national breeding programmes that are to a large extent based on Norwegian livestock breeds, Norway does not depend on external sources for the viability of its livestock sector (with the exception for poultry). In addition, the outbreaks of diseases in livestock production systems have been few and the use of antibiotics and other medication is restrictive (3.7 mg veterinary antimicrobial agents/Populations Correction Unit in 2011)* and controlled by the veterinarian authorities. As a result, Norway is in a quite favorable position in terms of food security, sustainability and resilience.

c. Niche production of different plant and livestock based products is increasing (e.g. jams, cheese, meat products, etc.), providing new opportunities for farmers to broaden their product range and increase their income. The significant diversity in plants and livestock could contribute more to the development of innovative niche products.

*Source: Third ESVAC report, p.26: http://www.bondelaget.no/getfile.php/Bilder%20NB/Mat/Mat-%20og%20landbrukspolitikk/Husdyrproduksjon/Antibiotika%2CEMArapport1401.pdf

59. **Do you have information on the proportion of the population in your country that uses wild food on a regular basis for food and nutrition? If available, include information such as the proportion of the diet that is collected from the wild in normal time and in times of scarcity, drought, natural and human-made disaster, and the degree to which wild foods are used (for subsistence, supplementing, nutrition, other).**

Provide explanations and additional information as regards the gender differences in the patterns of use, management and consumption of wild food, including data disaggregated by sex.

HUNTING AND FISHING
Generally speaking, recreational hunting and fishing is of very marginal importance to the population's food supply and nutrition security. The most significant contribution of wild foods to the population's food supply comes from commercial fishing (self-recruiting capture fisheries).

Hunting is a popular autumn event for many Norwegians. In 2014, Norway's hunter register included 464,176 subscribers with Akershus contributing the largest number (18,700). 194,679 participated in the 2013/2014 hunting season, of which 92,7% were men. However, the number of women hunters has been steadily increasing over the years. 40% of these exclusively hunted wild deer, 35% hunted only small wild animals and about 25% hunted both (SSB, 2014).

Hobby fishing is one of the most popular outdoor activities in Norway. Approximately half of Norway's adult population is considered to be a recreational fisherman, even if the majority, or 56%, fishes sporadically and is categorized as "an occasional angler". Coast or sea are the most common fishing sites (56%), followed by lakes (26%) and rivers (18%). Annually, USD 271 million is spent on transportation and licenses linked to recreational fishing in lakes and rivers, with the so-called "sports fishermen" having the highest mean annual expenditure. Recreational fishery is a male dominated hobby with only 36 % of the 1,161 recreational fishermen being a woman. The average age of fishermen is 40 (Toivonen et al., 2000).

There is also a growing sea angling tourism industry, involving fishing tourism enterprises that arrange lodging, boat rental and equipment for both foreign and Norwegian tourists. Recent estimates indicate that this industry generates more than USD 73 million annually (Borch et al., 2011).

CLOUDBERRIES
The Cloudberry, called "molter" in Norwegian and often nicknamed "highland gold" (viddas gull) is an important berry variety for Norway. It grows in swamp areas on mountains, plains and even by the sea. It can take up to seven years for female plants to produce fruit. Cloudberries are part of Norwegian traditional cuisine. They are used as an ingredient in pies (bløtkaker), cream ("multekrem"), yoghurt, ice-cream, sauces and jams. Cloudberries are also part of Sámi culture, where they were traditionally preserved in reindeer milk, which contains high levels of fat (the cloudberry cream is likely to have derived from this practice). The commercial cultivation of cloudberries has proven to be difficult and with handpicking being the only way to harvest them cloudberries are of high economic value. Research director Inger Martinussen from Bioforsk Nord inTromsø suggests an option would be to distribute new and better varieties in swamp areas, in search of enhancing the economic activities around the production and processing of cloudberries. She does indicate that improving the selection and development of new cloudberry varieties would require more research on the heredity traits and environmental conditions that affect the main characteristics of the berry (i.e berry size, the number of flowers and the taste and content of health-promoting substances) (Forskning.no, 2011). The general rule is that cloudberries can be freely picked in outlying fields/unfenced areas. However, this rule can slightly differ across regions. In the northern counties of Nordland and Troms landowners have the right to forbid cloudberry picking on their property, while in the northernmost county of Finnmark, anyone can pick cloudberries, but their consumption should be on site or else a special permit is needed. According to paragraph 400 of the penal code (Straffeloven), one could be fined and even put in jail for up to three months if found guilty of unlawful cloudberry picking.
Next to the Cloudberry, the Sámi and the local population in the northern parts of the country also used the vitamin C-rich arctic raspberry (Åkerbær (Rubus arcticus)) for jams and deserts. Arctic raspberries are also known to have been used as medicine against scurvy, a vitamin C deficiency disease. At present, the arctic raspberry is still quite commonly found in the inner parts of Troms and Finnmark, but little is known about its consumption. More eastwards, in Finland, this berry variety is used for the production of Mesimarja liquor.

REINDEER
Still today, the protein-rich reindeer meat is the staple food of most reindeer herding Sámi. They also use the reindeer's blood to produce sausages. Other sources of protein in the Sámi diet include fresh water fish, which they consume boiled, grilled, dried, smoked or salted and wild birds. Wild berries are another mainstay of the Sámi diet, especially the vitamin-C rich cloudberry, as previously mentioned. Finally, at times, western-style medical care is supplemented with traditional more natural medical techniques, including the use of earth, turf and specific herbs and plants (Sexton & Stabbursvik, 2010).

The adoption of ecosystem approaches

60. **Describe in Table 24 the extent to which you consider that ecosystem approaches have been adopted for the different production systems in your country (widely adopted (2), partially adopted (1), not adopted (0), not applicable (NA)) and indicate whether ecosystem approaches are considered of major importance (2), some importance (1), no importance (0), not applicable (NA). You may also want to describe landscape approaches that have been adopted in your country.**

Table 24. Adoption of and importance assigned to ecosystem approaches in production systems in the Country.

Production system	Ecosystem approach adopted (name)	Importance assigned to the ecosystem approach (2,1,0,NA)	Importance assigned to the ecosystem approach (2,1,0,NA)
A4	Ecosystem approach to fisheries	2	2
O1	Sustainable Forest Management	2	2
C12	Organic farming	2	2

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61. **For each production system in which an ecosystem and landscape approach has been widely adopted (as indicated in Table 24) describe:**

a. **The specific actions that have been taken to ensure adoption;**
b. **Any observed results from adoption;**
c. **Plans for adoption or for further adoption in new or existing production areas;**
d. **Lessons learned.**

ECOSYSTEM APPROACH TO FISHERIES:
- In 1997, ministers and EU commissioners responsible for North Sea fisheries and environment agreed to develop and apply an ecosystem approach in order to integrate fisheries and environmental protection, conservation and management measures. This culminated in the Bergen Declaration from the 5th North Sea Conference in 2002, where a political commitment was made to implement an ecosystem approach. The ministers agreed to a conceptual framework for the EA including an integrated set of Ecological Quality Objectives.
- Following the Bergen Declaration, Norway's Institute of Marine Research, which provides most of the scientific advice for fisheries management strengthened its ecosystem focus in its research and advisory work.
- The Government of Norway adopted the ecosystem approach to ocean management in 2002 and the management plan for the Barents Sea is a step in its practical implementation. The plan is developed to reconcile different uses by providing a framework that allows the exploitation of the various resources while maintaining the ecosystem structure and function. Goals and targets were set and agreed for this region.

SUSTAINABLE FOREST MANAGEMENT: THE ECOSYSTEM APPROACH APPLIED TO FORESTS
a. Norway has a national forest policy based on a wide range of measures (i.e. legislation, taxation, financial support schemes, research and advisory bodies). The policy also incorporates the country's obligations under international agreements (i.e. the criteria for sustainable forest management that have been negotiated in the framework of forest policy cooperation in Europe are incorporated in Norwegian law). The main objectives of the Forestry Act, which applies to all categories of forest ownership, are to promote sustainable forest management;
b. A regulation under the Forestry Act requires forest owners to reinvest a part of their revenue from forestry into a government administered fund: the Forest Trust Fund. This fund is used to secure long term investment in sustainable forest management such as silviculture, forest management planning and environmental measures. A forest owner is also required to deposit between 4 and 40% of the gross revenue from the sale of timber and fire wood to a trust fund that remains with the forest holding. Support schemes for forestry, including financial support is also granted for developing forest management plans, including environmental inventories (Det norske Skogselskap, 2011).

ORGANIC FARMING
a. The Norwegian government aims to increase the production and consumption of organic food to 15% by 2020. To achieve this goal, the Ministry for agriculture and food developed an action plan entitled "Økonomisk, agronomisk-økologisk!" (i.e. "Economic, agronomic-organic!"). This plan was published in 2009 and is available at: http://www.regjeringen.no/upload/LMD/Vedlegg/Brosjyrer_veiledere_rapporter/Handlingsplan_okologisk_200109.pdf
The three main goals of the action plan's strategy are to:
- Create the conditions that are needed to ensure that an as large as possible share of the nationally consumed organic food products are Norwegian;
- Increase the consumption of organic food products, both in the private and public sector, through market development; and
- Ensure work related to the development of organic food production also becomes an integrated part of the activities undertaken in sectors other than the agricultural sector. To achieve these goals, incentives, including in the form of subsidies, have been established to enhance both the number of organic farmers and the area under organic cultivation.

White Paper Nr.9 (2011-2012) Agricultural and food policy “Welcome to the table” (Velkommen til bords) further reports on the development of organic farming in Norway and discusses the challenges of implementing the action plan.

In September 2000, Oikos (Økologisk Norge) was established, following the merger of Norsk Økologisk Landbrukslag (NØLL), Norsk Økologisk Urtelag (NØU) and Økoprodusentane. Oikos is a non-governmental organisation that actively serves Norway's organic community by strengthening communication among the different stakeholders and undertaking both practical and political work in favour of organic food production.

b. Between 1992 to 2009 both the number of organic farms as well as the total area under organic cultivation steadily increased, as did the production and consumption of organic products. Between 2006 and 2012, organic food sales increased by more than 140%. This trend seems to be continuing. Between 2012 and 2013 the revenue from organic food sales increased by 16% reaching an amount of approximately USD 244 million (or 1% of the total food expenditure in grocery stores), while the sales revenue in the first half of 2014, increased by 32%, compared to the same period in 2013, generating about USD 128 million. However, the total area under organic farming decreased from 5.6% in 2012 to 5.3% in 2013 (Oikos, 2014).

c. The government is still committed to increasing the production and consumption share of organic food to 15% by 2020, acknowledging, however, that this is a challenging task (Oikos, 2014).

d. lessons learned: The subsidies that have been granted to organic farmers have so far mainly been linked to the size of the area under organic cultivation. Linking these subsidies to, for example, whether the farmer contributed to improving his/her arable land's soil structure and health and/or actively managed the delivery of ecosystem services could also have been beneficial. In addition, only limited attention has been given to training the farmers in the more practical aspects of organic farming.

Gaps and priorities

62. **With respect to the use of management practices or actions that favor or involve the use of biodiversity for food and agriculture:**
   a. **What are the major gaps in information and knowledge?**
   b. **What are the main capacity or resources limitations?**
   c. **What are the main policy and institutional constraints?**
   d. **What actions are required and what would be the priorities?**

a.

- Management practices or actions favoring the use of biodiversity for food and agriculture are not necessarily undertaken with the objective to favor or involve the use of biodiversity for food and agriculture.

- While the awareness on the importance of biodiversity for food and agriculture to food production and food security is increasing, its conservation and sustainable use is not necessarily taken into account/prioritized in management strategies.

c. Essentially as a result of political priorities, consistent management actions in favor of biodiversity are more common in the environmental than in the agricultural community.

d. More resources should be allocated to strengthen research on and promote the use of management practices or actions that favor the use of biodiversity for and agriculture.

63. **With respect to the sustainable use of biodiversity for food and agriculture:**
   a. **What are the major gaps in information and knowledge?**
   b. **What are the main capacity or resources limitations?**

c. **What are the main policy and institutional constraints?**
d. **What actions are required and what would be the priorities?**

a.
- In general, knowledge about the sustainable use of animal, plant, forest and aquatic genetic resources is very well documented in Norway. Even so, characterization of the less conventional and more traditional plant varieties and endangered native livestock breeds is still missing. In the absence of characterization, the potential of these genetic resources for food and agriculture is not fully exploited, their use is not optimal and their possible contribution to ecosystem services and food security is not sufficiently recognized.
- Knowledge of the sustainable use, or of any other aspects, of associated biodiversity in and around production systems is very limited. With respect to these components of biodiversity, information and knowledge generation, if any, tends to focus on conservation rather than on (sustainable) use.
b. In general, there is a lack of capacity on and knowledge of the distribution and functions of associated biodiversity in and around production systems. The absence of such knowledge makes it difficult to conserve and use these components of biodiversity in a sustainable manner. The resources allocated for research in this field are also very limited.
c. At present, particularly the sustainable use of associated biodiversity in and around production systems does not seem to be a political priority.
d.
- The importance of using (associated) biodiversity for food and agriculture for sustainable food production and for its conservation, needs to be recognized more among the relevant stakeholders, including decision-makers, farmers and consumers. To this end, awareness raising activities need to be strengthened and/or developed.
- Overall, more research needs to be undertaken on the sustainable use of biodiversity for food and agriculture, which is of importance both to the conservation of biodiversity for food and agriculture and to sustainable and healthy food production. To enhance research in this area, more resources are needed.

64. **With respect to the contribution of biodiversity for food and agriculture to improving productivity, food security and nutrition, livelihoods, ecosystem services, sustainability, resilience and sustainable intensification:**
a. **What are the major gaps in information and knowledge?**
b. **What are the main capacity or resources limitations?**
c. **What are the main policy and institutional constraints?**
d. **What actions are required and what would be the priorities?**

In general, biodiversity for food and agriculture is believed to be important for increasing food production in the future. However, maintaining genetic variation is costly and time consuming and is not always in balance with the short term focus of increasing production and economic gains.

In general, the contribution of traditional plant varieties and endangered native livestock breeds to food security tends to be undervalued. Characterizing these varieties and breeds should be prioritized to gain a better understanding of their potential values and use.

65. **With respect to the adoption of ecosystem approaches:**
a. **What are the major gaps in information and knowledge?**
b. **What are the main capacity or resources limitations?**
c. **What are the main policy and institutional constraints?**
d. **What actions are required and what would be the priorities?**

Ecosystem approaches are being adopted in several production systems (e.g. in the forestry and fishery sectors). However, in the ecosystems of relevance to food and agriculture, there is still an important information and knowledge gap when it comes to the delivery of ecosystem services and how these are linked to the different management practices. This area of work is quite "overwhelming" because of its vastness and would benefit from a "practical" approach. Mapping the likely/predicted occurrence of ecosystem services and of the organisms that contribute to their delivery in the different production systems would help decision makers and other stakeholders to fully integrate the adoption and implementation of ecosystem approaches in the formulation of policies and in the development of management strategies.

CHAPTER 5: The state of interventions on conservation and use of biodiversity for food and agriculture

Proposed structure of the chapter and information to be included in the Country Reports

The main objective of this chapter is to provide an assessment and analysis of national and local interventions and activities, along with the state of international collaboration, that support conservation and sustainable use of biodiversity for food and agriculture. The analysis of interventions specific to plant, animal, forest and aquatic genetic resources will be based on the information provided in the respective State of the World Reports.

Information on the following topics should be covered in the Country Report:

- National policies, programmes and enabling frameworks that support or influence conservation and sustainable use of biodiversity for food and agriculture and the provision of ecosystem services;
- Policies, programmes and enabling frameworks governing exchange, access and benefits;
- Information management;
- Local and informal-sector actors and initiatives;
- Availability of capacity and resources;
- Participation in international and regional policies, legal frameworks and collaboration with other countries;
- Knowledge generation and science for the management and sustainable use of biodiversity for food and agriculture.

National policies, programmes and enabling frameworks that support or influence conservation and sustainable use of biodiversity for food and agriculture and the provision of ecosystem services

66. **Identify and describe the main policies, programmes and enabling frameworks that support or specifically address the objectives below, briefly describing the policies, programmes or enabling frameworks listed and provide any available information on the extent of implementation or of lessons learned. For each objective, list up to 10 major policies, programmes and enabling frameworks.**

a. **Support the integrated conservation and sustainable use of biodiversity for food and agriculture across sectors;**
b. **Support the conservation and sustainable use of associated biodiversity;**
c. **Address food security and nutrition with explicit reference to biodiversity for food and agriculture, associated biodiversity and/or wild foods;**
d. **Address the maintenance of ecosystem services with explicit reference to biodiversity for food and, associated biodiversity and/or wild foods;**
e. **Improve resilience and sustainability of production systems with explicit reference to biodiversity for food and agriculture, associated biodiversity and/or wild foods;**
f. **Support farmers, pastoralists, forest dwellers and fisher folk to adopt and maintain practices that strengthen the conservation and use of biodiversity for food and agriculture.**

a./b.
Agro-environmental policies and programmes mostly contribute to improving the maintenance and use of biodiversity for food and agriculture across different sectors. In this respect, the Regional Environment Programme (RMP) has been particularly effective. Through the provision of grants, this programme contributes to increasing the sustainable performance of agriculture. The Programme's priorities are set by the Ministry for Agriculture and Food (e.g. with respect to the species and habitats to conserve), while the decisions on its content are taken at County level. The RMP has contributed significantly to the conservation of biodiverse pastures and to maintaining associated biodiversity species, such as for example salamanders.

b. The ecosystem approach applied to fisheries, as well as sustainable forest management, landscape management and cultural landscape management practices all contribute to the conservation and sustainable use of biodiversity associated with food and agriculture.
More specifically, the sustainable forest management approach supports the conservation and sustainable use of forest associated biodiversity by promoting, inter alia, the volume of standing and lying dead wood and by protecting forest areas and other wooded land known for their biological diversity, landscapes and specific natural elements. This approach also promotes the maintenance and enhancement of protective functions in forest management to prevent soil erosion, preserve water resources, manage natural resources against natural hazards and maintain other forest ecosystem functions.

c.
- The long term safety deposit of seeds in the Svalbard Global Seed Vault is a Norwegian initiative to safeguard seeds from the wide range of genetic diversity of crops that are vital to global food security. From 2012 to 2013, the number of stored seeds increased by 4%. The Seed Vault encompasses samples of about one third of the unique seeds that according to FAO are stored in genebanks worldwide.
- The policy for the conservation of cultivated land/soil should also contribute to ensuring food security and nutrition. At times, however, the implementation of this policy has been subject to trade offs in favour of, for example, housing and road development.

d. The ecosystem approach applied in agriculture, forestry and fisheries provides the enabling framework to maintain ecosystem services in the relevant production systems. At present, there are however no explicit policies or programmes in place exclusively focusing on preserving and/or enhancing the delivery of ecosystem services. The Norwegian government is aware of the need for the development of such policies and programmes, following a report published by an expert commission in 2013, describing the natural benefits-on the value of ecosystem services (NOU, 2013). This report will be built on to improve the country's natural resource management.

e.
- Biomass and timber from Norwegian forests play and will continue to play an important role in the years to come, as welcomed renewable sources that can help meet the challenges of climate change.
- Policies and programmes promoting the maintenance of cultural landscapes through the promotion of outfield livestock grazing systems, such as the selected cultural landscapes initiative (Utvalgte kulturlandskap i jordbruket, www.slf.dep.no).
- Norway's strategy on invasive alien species: this cross-sectoral strategy includes the monitoring and combating of invasive alien species. The operational and financial responsibilities for the implementation of this national strategy have been divided between the different ministries (Norwegian Ministry of the Environment, 2007). The Nature Diversity Act also includes provisions to deter the introduction of invasive alien species to Norway (Chapter IV Alien organisms, sections 28-32).
- In the context of climate change and the sustainability of production systems, research on reducing the emission of methane produced by livestock is increasingly gaining interest.
- The policy of limiting the use of pesticides and antibiotics (e.g. by being restrictive about imports of breeding animals and other introductions of pests and diseases) will continue to contribute to the sustainability and resilience of agricultural production systems in Norway.

f.
- The Norwegian Water and Wetlands Initiative to ensure maintenance and enhancement of wetland biodiversity and environmental goods and services for improved local livelihoods.
- Norway's agricultural policies have traditionally supported small scale structured farming, which has had a significant effect on the contribution of small scale farmers to the conservation and use of biodiversity in agriculture.
- subsidy schemes (Norwegian Agricultural Authority), Finnmark Act (2005)
- Arbediehtu project
- Nature Diversity Act-Nagoya Protocol.
- Forest Act
- The Norwegian government aims to increase Norway's share of organic agricultural production and consumption to 15% by 2020.

67. **List up to 10 major policies, programmes and enabling frameworks in your country that enhance the application of an ecosystem approach or a landscape approach and that contain an explicit reference to biodiversity for food and agriculture, associated biodiversity and/or wild foods. Include a brief description of the policies, programmes and enabling frameworks together with any information on the extent of their application (production system and area) and observed effect. Where possible provide examples of best practices or lessons learned.**

- The Norwegian Genetic Resource Centre recently developed and published indicators to monitor the country's animal, forest and plant genetic resources. In this context, a number of indicators also contribute to monitoring the biodiversity in cultural landscapes and in protected areas, thereby providing the information needed to enhance the application of ecosystem/ landscape approaches (www.genressurser.no).
- Parliament has set the goal of 15% of Norway's food production and consumption to be organic by 2020. By definition, organic agriculture maintains healthy soils, sustainable ecosystems and human health, by building on biological processes, biodiversity and nutrient cycles (International Federation of Organic Agriculture Movements - IFOAM). It hereby enhances the application of an ecosystem approach, as well as the conservation and use of biodiversity for food and agriculture.
- Policies and programmes promoting the maintenance of cultural landscapes through the promotion of outfield livestock grazing systems, such as the selected cultural landscapes initiative (Utvalgte kulturlandskap i jordbruket, www.slf.dep.no).
- Heritage value project (Arvesølv-prosjektet, www.bioforsk.no): The objective of this project was to increase knowledge of and conserve biodiversity of nature types and species in old outlying fields, which had been pastured and mowed and unploughed

(Asdal, 2008). The work that was undertaken in the framework of this project is continued in other forms and projects, the most important one being the Norwegian Environment Agency's Action plan for mowed fields (Å. Asdal, personal comments).
- The Forestry Act promotes sustainable forest management. The criteria for the sustainable forest management approach have been negotiated in the framework of forest policy cooperation in Europe (FOREST EUROPE). Under FOREST EUROPE, criterium nr. 4 of the sustainable forest management approach includes 9 quantitative indicators to monitor the maintenance, conservation and appropriate enhancement of biological diversity in forest ecosystems. These indicators are used to assess, among others, the diversity of tree species (including of introduced and threatened species) and of forest tree genetic resources, as well as the volume of both standing and lying deadwood and the area of protected forests, that are of importance as habitat providers to forest associated biodiversity. The Norwegian Genetic Resource Centre also developed indicators to monitor the state of forest genetic resources (www.genressurser.no).
- Forest Certification scheme (PEFC) and Living Forest standard
The Living Forest standard was agreed upon in 1998, as a result of increased awareness on forestry and environmental issues. The purpose was to develop criteria for sustainable forestry in Norway and related systems, as well as to document and control the environmental conditions in forests. Although the Living Forest Standard was formally suspended in June 2012, the forestry sector continues to follow its rules and guidelines and the Standard has been built into and is maintained as part of Norway's Programme for the Endorsement of Forest Certification scheme (PEFC).
- The management plan for the Barents Sea contributes to the implementation of the Ecosystem Approach to Fisheries.

Briefly describe policies, programmes and enabling frameworks that meet the objectives described in questions 68 and 69. Consider the following discussion points in your responses, where information is available:

a. extent of implementation;
b. production systems involved;
c. the extent of use of biodiversity for agriculture;
d. lessons learned;
e. evidence of indicators of vulnerability that have decreased as a result of these efforts;
f. describe the value added of mainstreaming gender in programmes, policies and enabling frameworks, providing sex-disaggregated data where possible.

68. Describe up to 10 major policies, programmes and enabling frameworks in your country that embed the use of biodiversity for food and agriculture, including its different components, into disaster management and response.

- To limit the risk of landslides and avalanches, Norway has a regulation requiring the maintenance of protective forest areas in mountains towards the timber line (the edge of the habitat at which trees are capable of growing).

69. Describe up to 10 major policies, programmes and enabling frameworks in your country that embed the use of biodiversity for food and agriculture, including its different components, into climate change adaptation and mitigation strategies and plans (NAPAs, NAPs, NAMAs, etc.).

This text box not expandable. Relevant information is provided in Annex I to this questionnaire.

70. **What arrangements are in place or foreseen in your country that help to ensure that the conservation of biodiversity for food and agriculture is taken into account in national planning and policy development of sectors other than agriculture (e.g. NBSAPs or infrastructure development such as transport or energy)?**

NATIONAL BIODIVERSITY STRATEGY AND ACTION PLAN (NBSAP)
Norway’s current NBSAP was adopted in the form of a white paper "Norwegian biodiversity policy and action plan – cross-sectoral responsibilities and coordination" (White Paper Nr. 42 (2000-2001)). The NBSAP forms an integral part of Norway's broader national environmental policy. The white paper emphasized the need for mapping and monitoring biodiversity as a basis for knowledge-based management and coordination of legislative and economic instruments. Norway’s National Biodiversity Strategy and Action Plan has been revised by two later white papers, both entitled "The Government’s Environmental Policy and the State of the Environment in Norway" (White papers Nr. 21 (2004–2005) and Nr. 26 (2006–2007)). Since the adoption of the NBSAP, Norway has considerably strengthened the knowledge base on biodiversity, including biodiversity for food and agriculture, and it has also improved the coordination of relevant legislative instruments. For example, the Nature Diversity Act and the Planning and Building Act (both from 2009), both of which have provisions in place to protect biodiversity, apply across sectors. Other cross-sectoral measures that also encourage coordinated use of legislative and other instruments to protect the environment through knowledge generation, include the management plans for Norway’s sea areas

and the river basin management plans. So far, there has been little coordination of economic instruments.

The Government is currently in the process of drawing up an action plan to halt the loss of biodiversity and implement national goals and the Aichi targets (Norwegian Ministry of Climate and Environment, 2014).

NATURE DIVERSITY ACT
The Nature Diversity Act aims to protect biological, geological and landscape diversity and ecological processes through conservation and sustainable use, and in such a way that the environment provides a basis for human activity, culture, health and well-being, now and in the future, including a basis for Sámi culture. The Act applies to Norwegian land territory, including river systems, and to Norwegian territorial waters, thereby covering a series of sectors, the agricultural sector being one of them. Among others, the Act includes chapters focusing on species management, alien organisms and access to genetic material.

Major disturbances to biodiversity, such as infrastructure development are avoided in endangered habitats and in vulnerable habitats to maintain important ecological functions (MoE-biodiversity).

WHITE PAPER NR.9 (2011-2012) AGRICULTURAL AND FOOD POLICY “WELCOME TO THE TABLE" (VELKOMMEN TIL BORDS)
This White Paper presents the government's long term and ambitious approach to increase national food production by using, as much as possible, Norwegian resources. This policy aims to provide opportunities both to farmers and to the Norwegian food industry and to contribute to food safety among consumers.

71. **Has your country identified any obstacles to developing and implementing legislation that would protect associated biodiversity? List and describe initiatives in Table 25.**

Table 25. Obstacles to developing and implementing legislation that would protect associated biodiversity identified in the country.

Component of associated biodiversity	Obstacles to legislation for protection of associated biodiversity
Native bumblebees and honeybees	The Norwegian Food Safety Authority banned the import of buff-tailed bumblebees for use in greenhouses on the scientific advice of Norwegian and foreign biologists, but subsequently lifted the ban following protests from market gardeners. Buff-tailed bumblebees often carry a range of parasites which can infect both native bumblebees and honeybees.
Multiple components	White paper 26 (2012–2013): National transport plan 2014-2023
Multiple components	New development plan and building law
Native invertebrates and crops	Exotic garden crops, which can harbour invasive alien species, including pests.
Multiple components	The Nature Diversity Act requires all sectoral laws to consider their effects on associated biodiversity. In general, the implementation of this requirement is still difficult in view of the lack of knowledge of and awareness on associated biodiversity and their functions.

Add row
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Provide a concise description of the obstacles to legislation reported in Table 25, and specify a course of action proposed to address this, where possible. Where possible provide examples of best practices or lessons learned.

The National Biodiversity Information Centre regularly assesses the status of species in different habitats, including agricultural lands, forests and marine environments. The knowledge on the roles of these species, as well as of the interactions between them, with respect to the delivery of ecosystem services and to food and agriculture in general, is still very limited. This knowledge gap, makes it difficult to define which species should be prioritized when it comes to development of supporting legislation.

The National transport plan, while focusing on the maintenance and expansion of infrastructural networks, does include a provision to protect and manage the biodiversity in the edges of ditches next to roads, railway tracks, etc.

Policies, programmes and enabling frameworks governing exchange, access and benefits

72. **Has your country taken measures with the aim of ensuring that access to its genetic resources shall be subject to its prior informed consent (PIC) and that benefits arising from their utilization shall be shared in a fair and equitable manner? If yes, identify for which resources and for which uses (e.g. to conduct research and development on the genetic and/ or biochemical composition of the genetic resource) prior informed consent has to be obtained and benefits have to be shared. Indicate in Table 26 for the different categories (and possibly uses) of associated biodiversity, if prior informed consent has to be obtained and benefits have to be shared.**

Table 26. Policies and programmes governing the access to its genetic resources of associated biodiversity established in the country.

Component of associated biodiversity	Intended use (e.g. any use, research and development, commercial use)	PIC and benefit-sharing required (Y/N)
Access to vascular plants, mosses, algae, parts of plants (including berries and fruit), fungi, lichens, terrestrial invertebrates and microorganisms is governed by the Nature Diversity Act According to the Nature Diversity Act, the King may make regulations or individual decisions regarding harvesting and other removal of plants and fungi that are not regulated by provisions laid down in or under another statute.	Any use The public right of access (Allemannsretten) gives the right to pick berries, fungi and flowers for personal consumption in most outlying areas, with the exception of some rare species (special rules exist for protected species).	At present there is no PIC requirement. Under the Nature Diversity Act the King has the competence to make regulations for PIC and Benefit-sharing. The government is currently working on PIC regulations.
Access to wildlife (e.g. terrestrial mamals, birds, reptiles and amphibians that occur naturally in the wild and their eggs, nests and lairs) is governed by the Wildlife Act. According to the Wildlife Act, the King decides which species of wildlife may be hunted (game species) and during which periods of time hunting may take place.	Any use	At present there is no PIC requirement. Under the Nature Diversity Act the King has the competence to make regulations for PIC and Benefit-sharing. The government is currently working on PIC regulations.
Access to wild living marine resources and genetic material derived from them (including plant varieties, fungus species and invertebrates) is governed by the Marine Resources Act	Any use	PIC: No, but could be applied by law. Benefit-sharing: No, but could be applied by law.

Component of associated biodiversity	Intended use (e.g. any use, research and development, commercial use)	PIC and benefit-sharing required (Y/N)
Access to natural stocks of anadromous salmonids, fresh water fish, their habitats and other fresh-water organisms (plants and animals) is governed by Act No.47 of 15 May 1992 relating to salmonids and fresh-water fish etc.	Any use - It is however prohibited to: 1. release salmonids, fresh-water fish, live eggs or fry of such species and other organisms in water courses, fjords or the sea without permission from the Ministry; and 2. initiate stock enhancement measures for salmonids and fresh-water fish without permission from the Ministry. - The Ministry may grant permission to catch broodstock or juvenile fish or to carry out scientific investigations, practical trials , or stock enhancement measures. - For statistical purposes, any person who sells, processes or uses salmonids or fresh-water fish for commercial purposes is required to report the weight and value of each fish species separately, as well as the name and address of the seller.]	PIC: No, but could be applied by law. Benefit-sharing: No, but could be applied by law.

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73. **Has your country taken measures with the aim of ensuring that the prior informed consent or approval and involvement of indigenous and local communities is obtained for access to genetic resources and that benefits arising from the utilization of genetic resources that are held by indigenous and local communities, are shared in a fair and equitable way with the communities concerned, based on mutually agreed terms? If yes, provide a description of the measures and where possible, examples of best practices or lessons learned.**

THE NATURE DIVERSITY ACT

The Nature Diversity Act provides the legal framework for the protection of Sámi culture, with Chapter VII focusing on access to genetic material in particular.

In June 2013, following discussions at governmental level, including the participation of the Sámi Parliament, an amendment to the Nature Diversity Act was adopted by Parliament in order to be able to ratify the Nagoya Protocol. This amendment involved the expansion of Section 61 of the Act to include paragraph a. covering access to and utilization of traditional knowledge associated with genetic material. According to this new paragraph, indigenous peoples and local communities (IPLCs) have the right to protect their interests when knowledge related to genetic material they developed, transmitted and preserved is being accessed and utilized. The King may issue regulations that access to and use of traditional knowledge requires the prior informed consent of IPLCs, which could also include sanctions in the case of illegitimate accession or utilization. The King may decide that the issued regulations also apply to traditional knowledge developed, transferred and conserved by IPLCs in another State, provided that access to or use of the knowledge also requires the prior informed consent of IPLC's under the law of that State.

Other relevant sections of the Nature Diversity Act include:
- Section 8 (knowledge base), which states that the authorities shall attach importance to knowledge that is based on many generations of experience acquired through the use of and interaction with the natural environment, including traditional Sámi use, and that can promote the conservation and sustainable use of biological, geological and landscape diversity;
- Section 14 (other important public interests and Sámi interests), which mentions that measures under this Act shall be weighed against other important public interests. When decisions are made under the Act that directly affect Sámi interests, due importance shall be attached, within the framework that applies for the individual provision, to the natural resource base for Sámi culture; and
- Section 57 (management of genetic material), which refers to the fact that genetic material obtained from the natural environment is a common resource belonging to Norwegian society as a whole and managed by the state and that it shall be utilized to the greatest possible benefit of the environment and human beings in both a national and an international context, also attaching importance to appropriate measures for sharing the benefits arising out of the utilisation of genetic material and in such a way as to safeguard the interests of indigenous peoples and local communities.

THE CONVENTION ON BIOLOGICAL DIVERSITY (CBD) AND THE NAGOYA PROTOCOL ON ACCESS TO GENETIC RESOURCES AND THE FAIR AND EQUITABLE SHARING OF BENEFITS ARISING FROM THEIR UTILIZATION TO THE CONVENTION ON BIOLOGICAL DIVERSITY (NAGOYA PROTOCOL)

As a Contracting Party to the CBD, Norway has committed itself to implementing Articles 8(j) and 10(c) of the Convention, which entails the preservation of the traditional knowledge relating to biological diversity of Sámi. According to Article 8 (j), each contracting party shall respect, as far as possible and as appropriate, preserve and maintain knowledge, innovation and practices of indigenous peoples and local communities and promote their wider application with the approval and involvement of the holders of such knowledge, innovations and practices and encourage the equitable sharing of the benefits arising from their utilization. and local communities. Prior informed consent is currently seen as critical to securing these rights.

On 1 October 2013, Norway ratified the Nagoya Protocol, which entered into force on 12 October 2014. The Norwegian delegation, including representatives from the Sámi Parliament, actively participated in the negotiations of the Protocol until its adoption in October 2010. The Protocol, as well as the process of its development, have been significant steps in mainstreaming indigenous rights as a cross-cutting issue in international negotiations.
Articles 5, 7, 11 and 12 of the Protocol are of particular relevance to the Sámi people:
- Article 5.: Fair and Equitable Benefit-sharing. According to this article, each Party shall take legislative, administrative or policy measures, as appropriate, in order that the benefits arising from the utilization of traditional knowledge associated with genetic resources are shared in a fair and equitable way with indigenous peoples and local communities holding such knowledge, and that such sharing shall be upon mutually agreed terms;
- Article 7.: Access to Traditional Knowledge Associated with Genetic Resources. In accordance with domestic law, each Party shall take measures, as appropriate, with the aim of ensuring that traditional knowledge associated with genetic resources that is held by indigenous peoples and local communities is accessed with the prior and informed consent or approval and involvement of these indigenous peoples and local communities, and that mutually agreed terms have been established;
- Article 11.: Transboundary Cooperation. This article refers to instances where the same genetic resources are found in situ within the territory of more than one Party. This is highly relevant to Sámi who are living across four adjacent states, including Norway; and
- Article 12.: Traditional Knowledge Associated with Genetic Resources. This article is also of importance, as it specifically binds Parties to ensure the participation of the IPLCs when establishing mechanisms to inform potential users of traditional knowledge associated with genetic resources about their obligations.

Work to bring national legislation relevant to access and benefit-sharing of genetic resources, as laid out in the Nature Diversity Act, in line with the Nagoya Protocol is still ongoing and a proposal is expected to be presented at a public hearing in the first half of 2015.

ARBEDIEHTU PROJECT:

The Árbediehtu ("inherited knowledge") project was developed and is being carried out by the Sámi University College. It aims to collect, document and systematize the traditional knowledge and methods Sámi have been utilizing for generations to manage the natural resources that are key to their livelihood (birgejupmi). This knowledge has so far mainly been transferred from one generation to the next through verbal communication and by practice. The Project's work is aligned with the conventions and declarations that were ratified by Norway and are of relevance to IPLCs.
The Project's long-term goal is to support Sámi communities in developing a sustainable livelihood, through: (i) the preservation of traditional knowledge ; (ii) the inclusion of traditional knowledge in educational programmes; and (iii) the use of traditional knowledge in decision making processes on the conservation and sustainable use of biological diversity.

Information management

74. List and describe any linkages between sector information systems on biodiversity for food and agriculture at national level. Where possible provide examples of best practices or lessons learned.

Statistics Norway (SSB): includes information on all sectors related to biodiversity for food and agriculture. SSB does not per se aim to establish any linkages between sector information systems. However, its database provides a series of figures combining information from different sectors (i.e. agriculture related figures, such as the share of agriculture of the country's gross domestic product (GDP), is calculated by combining crop, livestock and forest related figures).

Species Map System (Artskart): The Species Map Service (Artskart), provided by the Norwegian Biodiversity Information Centre and the Global Biodiversity Information Facility Norway (http://www.gbif.no), distributes data on species found in Norway. The Service retrieves most information from the Species Observation System, a database that contains most of the available digital information on the presence of species in Norway. More than 30 Norwegian and foreign data providers working in different

sectors have processed, adapted and made electronically available spatial species occurrence data from their primary databases. Data providers include Bioforsk, the Institute of Marine Research, the Norwegian Association of Fungi and Useful Plants, the Norwegian entomological scoiety, the Norwegian Forest and Landscape Institute, the Norwegian Institute for Nature Research (NINA) and the Norwegian Institute for Water Research (NIVA). A complete list of data providers can be found at: https://artskart.artsdatabanken.no/FaneStatus.aspx
The Species Map Service is an important tool in natural resource management, and is also used by research and industry. Reference: http://artskart.artsdatabanken.no/default.aspx

Naturbase: This database is managed by the Norwegian Environment Agency and provides information, including maps, on, inter alia, protected areas, habitats that are conserved under the Nature Diversity Act, farmlands of high biological value and cultural heritage sites. Being connected to other databases, such as the environmental inventories in forests, forest management plans and land resource maps from the Norwegian Forest and Landscape Institute and the threatened and vulnerable species database from the Norwegian Biodiversity Information Centre, allowing its users to combine data from Naturbase with that of other sources.

Database for protected areas in forests (skogverndatabase): This database includes data from Naturbase, as well as information from other forest-related background material. It is the only database to provide an overview of all the main and associated tree species that are present in protected areas in forests.

Farms Map (Gårdskart): Mapping service designed to assist agricultural managers, as well as owners and users of agricultural properties. The service is based on a series of different databases, including Norway's farm register that is managed by the Norwegian Agriculture Agency, Norway's Cadastre and the detailed land resources mapping service AR5 from the Norwegian Forest and Landscape Institute.

75. **Has your country established national information systems on associated biodiversity? List in Table 27, along with a description of the components of associated biodiversity addressed, and a brief description of information included, use and applications of the information system.**

Table 27. National information systems on associated biodiversity in the Country.

National information system (List)	Components of associated biodiversity addressed (List)	Concise description of information systems
The 2010 Norwegian Red List	All	The 2010 Norwegian Red List contains extinction risk assessments. Of the 40,000 known multi-cellular species on mainland Norway and in adjacent waters, 21,000 have been evaluated, resulting in 4599 red listed species. This list has been prepared in accordance with the IUCN criteria and the information provided is based on knowledge on distribution, population size and development for each species. The Norwegian Red List is supported by searchable databases containing more detailed information from the relevant assessments, including the Species Map System (Artskart), Species Observation System (Artsobservasjoner) and Information system for Norwegian Habitat types (Naturtyper i Norge).
Norwegian Red List for Ecosystems and Habitat Types 2011	All	National risk assessment of ecosystems and habitat types, covering all terrestrial, freshwater and marine systems. The Norwegian Red List for Ecosystems and Habitat Types 2011 is supported by searchable databases containing more detailed information from the relevant assessments, including the Species Map System (Artskart), Species Observation System (Artsobservasjoner) and Information system for Norwegian Habitat types (Naturtyper i Norge).

National information system (List)	Components of associated biodiversity addressed (List)	Concise description of information systems
Alien species in Norway-with the Norwegian Black List 2012	All (including bacteria, algae, fungi, insects, fish)	Provides an overview of a large number of alien species that are found in Norway and assesses the ecological impact of those alien species that reproduce in Norwegian territories (how likely is a species to establish and spread and what is/ could be its effect on biodiversity). Species with the greatest ecological impact form the 2012 Black List. The Norwegian Black List 2012 is supported by searchable databases containing more detailed information from the assessments, including the Species Map System (Artskart), Species Observation System (Artsobservasjoner) and Information system for Norwegian Habitat types (Naturtyper i Norge).
Norwegian Nature Index	Index calculated for major habitat types (excluding cultivated agricultural land) based on the assessment of key species, including algae, lichens, fungi, plants, invertebrates, fish, amphibians, birds and mammals that indicate the potential for biological diversity for several species	The Nature Index is designed to show trends in biodiversity in major ecosystems, excluding agricultural land. It is based on a large number of indicators (309) representing different aspects of biodiversity. The overall objective is to measure whether Norway is succeeding in halting the loss of biodiversity, as pledged under several international agreements. The Norwegian Government made the Norwegian Environment Agency responsible for developing a biodiversity index to document overall trends for major ecosystems and the species they support. The first edition of the Nature Index was published on 23 September 2010 (http://www.miljodirektoratet.no/old/dirnat/ attachment/2246/DN-Report-1-2011.pdf).
National monitoring programme for wild cervids	Moose, red deer, wild reindeer	The National monitoring programme for wild cervids in Norway was established in 1991. It is run by the Norwegian institute for nature research (NINA). The data collected during the 21 years of monitoring represent a unique opportunity to follow the development in population condition (carcass mass, fecundity and recruitment rates), population density and population structure of representative populations of moose, red deer and wild reindeer. The monitoring is carried out in 17 monitoring areas distributed all over Norway (moose: 7, red deer: 3, reindeer: 7) (Solberg et al., 2012).
Naturbase	Selection of natural and recreational areas across Norway	Database managed by the Norwegian Environment Agency. This agency was established on 1 July 2013 as a result of the merger of the Norwegian Climate and Pollution Agency and the Norwegian Directorate for Nature Management. The database provides information, including maps, on Norway's major habitats (www.naturbase.no).
Algaeinfo	Provides updated information on the algal situation in Norwegian waters	The information provided in this database is published by the Institute of Marine Research in cooperation with Oceanor, the Norwegian Ministry of Trade, Industry and Fisheries and the Norwegian Institute for Water Research (http://algeinfo.imr.no/eng/).
State of the environment in agriculture (Miljøstatus i landbruket)	Multiple components	Through the yearly report State of the environment in agriculture, the Norwegian Agricultural Authority shows how the agricultural sector is following up on the country's environmental goals. The report includes information on subsidies that were granted for measures taken to safeguard biodiversity in agriculture.

National information system (List)	Components of associated biodiversity addressed (List)	Concise description of information systems
Statistics Norway	Multiple components, including wild foods (e.g. hunting data)	Statistics Norway was founded in 1876. It is responsible for the country's official statistics and carries out extensive research and analysis activities. Statistics Norway reports to the Ministry of Finance, but is a professionally autonomous organization. Statistics Norway produces statistics on: • The population and living conditions • Resources and the environment (including agriculture) • The economy and national accounts • Municipal, county authority and central government activities
Norwegian Association of Fungi and Useful Plants (Norges sopp-og nyttevekstforbund)	Edible and poisonous fungi	The Norwegian Association of Fungi and Useful Plants (NSNF) is an umbrella organization for the country's various fungal and crop associations. It was formed in 2005, when the Norwegian fungi association (Norsk soppforeningen) merged with the Useful plants association (Nyttevekstforeningen). It includes 30 member associations in the counties of Østfold, Akershus and Oslo, Hedmark, Buskerud, Oppland, Vestfold, Telemark, Aust-Agder and Vest-Agder, Rogaland, Hordaland, Sogn og Fjordane, Møre og Romsdal, Sør-Trøndelag, Nord-Trøndelag, Nordland and Troms and has a total of about 3800 members. NSNF provides, among others, information on edible and poisonous fungi in Norway, it participates in mapping them and it organizes fungi identification courses for anyone interested.
National Forest Inventory (NFI)	Different components of associated biodiversity	The National Forest Inventory (NFI) was established in 1919 to oversee the development of forest resources in Norway based on statistical sampling techniques. It was the world's first national forest inventory. Today, the inventory is based on permanent sample plots which are re-visited every five years. This ongoing evaluation systematically collects information on forest growth, production capability, standing timber volume, species distribution and availability, but also on the environmental status of forests. Ever since the 1920s, strategic decisions and planning in Norwegian forest management, and the design of forest policies, have been based on the systematic gathering, recording and analysis of information. Statistical information from NFI has significantly contributed to ensure the sustainable management of forest resources, and has in recent years also gained importance with respect to the sustainable management of biodiversity.
Terrestrial Ecosystems Monitoring Programme (TOV)	Biological components of common boreal and low alpine ecosystems (e.g. components	The main aim of the Monitoring Programme for Terrestrial Ecosystems is to detect both short- and long-term effects of climate change, long-range pollutants and other natural and anthropogenic impact factors on vegetation and fauna in the natural environment of common boreal and low alpine ecosystems.

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76. Has your country established information systems intended to support maintenance of traditional knowledge on biodiversity for food and agriculture, including associated biodiversity? If yes, describe these and include information where

available on socio-economic, policy and collective action aspects.

This text box is non-expandable. Relevant information is provided in Annex I to this questionnaire.

Stakeholder participation and ongoing activities that support maintenance of biodiversity for food and agriculture

77. **List the most important stakeholder groups, including groups or associations of farmers, forest dwellers, fisher folk and pastoralists, NGOs or other civil society organizations active in the conservation of biodiversity for food and agriculture. Briefly summarize their scope, objectives and activities and any outcomes to date. Where possible provide examples of best practices or lessons learned.**

MAIN ORGANIZATIONS AND/OR GROUPS THAT ACTIVELY CONSERVE BIODIVERSITY FOR FOOD AND AGRICULTURE

Farmers, fishermen and forest owners actively contribute to the conservation of biodiversity for food and agriculture, both as individuals and as part of associations.

Aqua Gen AS: breeding company that develops, produces and provides genetic material to the global fish farming industry. The company is a leading supplier of Atlantic salmon and rainbow trout fertilized eggs.

Plant clone collections: cultivars, landraces and other genotypes of vegetative propagated plant species are conserved as living plants in so-called "clone archives" in different parts of Norway. These collections are hosted by local museums, botanical gardens, research stations, etc.

GENO Breeding and A.I. Association: cooperative that is owned by Norwegian cattle farmers. GENO aims to secure the long-term storage of genetic material of all bulls and bull mothers for Norwegian Red (NRF) cattle. In cooperation with the Norwegian Genetic Resource Centre, GENO also actively supports the conservation of the native and endangered cattle breeds.

Graminor Ltd.: plant-breeding company, responsible for providing Norwegian farming and horticulture with a diversity of disease-free field crops and horticultural plants that are suitable for Norwegian growing conditions. The company aims to develop new and improved plant varieties, test and represent imported varieties, and produce pre-basic seeds for further multiplication and marketing by seed companies. Near the city of Hamar in south-eastern Norway, Graminor undertakes research, breeding and testing of new varieties of cereals, potatoes, strawberries and forage grasses in greenhouses and through field pilots. Testing of grass varieties for the northern regions of Norway takes place at Bioforsk Nord in Tromsø, and of fruit and raspberries at Njøs Research Station in Sogn og Fjordane.

Hvam Agricultural College, in cooperation with the Norwegian Genetic Resource Centre, runs a genebank for egg laying hens.

NOFIMA: Nofima is one of the largest institutes for applied research within the fields of fisheries, aquaculture and food research in Europe. Their scientists have pioneered work in fish breeding since the beginning of the 1970s, and have contributed to the ability of the Norwegian aquaculture industry to produce salmon with better health and in half the time previously required, using less feed.

Norsvin: cooperative owned by Norwegian pig producers. Norsvin is a pig breeding company that sells live animals and semen to both Norwegian and international customers. The company actively participates in debates relevant to the pig industry, including at the political level. Norsvin has an ex situ gene bank of native boar semen that was stored during the period 1990-2000.

Norwegian Sheep and Goat association (Norsk sau og geit-NSG): is a national organization that works to safeguard the interests of sheep and goat holders. Activities include the development of breeding programmes for sheep and goat and the maintenance of outlying fields and grazing land. NSG works closely with agricultural research institutes, other farm organizations, government agencies and policy makers. The organization has about 11,000 members across Norway. NSG has a large storage of semen from the Norwegian goat- and sheep breeds and this storage is expanding every year.

For each endangered native breed there is a breed society or a breeding association. These are important for connecting the different stakeholders that are interested in these breeds, such as the farmers, the Norwegian Genetic Resource Centre and the specific breed associations. Only for the endangered cattle breeds there is an umbrella organization (Norsk Bufe).

Norwegian Association of Hunters and Anglers (Norges Jeger- og Fiskerforbund - NJFF): is the national organization for hunters and anglers in Norway. NJFF has approximately 120 000 members belonging to 570 local hunting and fishing clubs dispersed across the country's 19 counties. NJFF works to secure and maintain viable game and fish stocks in order to (i) ensure future hunting and fishing opportunities; (ii.) enable all motivated hunters and anglers to hunt and fish at a reasonable

price; and (iii.) promote hunting and fishing as legitimate forms of harvesting natural resources now and in the future. NJFF is also interested in maintaining and improving the hunting skills of Norwegian dog breeds.

In cooperation with the Norwegian Genetic Resource Centre, the Norwegian Kennel Club and the different dog breed societies established a national genebank including semen from the six native endangered hunting/herding dog breeds.

Norwegian Beekeepers Association (Norges Birøkterlag - NB): is the national organization for beekeepers in Norway. NB has approximately 2800 members. The organization runs a breeding program for Apis mellifera mellifera, one of the threatened subspecies of honeybees in Europe. It also supports conservation activities in an assigned conservation area for this subspecies.

Norwegian Seed Savers: is a non-profit organization that was established by the Norwegian Genetic Resource Centre (Genressurssenteret) in collaboration with the Norwegian Garden Society (Hageselskapet) in 2006. The organization aims to conserve old heritage vegetables by active cultivation and use through a group of amateur gardeners throughout Norway. By autumn 2008, 40 people had joined. Members have initially been given access to seed and vegetative material mostly sourced from the Norwegian Genetic Resource Centre in collaboration with Nordgen. In 2012, the Norwegian Seed Savers had 170 members.

There are also individuals who have cared for certain varieties over many years. The national programme on plant genetic resources for food and agriculture has supported such dedicated enthusiasts in establishing networks within different crop groups whereby farmers or gardeners are appointed custodians and maintain certain varieties each year. These custodians produce seeds or propagate plant parts for distribution and prepare annual reports about the conservation of each maintained variety.

Slow Food: Through the Ark of Taste initiative, the Slow Food Foundation globally collects small-scale quality productions that belong to the cultures, history and traditions. This initiative was created to point out the existence of special products, draw attention to the risk of their extinction and invite everyone to take action to help protect them. In some cases this might be by buying and consuming them or telling their story and supporting their producers, in others, such as for example endangered wild species, this might mean eating less or none of them in order to preserve them and favor their reproduction. In November 2014, 10 of the 2020 products that were admitted to the international Slow Food Foundation's Ark of Taste were Norwegian, including 3 edible plants/crops (i.e. Angelica ‘Vossakvann’, Garden pea ‘Jærert’ and Turnip ‘Målselvnepe’), 2 livestock breeds (i.e. Telemark cattle and and Villsau sheep), two cheese products (i.e. Artisan Sognefjord Geitost and Hedmark and Oppland Counties Pultost) and three fish related products (i.e. Baccala from Møre og Romsdal, Cured and Smoked Herring from Sunnmøre and Stockfish from the Isle of Sørøya). For more information on these products see: http://www.slowfoodfoundation.com/ark#risultati

ORGANIZATIONS AND/OR GROUPS THAT SUPPORT THE CONSERVATION OF BIODIVERSITY FOR FOOD AND AGRICULTURE

Biodynamic Association (Biologisk dynamisk forening): was founded in 1950 by a small group of farmers and consumers wishing to develop bio-dynamic farming in Norway. The association works to spread knowledge on bio-dynamic farming and to increase the number of farmers that produce food using bio-dynamic methods. In bio-dynamic farming, great importance is attached to biodiversity within the agricultural landscape and a minimum of ten percent of the total farm acreage is set-aside to preserve biodiversity.

Bioforsk: the Norwegian Institute for Agricultural and Environmental Research, conducts applied and specifically targeted research linked to multifunctional agriculture and rural development, plant sciences, environmental protection and natural resource management. Bioforsk's objective is to provide industries, governments and consumers with new knowledge, services and solutions within these scientific fields. Bioforsk also gives high priority to International collaboration with respect to the conservation of biodiversity for food and agriculture.

Norwegian Association of Fungi and Useful Plants (Norges sopp-og nyttevekstforbund): umbrella organization for the country's various fungal associations and crop associations established in 2005. At present, the organization has about 3800 members. The association aims to (i.) increase the use and knowledge of mushrooms and herbs; (ii.) facilitate the collection of mushrooms and herbs; (iii.) participate in efforts to conserve biodiversity in nature and to advise on species interactions with other organisms and their beneficial and harmful effects; and (iv.) work for both public and scientific interest in the fields of mushrooms and herbs.

Nature Conservation Association (Naturvernforbundet): founded in 1914, the Nature Conservation Association is the oldest environmental protection organization in Norway. The association focuses on environmental issues related to area conservation, climate change, energy and transport. It has approximately 20,000 members.

Norwegian Biodiversity Network (SABIMA): SABIMA is an umbrella NGO working to strengthen the protection of biodiversity in Norway. It influences political and other processes to improve the conditions for biodiversity in Norway. SABIMA focuses on better legislation, more sustainable use of resources, and more robust and comprehensive management systems.

Norwegian Genetic Resource Centre: coordinates expertise and activities regarding the conservation and utilisation of national genetic resources. The centre has been commissioned to contribute to the effective management of genetic resources in farm animals, crops and forest trees. It also acts as an advisory body to the Norwegian Ministry of Food and Agriculture.

Norwegian Farmers and Smallholders Union (Norsk Bonde- og Småbrukarlag): politically independent organization that works to improve the economic and social conditions in agriculture, including by participating in the annual agricultural negotiations. The organization's area of focus include: increased food production, economic development, local breeding, animal welfare and dynamic cultural landscapes. The Union has about 7,000 members.

Norwegian Farmers' Union (Norges bondelag): largest trade union for farmers in Norway that aims to improve conditions for agriculture (e.g. it negotiates with the State on farmer income opportunities on an annual basis) and to enhance agriculture's importance to society. The Union is financially and politically independent and counts 60,500 members.

Norwegian Fishermen's Association (Norges Fiskarlag) is the professional fishermen's union and business organization. It was founded in 1926. The association is politically independent and is based on the voluntary membership of fishermen. Today, the Norwegian Fishermen's Association has approximately 5700 members.

Norwegian Forest and Landscape Institute (Norsk institutt for skog og landskap): The institute conducts research and provides information about forests, soils, outlying fields and landscapes. It also manages a range of national mapping programs and resource inventories related to land cover, forestry, agriculture, landscape and the environment. The institute shares its knowledge with the authorities, the private sector and the general public to contribute to the sustainable management of and value creation based on land resources.

Norwegian Garden Association (Norske Hageselskap): independent environmental organization aiming to promote gardening, sustainable horticulture and green surroundings through the dissemination of information. The association has approximately 25,000 members.

Norwegian Institute for Nature Research (NINA): established in 1988, the institute is responsible for long-term strategic research and commissioned applied research to facilitate the implementation of international conventions, decision-support systems and management tools, as well as to enhance public awareness and promote conflict resolution. NINA offers broad-based ecological expertise covering the genetic, population, species, ecosystem and landscape level, in terrestrial, freshwater, and coastal marine environments. NINA is, among others, experienced in dealing with natural and human aspects of resource and biodiversity management.

Norwegian Ornithological Society (NOF): was founded in 1957. The society aims to protect birds and their habitats in Norway and to influence any related developments through research and documentation. NOF has about 9000 members.

Oikos - Økologisk Norge: Oikos is a non-governmental organization. It was founded in September 2000 with the aim to establish a national movement of organic producers and consumers in Norway and strengthen its voice in Norwegian politics, economics and social life. In addition to political lobbying and holding meetings with stakeholders in the food and agricultural sectors, Oikos runs many projects. Next to promoting the production and consumption of organic food, the organization also contributes to raising awareness on the importance of associated biodiversity in food production systems. In this respect, Oikos promotes, among others, the conservation of soil biodiversity. Oikos is a member of IFOAM (International Federation of Organic Agriculture Movements).

State of the Environment in Norway (Miljøstatus i Norge): administered by the Norwegian Environment Agency, it's website provides regularly updated information on the state of the environment in Norway, including on relevant laws and agreements. State of the Environment in Norway also keeps an overview of the national environmental objectives.

World Wide Fund for Nature (WWF): WWF Norway aims to protect and preserve the values of nature and its biodiversity in marine and coastal areas, in fresh water and on land. The organization also continuously works to improving Norway's climate and energy related policies and laws.

78. **Describe any incentives or benefits to support activities for the conservation and sustainable use of biodiversity for food and agriculture or associated biodiversity (such as payments, provision of inputs, subsidies or other forms of incentives/ benefits). Briefly describe how these have been applied, to what extent and the stakeholders involved (including provisions on gender balance if any). Indicate any lessons learned and planned development incentives.**

Norway's agriculture sector benefits from supportive policies, including fiscal policies and subsidies set by the Agricultural Agreement (Jordbruksavtalen). At present, there are approximately 100 different types of agriculture related subsidies targeting small-scale to large-scale farmers. Of the the subsidies included in the Agricultural Environment programme (Miljøprogram i jordbruket), some aim to directly support the conservation and sustainable use of biodiversity for food and agriculture and/or associated biodiversity (e.g. subsidies for pasture fields and those supporting the conservation of native livestock breeds), while others do so indirectly (e.g. subsidies promoting outfield grazing). Subsidies directed at organic production are also important for the support of sustainable use of biodiversity/associated biodiversity. Other subsidies may have a negative influence (e.g. subsidies related to development projects). At times, different considerations need to be made for different sectors, leading to inevitable trade-offs.

The Regional Environment Programme (RMP), that is included in the Agricultural Environment programme and is managed by the Norwegian Agricultural Authority, is a central component in the national environmental efforts in agriculture. Through the provision of grants, the programme contributes to increasing the sustainable performance of agriculture. Interesting provisions in this respect include agricultural grants to maintain summer livestock farming in the mountains. This promotes extensive grazing, which prevents regrowth of outlying pastures and grasslands, thereby protecting the associated biodiversity that depends on open landscapes. Grants like these are also of importance to farmers who keep ruminants of native threatened livestock breeds (e.g. Telemark cattle). Other grants are provided in support of projects to, for example, prevent nutrient runoff from agricultural areas. Regarding the latter, USD 28 million was spent on projects like these in 2011 (Norwegian Ministry of Climate and Environment, 2014). While the decisions on the content of the RMP are taken at the County level, the priorities that have been set by the Ministry of Climate and Environment, such as those with respect to the species and habitats to conserve, are also taken into account. Support provided through the RMP has contributed, inter alia, to the conservation of unique cultural landscapes, including biodiverse pastures and the range of different species they are hosting, like for example salamanders.

The Forest Certification scheme (PEFC) promotes sustainable forest management through certification of forest properties and forest products. It is considered to be the certification system of choice for small forest owners (http://www.pefc.org/about-pefc/membership/national-members/16-Norway).

In 2013, the Ministry of Environment published Norway's first review on the state of its ecosystem services. Using the Millennium Ecosystem Assessment as a reference, this study assessed, described and made an attempt to valuate the ecosystem services that are of most relevance to the country. The document addresses and makes recommendations as to the possible payment/remuneration in support of activities that are perceived to favour the delivery of ecosystem services.

79. List up to 10 major projects (either in progress or completed in the last five years) that support the conservation and sustainable use of biodiversity for food and agriculture, associated biodiversity and/or wild foods. For each project listed describe the components of biodiversity, the production system and area covered, and the results, outcomes and lessons learned. Projects described in sector reports need not be described here.

A broad range of projects in support of the conservation and sustainable use of biodiversity for food and agriculture, associated biodiversity and/or wild foods have been/are being undertaken. Some of these projects are included in Norway's sectoral reports on animal, plant and forest genetic resources, others include:

ESTABLISHMENT OF PGR IN SITU CONSERVATION IN PROTECTED AREAS IN NORWAY
Overall goal of the ongoing project:
National implementation of the PGR in situ conservation provisions reflected in the ITPGRFA and the GPA for PGR. This project will contribute to achieving Aichi target 13 to have sustained genetic diversity within crops and their wild growing relatives by 2020. The project is be carried out in accordance with the Norwegian Nature Diversity Act and its regulations.
Components of biodiversity: crop wild relatives and their associated biodiversity
Area: Protected areas (field work is currently being carried out in 5 to 10 hot-spots where the so-called "important CWR" occur.
Project partners: University of Birmingham, GBIF Norway, Natural History Museum (Oslo), NordGen, County authorities responsible for the management of protected areas and the Norwegian Environment Agency (observer). The County authorities and the Norwegian Environment Agency will provide support in determining how genetic resources of certain CWR species could be protected, while respecting the existing protected areas regulatory framework of the Nature Management Act.

WILD APPLE IN NORWAY
Component of biodiversity: wild apple trees
Objective: Analyze status of wild apple trees with respect to their genetic variation to define how to best protect them (in situ/ex

situ conservation?).

LIVING FOREST (LEVENDE SKOG)
The Living Forest standard was initiated in 1995 and agreed upon in 1998, as a result of increased awareness on forestry and environmental issues. The purpose was to develop criteria for sustainable forestry in Norway and related systems, as well as to document and control the environmental conditions in forests. The aim was also to strengthen Norwegian and international confidence in products from Norwegian forestry and the Norwegian forest industry. The standard was developed with the participation of forest owner organizations, the forest industry, trade unions and environmental and outdoor organizations. Government officials participated as observers (Det norske Skogselskap, 2011). Although the Living Forest Standard was formally suspended in June 2012, the forestry sector continues to follow its rules and guidelines and the Standard has been built into and is maintained as part of Norway's Programme for the Endorsement of Forest Certification scheme (PEFC).

BETTER POLLINATION OF RED CLOVER WITH HELP OF BUMBLE AND HONEY BEES (PolliClover)
Project undertaken by Bioforsk (2013-2017)
Objective: Red clover is Norway's main pasture legume crop. It fixes nitrogen directly from the air and adds extra protein and minerals to animal fodder. This project aims to reverse the continuous decline in red clover seedlings through the active use of pollinators and to evaluate the effects of habitat management with a view to increase bumble bee density.

COOPERATIVE STRUCTURES significantly contribute to the conservation and sustainable use of biodiversity for food and agriculture at national, regional and international levels.

DEVELOPMENT PROJECTS ON ANIMAL, PLANT AND FOREST GENETIC RESOURCES
Projects relevant to the development of the animal, plant and forest genetic resources sectors are included in Norway's sectoral reports on animal, plant and forest genetic resources, as well as in the strategic plan of the Norwegian Genetic Resource Centre and its rolling plans of action for the conservation and use of farm animals, forest trees and plants (http://www.skogoglandskap.no/filearchive/rapport_19_13_strategiplan_for_norsk_genressurssenter.pdf; http://www.skogoglandskap.no/temaer/handlingsplan_husdyr/subject_view; http://www.skogoglandskap.no/temaer/handlingsplan_skogtrer/subject_view; and http://www.skogoglandskap.no/temaer/handlingsplan_planter/subject_view

ENVIRONMENTAL PLAN (MILJØPLAN - LANDBRUKETS HUS)
A tool for recording, planning and documenting measures related to agricultural operations.

GOAL NORWEGIAN GOVERNMENT:
The Norwegian government aims to increase the production and consumption of organic food to 15% by 2020 (White paper Nr.9 (2011-2012)). To reach this target, incentives, including in the form of subsidies have been established, to enhance both the number of organic farmers and the area under organic cultivation. These subsidies have mainly been linked to the size of the area under organic cultivation and not to, for example, to whether the farmer contributed to improving his/her arable land's soil structure and health and/or managed to improve the delivery of ecosystem services. In addition, only limited attention has been given to training the farmers in the more practical aspects of organic farming.
The production and consumption of organic products in Norway has been steadily increasing over the past two decades. Between 2006 and 2012, the revenue from selling organic products increased by 142 per cent. From 1992 to 2009 both the number of organic farms as well as the total area under organic cultivation steadily increased. From 2009 to 2012 these figures slightly decreased.

LIVING TOPSOIL PROJECT (LEVENDE MATJORD)
The "Living topsoil" project was established in 2009 by county representatives of Buskerud, Lindum AS, VitalAnalyse and Bioforsk Økologisk. It finished its first cycle in 2013 and entered into its second four year cycle in 2014. This project is mainly funded by the Norwegian Agricultural Authority (Landbruksdirektoratet). Through this Project, farmers are encouraged approach their soils from a biological perspective and to take into account the soil food web dynamics. Within this project, soil health, including the occurrence of associated soil biodiversity, is being assessed on agricultural land of both conventional and organic farmers. Following such assessments, farmers are given advice on possible ways to bring back "life" into the soil. Farmers participating in this project are from the counties of Buskerud, Østfold, Vestfold and Rogaland. Both farmers, in particular the conventional ones, and decision makers at county (fylkesmannen) and national (Norsk Landbruksrådgiving) levels have shown great interest in this project.
This project is closely linked to the "Soil knowledge and soil culture" project (Jordkunnskap og jordkultur). This project, which aims to stimulate biological diversity and improve the amount of humus in topsoils, was initiated and is funded by the Norwegian Agricultural Authority.

VRI VESTFOLD PROJECT
In this ten-year project, companies and researchers work together to increase innovation and value creation in businesses, that are focussing on food, micro-technology, water purification and energy and marine engineering, in the Vestfold region. The project is mainly funded by Norway's Research Council and the project's owner Vestfold Value Creation.
One of the project's research areas includes vermicomposting. In this process, various earthworms are used to break down a

mixture of horse manure, cow dung and vegetable waste, resulting into worm castings or worm manure. These nutrient-rich castings are subsequently tested as organic fertilizers and soil conditioners to produce healthier and more resistant food crops. Through this research, which is being carried out by Stenersens Gardening, the project ultimately aims to reduce the use of chemical fertilizers in crop production and to enhance sustainable crop intensification.

ENVIRONMENTAL RECORDING IN FORESTS (MILJØREGISTRERING I SKOG) (MiS)
This project is being implemented by the Norwegian Forest and Landscape Institute and is funded by the Ministry of Agriculture and Food. The two interrelated objectives of MiS are to i) improve the knowledge of the environmental benefits of biodiversity in forests; and ii) develop methods to detect and monitor this biodiversity. The project includes the utilization of a registration tool, that provides information to forest owners on areas that are particularly important to conserve from an environmental perspective.

THE PROJECTS DESCRIBED ABOVE ARE NOT LISTED IN ORDER OF PRIORITY AND THE LIST IS NOT EXHAUSTIVE

80. **List in Table 28 up to 10 major landscape based initiatives to protect or recognize areas of land and water in your country of particular significance for biodiversity for food and agriculture.**

Table 28. Landscape based initiatives to protect or recognize areas of land and water in the country with particular significance for biodiversity for food and agriculture.

Landscape based initiatives	Description of sites and their characteristics of relevance to biodiversity for food and agriculture	Extent (area)
National Parks (SoW-PGRFA2, Table 5. page 18)	Number: 29 - 8.3% of Norway's total land area	26,756 km2 (2008 figures)
Protected landscapes	Number: 174 - 4.7%	15,093 km2
Nature reserves (area increased by 94.5% between 1996 and 2008)	Number: 1,822 - 1.3%	4,299 km2
Nature monuments	Number: 101 - 0%	2 km2
Other protected areas	Number: 122 - 0%	126 km2
Mapping of valuable nature types		
Distribution of farm maps		
Selected nature types/cultural landscapes		
Cultural heritage sites	The Directorate for Cultural Heritage (Riksantvikaren) is responsible for the implementation of the Norwegian Cultural Heritage Act and the related objectives laid down by the Norwegian Parliament and the Ministry of Environment. The Directorate ensures that a representative selection of monuments and sites from all periods is preserved for present and future generations. The selection of monuments and sites must provide an overview of historical developments, the way of life and the range of works of art and craftsmanship of each period.	
Subsidies promoting farming in mountainous areas (seterdrift tillskud)		

Landscape based initiatives	Description of sites and their characteristics of relevance to biodiversity for food and agriculture	Extent (area)
Selected Agricultural Landscapes	This project was established in 2006 by the Ministry of Agriculture and Food and the Ministry of Environment. It was led and coordinated by the Norwegian Agricultural Authority in close cooperation with the Regional Agricultural Authorities, Nature Management, and Cultural Heritage administrations. The mandate was based on the Ministry of Agriculture and Food's Parliamentary Paper no: 1 (2005-2006), which stated that " Cultural landscapes of special historical and biological value are to be registered, and a plan for their management effected before the end of 2010". Parliamentary Paper 21 (2004-2005), on Norway's Environmental Policy/State of the Nation's environment stipulated that "The historical agricultural landscapes are to be managed in such a way that the historical features, aesthetic values, biodiversity and accessibility are maintained". Regional administrators and councils cooperate with the landowners by managing and maintaining the natural- and cultural treasures in the areas. The criteria for selecting the landscapes were as follows: • agricultural landscapes rich in biodiversity and historical/cultural assets • that long-term management and upkeep of the landscape was viable More information on this project and on the 20 designated landscapes is provided at: https://www.slf.dep.no/no/miljo-og-okologisk/kulturlandskap/utvalgte-kulturlandskap#english	The selected landscapes vary greatly in size i.e. from 9 to 16500 hectares
Heritage value project (Arvesølvprosjektet)	The objective of this project was to increase knowledge and conserve biodiversity of nature types and species in old outlying fields that had been pastured or mowed and unploughed. The work that was undertaken in the framework of this project is continued in other forms and projects, the most important one being the Norwegian Environment Agency's Action Plan for mowed fields (Å. Asdal, personal comments). More information on this project can be found at: http://www.bioforsk.no/ikbViewer/page/prosjekt/hovedtema?p_dim2=23261&p_sub_id=23260&p_dimension_id=23259&p_menu_id=23270	In autumn 2010, the project was active in 33 different areas in the counties of Aust-Agder, Vest-Agder, Telemark, Rogaland and Hordaland
SEE ANNEX I TO THIS QUESTIONNAIRE FOR ADDITIONAL INFORMATION		

Add row

Delete row

Collaboration between institutions and organizations

81. **Describe existing linkages and collaboration between sectors in national programmes and policies governing conservation and sustainable use of biodiversity for food and agriculture. These may include overall strategies and plans developed by your country, committees or other national bodies which oversee or support collaboration, shared actions, facilities or resources and specific activities which involve inter-sector collaboration.**

THE NORWEGIAN GENETIC RESOURCE CENTRE AND ITS GENETIC RESOURCE COMMITTEES
The Norwegian Genetic Resource Centre is responsible for monitoring, ensuring access to and increasing the use, knowledge and awareness on the conservation and sustainable use of animal, plant and forest genetic resources for food and agriculture. Having a single centre working on a large share of the country's genetic resources for food and agriculture, Norway is in a privileged position to both identify and take advantage of the synergies between the different sectors and to weigh the trade-offs, of which there are few. The Centre organizes both regular and ad hoc meetings during which its sectoral committees on animal, plant and forest genetic resources both jointly and separately discuss and provide advice on, inter alia, the Centre's strategic and action plans and on national policies of relevance to genetic resources for food and agriculture (e.g. environmental related policies). Joint meetings of the three genetic resource committees have led to interesting exchanges of knowledge and expertise across sectors on issues such as the characterization of genetic resources, in situ and ex situ conservation and the

development of indicators.

COLLABORATION BETWEEN MINISTRIES FOR THE IMPLEMENTATION OF THE CONVENTION ON BIOLOGICAL DIVERSITY (CBD)
The Norwegian Ministry of Climate and Environment (KLD) is the authority responsible for reporting to the CBD on the Convention's implementation in Norway. Since 1998, KLD submitted five reports to the CBD, providing information on the status and trends of biodiversity in Norway, on progress made with respect to the implementation of the Convention and highlighting successes and remaining challenges. In the last and fifth national report to the CBD, that was submitted in July 2014, KLD reported on the implementation of the 20 Aichi Biodiversity Targets (http://www.cbd.int/reports/nr5/). In this context, the Ministry of Agriculture and Food was particularly responsible for providing the necessary information to KLD on the implementation of Aichi target 13 (By 2020, the genetic diversity of cultivated plants and farmed and domesticated animals and of wild relatives, including other socio-economically as well as culturally valuable species, is maintained, and strategies have been developed and implemented for minimizing genetic erosion and safeguarding their genetic diversity).

WHITE PAPERS AND LAWS FOR THE IMPLEMENTATION OF THE CONVENTION ON BIOLOGICAL DIVERSITY AND OF THE INTERNATIONAL TREATY ON PLANT GENETIC RESOURCES FOR FOOD AND AGRICULTURE INVOLVING DIFFERENT SECTORS
• White paper Nr.58 (1996-97) - Environmental policy for sustainable development (Miljøvernpolitikk for en bærekraftig utvikling)
• White paper Nr.42 (2000-2001) – Norwegian biodiversity policy and action plan - cross-sectoral responsibilities and coordination
• White paper Nr.9 (2011–2012) Agriculture and food policy “Welcome to the table”
• White paper Nr.21 (2011-2012) Norwegian climate policy
• Act of 19 June 2009 Nr.100 Relating to the management of biological, geological and landscape diversity (Nature Diversity Act)

ACTIONS

As a follow-up to the above mentioned White papers and the Nature Diversity Act, concrete actions undertaken at the national level, include:
• The development of a national programme to map and monitor biological diversity
• The establishment of protected areas in the form of national parks, protected forests and protected marine areas
• General provisions on sustainable use in the Nature Diversity Act
• The establishment of the Norwegian Biodiversity Information Centre
• The development of action plans for endangered and prioritized species and for selected nature types
• The establishment of the Norwegian Genetic Resource Centre and of its genetic resource committees for animal, plant and forest genetic resources
• Norway's engagement in the establishment of the Nordic genetic resource centre (NordGen) in 2008
• The establishment of the Svalbard Global Seed Vault that became operational in 2008. The Seed Vault aims to safeguard both crops that are vital to global food security and forest tree seeds to secure longterm conservation of forest trees. In February 2015, the first forest tree seeds of Norway spruce (Picea abies) and Scots pine (Pinus sylvestris) were officially deposited and stored in the Seed Vault.

82. **How are ministries working together to meet Aichi Targets as they may apply to the conservation and sustainable use of biodiversity for food and agriculture in your country?**

The Ministry of Climate and Environment is the primary National Focal Point of the Convention on Biological Diversity (CBD). The Ministry reports on the status and trends of biodiversity in Norway through the submission of national reports to the CBD. For the preparation of such reports, the Ministry coordinates and consolidates inputs provided by the Norwegian Environmental Agency, other relevant ministries, including the Ministry of Agriculture and Food, and the Sámi parliament. For the most recently submitted Fifth National Report to the CBD, inputs from other relevant stakeholders, gathered through an open consultation, were are also included. Between 1998 and 2014, five national reports have been submitted to the CBD.

The Fifth National Report is the first report prepared by the Ministry of Climate and Environment since the adoption of the Strategic Plan for Biodiversity 2011-2020, including the Aichi Biodiversity Targets.

All Norwegian authorities, industrial sectors and other relevant actors are required to play their part in efforts to ensure the conservation and sustainable use of biodiversity. Since the adoption of its first National Biodiversity Strategy and Action Plan in 2001, Norway has taken a series of measures to strengthen its commitment to the implementation of the Convention and its Strategic Plan (2011-2020). The country, inter alia, strengthened its knowledge base and improved existing and developed new legislative instruments. In addition, the Nature Diversity Act was developed to protect biological diversity and ecological processes through conservation and sustainable use. The Act also includes provisions on alien species and access to genetic material. Applying to multiple sectors, the Nature Diversity Act significantly facilitates multi-sectoral coordination. Other cross-

sectoral measures of relevance to the conservation and sustainable use of biodiversity, include the Planning and Building Act, the management plans for Norway's sea areas and the river basin management plans. In addition, the National Budget includes an indicator set designed to monitor progress towards the targets of Norway's sustainable development strategy, some of which are based on Nature Index values.

Relevant monitoring programmes:
- Some of Norway's major ecosystems, including agricultural habitats, forests and marine and freshwater environments are monitored through biodiversity monitoring programmes; and
- The monitoring of certain animal populations (e.g. wild salmon, marine fish stocks and large ungulates).

Information source: Fifth National Report to the CBD, available at: http://www.cbd.int/doc/world/no/no-nr-05-en.pdf

83. **What future actions have been planned to support your country's efforts in addressing Aichi Targets as they may apply to the conservation and sustainable use of biodiversity for food and agriculture in your country?**

Aichi target 13: the Norwegian Genetic Resource Centre is developing actions plans to conserve animal, forest and plant genetic resources ex situ, while it is also undertaking an assessment of the status of characterization for these various sectors.

84. **Is your country involved in the implementation of regional and/or international initiatives targeting the conservation and sustainable use of associated biodiversity? List initiatives in Table 29.**

Table 29. Regional and/or international initiatives targeting the conservation and sustainable use of associated biodiversity.

Initiatives	Scope (R: regional, I: international)	Description	References
EEA and Norway Grants	R	For the period 2009-2014, €1.798 billion* has been set aside under the Grants. Projects may be implemented until 2016. Among others, The EEA Grants support programmes on biodiversity and ecosystem services in Bulgaria, Cyprus, Czech Republic, Lithuania, Poland, Romania and Slovenia. Programmes in this area will help beneficiary countries increase capacity to better manage and monitor Natura 2000 protected areas and protect native ecosystems. Better awareness and understanding of biodiversity and ecosystem services will improve the integration of biodiversity considerations in policy and legislative development	http:// eeagrants.org/
Nordic Council of Ministers	R	Official cooperation forum of the Nordic governments (Denmark, Finland, Iceland, Norway, Sweden, the Faroe Islands, Greenland and Åland). The Nordic Council of Ministers established, inter alia, working groups on microbiology, animal health and welfare and fisheries, respectively to ensure effective cooperation between the Nordic authorities in these fields.	http:// www.norden. org/en
EU Water Framework Directive	R	The EU Water Framework Directive, a framework for the Community action in the field of water policy, was adopted on 23 October 2000 and entered into force on 22 December of the same year. 12 Waternotes include issues that need to be addressed to implement the Directive, such as the management of ground water, the reduction of dangerous chemicals in Europe's waters and the importance of integrating water related policies.	http:// ec.europa.eu/ environment/ water/water-framework/ index_en.html

Initiatives	Scope (R: regional, I: international)	Description	References
FAO Commission on Genetic Resources for Food and Agriculture	I	Norway is one of the 177 Member countries of the FAO Commission on Genetic Resources for Food and Agriculture. The Commission provides an intergovernmental forum where issues of relevance to all components of biodiversity for food and agriculture, are discussed and negotiated. The Commission aims to reach international consensus on policies for the sustainable use and conservation of genetic resources for food an agriculture and the fair and equitable sharing of benefits derived from their use. Since its establishment, the Commission has overseen global assessments of the state of the world's forest, plant and animal genetic resources for food and agriculture. To address the main gaps and challenges identified in these assessments, the Commission agreed on policy responses in the form of Global Plans of Action through which governments commit themselves to taking action to promote the conservation and sustainable use of genetic resources for food and agriculture. The Norwegian Genetic Resource Centre mirrored both the structure and content of these global action plans in its strategic plan, as well as in the national action plans for animal, forest and plant genetic resources.	http://www.fao.org/nr/cgrfa/cgrfa-home/en/
Convention on Biological Diversity	I	Norway has been a contracting party to the Convention on Biological Diversity since 1993. The objectives of this Convention are the conservation of biological diversity (including biodiversity for food and agriculture), the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources.	http://www.cbd.int/convention/

Initiatives	Scope (R: regional, I: international)	Description	References
Svalbard Global Seed Vault	I	The Svalbard Global Seed Vault, established by the Norwegian government, opened in February 2008. The Seed Vault aims to provide facilities for safety deposit of samples of seeds of distinct genetic resources of importance to humanity. The Seed Vault provides secure conservation facilities free of costs for deposits under "black box conditions" on request from public and private holders of seeds, with priority on safeguarding a complete set of the world's seed accessions of plant genetic resources of importance for food and agriculture. The Seed Vault was planned and established in close collaboration with international bodies, and it can be considered as a step to facilitate the implementation of the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA). Management of the Seed Vault is carried out in cooperation with the Global Crop Diversity Trust (GCDT) which partly funds the operation of the vault, and NordGen, which is responsible for the everyday management. By November 2014, approximately 840,000 accessions from more than 20 international and national institutions were deposited in the Seed Vault - FAO estimates that there are about 2 million unique accessions in the world's 1750 recorded collections. In February 2015, the first forest tree seeds, consisting of accessions of Norway spruce (Picea abies) and Scots pine (Pinus sylvestris), were officially deposited and stored in the Seed Vault. An international Advisory Council monitors the activities and advises Norway on a wide range of issues related to the Svalbard Global Seed Vault.	http:// www.seedvault.no

Initiatives	Scope (R: regional, I: international)	Description	References
UNESCO's World Heritage in Norway: Vegøyan- The Vega Archipelago (2004)	National/International	Norway has seven sites on UNESCO's World Heritage List, including: 1. Vegøyan-The Vega Archipelago The Vega Archipelago is a cluster of islands centered on Vega, just south of the Arctic Circle, which forms a cultural landscape of 103,710 ha, of which 6,930 ha is land. The islands bear testimony to a distinctive frugal way of life, based on fishing and harvesting down from the eider ducks over the past 1,500 years. Fishing villages, quays, warehouses, eider houses (built for eider ducks to nest in), farming landscapes, lighthouses and beacons are important sites. Evidence is also found of human settlement from the Stone Age onwards. By the 9th century, the islands had become an important centre for the supply of down, which appears to have accounted for around a third of the islanders' income. 2. Geirangerfjord and Nærøyfjord Situated in south-western Norway, north-east of Bergen, Geirangerfjord and Nærøyfjord, are part of the west Norwegian fjord landscape. The two fjords, among the world's longest and deepest, are considered as archetypical fjord landscapes and among the most scenically outstanding anywhere. The sheer walls of the fjords have numerous waterfalls while free-flowing rivers cross their deciduous and coniferous forests to glacial lakes, glaciers and rugged mountains. The landscape features a range of supporting natural phenomena, both terrestrial and marine, such as submarine moraines and marine mammals. Remnants of old and now mostly abandoned transhumant farms add a cultural aspect to the dramatic natural landscape that complements and adds human interest to the area. The ministries of Agriculture and Food and of Climate and Environment jointly support the maintenance of these cultural landscapes, including their (associated) biodiversity, by providing annual funding for grazing and mowing.	http://unesco.no/eng-child-page/world-heritage-in-norway/
Gothenburg Protocol	I	The 1999 Gothenburg Protocol to Abate Acidification, Eutrophication and Ground-level Ozone sets emission ceilings for 2010 for four pollutants: sulphur, NOx, VOCs and ammonia. Parties whose emissions have a more severe environmental or health impact and whose emissions are relatively cheap to reduce will have to make the biggest cuts. Once the Protocol is fully implemented, Europe's sulphur emissions should be cut by at least 63%, its NOx emissions by 41%, its VOC emissions by 40% and its ammonia emissions by 17% compared to 1990. Under the Protocol, farmers will have to take specific measures to control ammonia emissions. The Protocol was amended in 2012 to include national emission reduction commitments to be achieved in 2020 and beyond.	http://www.unece.org/env/lrtap/multi_h1.html

Initiatives	Scope (R: regional, I: international)	Description	References
Forest Europe	R	FOREST EUROPE (The Ministerial Conference on the Protection of Forests in Europe) is the pan-European political process for the sustainable management of the continent's forests. FOREST EUROPE develops common strategies for its 46 member countries and the European Union on how to protect and sustainably manage forests. Since 1990, the collaboration of the ministers responsible for forests in Europe has had a great economic, environmental and social impact at the national and international level. FOREST EUROPE has led to achievements such as the guidelines, criteria and indicators for sustainable forest management.	http:// www.foresteurope.org/ about_us/ foresteurope
Norway has a long history in development cooperation contributing, among others, to projects working towards sustainable forest management in different regions of the world.	R/I	Multiple projects	NORAD, the Norwegian Forestry Group and others
International Barcode of Life (iBOL)	I	iBOL uses sequence diversity in short, standardized gene regions -DNA barcodes- as a tool for identifying known species and discovering new ones. By reinforcing traditional taxonomy, DNA barcoding is revolutionizing the capacity to know and monitor biodiversity. iBOL's main mission is to extend the geographic and taxonomic coverage of the barcode reference library (Barcode of Life Data Systems (BOLD)) storing the resulting barcode records, providing community access to the knowledge they represent and creating new devices to ensure global access to this information. That includes a hand-held device that will provide real-time access to identifications by anyone in any setting.	http://ibol.org
Berne Convention on the Conservation of European Wildlife and Natural Habitats	R	The Bern Convention is a binding international legal instrument in the field of nature conservation, covering most of the natural heritage of the European continent and extends to some States of Africa. It is the only regional Convention of its kind worldwide, and aims to conserve wild flora and fauna and their natural habitats, as well as to promote European co-operation in this field. The treaty also takes account of the impact that other policies may have on natural heritage and recognises the intrinsic value of wild flora and fauna, which needs to be preserved and passed to future generations. The Berne Convention has 50 parties.	http:// www.coe.int
Convention on the Conservation of Migratory Species of Wild Animals (CMS)	I	As an environmental treaty under the aegis of the United Nations Environment Programme, CMS provides a global platform for the conservation and sustainable use of migratory animals and their habitats. CMS brings together the States through which migratory animals pass, the Range States, and lays the legal foundation for internationally coordinated conservation measures throughout a migratory range. CMS has 120 parties.	http:// www.cms.int/
Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)	I	CITES is an international agreement between governments. Its aim is to ensure that international trade in specimens of wild animals and plants does not threaten their survival. CITES has 180 parties.	http:// www.cites.org

Initiatives	Scope (R: regional, I: international)	Description	References
OSPAR Convention	R	The OSPAR Convention is the current legal instrument guiding international cooperation on the protection of the marine environment of the North-East Atlantic. Work under the Convention is managed by the OSPAR Commission, made up of representatives of each of the 15 Contracting Parties and the European Commission, representing the European Union.	http://www.ospar.org
Helsinki Convention on the Protection of the Marine Environment of the Baltic Sea Area	R	The Helsinki Convention aims to prevent and eliminate pollution of the marine environment of the Baltic Sea area, including inland waters as well as the water of the sea itself and the sea-bed. Measures are also taken in the whole catchment area of the Baltic Sea to reduce land-based pollution. The governing body of the Convention is the Helsinki Commission (HELCOM). The Contracting Parties to HELCOM are Denmark, Estonia, Finland, Germany, Latvia, Lithuania, Poland, Russia and Sweden. The European Union is also a party to this convention.	http://helcom.fi/about-us/convention
European Landscape Convention	R	The aims of this Convention are to promote landscape protection, management and planning, and to organise European co-operation on landscape issues. The Convention has 38 parties.	http://conventions.coe.int/Treaty/en/Treaties/Html/176.htm
European Environment Agency (EEA)	R	EEA's mandate is to help the European Community and member countries make informed decisions about improving the environment, integrating environmental considerations into economic policies and moving towards sustainability, and to coordinate the European environment information and observation network. The EEA currently has 33 member countries.	http://www.eea.europa.eu
United Nations Environment Programme (UNEP)	I	Norway actively contributes to the United Nations Environment Programme. It strongly supports the organization's policies, plans and agenda, which are centered on cross cutting themes such as climate change, ecosystem management, environmental governance, harmful substances and hazardous waste and resource efficiency, including sustainable consumption and production. To support the United Nations in the field of Environment, mainly through UNEP, Norway established the GRID-Arendal Centre. The Centre generates environmental data, which it organizes and transforms into credible, science-based information products, delivered through innovative communication tools and capacity-building services targeting relevant stakeholders.	http://www.unep.org http://www.grida.no

Initiatives	Scope (R: regional, I: international)	Description	References
Intergovernmental Panel on Biodiversity and Ecosystem Services (IPBES)	I	IPBES was established in April 2012, as an independent intergovernmental body open to all member countries of the United Nations. The members are committed to building IPBES as the leading intergovernmental body for assessing the state of the planet's biodiversity, its ecosystems and the essential services they provide to society. IPBES provides a mechanism recognized by both the scientific and policy communities to synthesize, review, assess and critically evaluate relevant information and knowledge generated worldwide by governments, academia, scientific organizations, non-governmental organizations and indigenous communities. At present, IPBES counts 123 member countries, including Norway.	http://www.ipbes.net
Organisation for Economic Co-operation and Development (OECD)	I	OECD's Environmental Performance Reviews (EPRs) identify good practices and make recommendations to improve the reviewed country's environmental policies and programmes. Norway's latest Environmental Performance Review, that was conducted under the management of the OECD Working Party on Environmental Performance (WPEP), dates back to May 2011.	http://www.oecd.org/norway/norway2011.htm
FAO Port State Measures Agreement to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing	I	This in 2009 adopted FAO Agreement aims to prevent, deter and eliminate illegal, unreported and unregulated (IUU) fishing through the implementation of robust port State measures. IUU is a global threat to sustainable fisheries and to the management and conservation of fisheries resources and marine biodiversity.	http://www.fao.org/fishery/topic/166283/en
International Convention for the Control and Management of Ships' Ballast Water and Sediments (BWM Convention)	I	The Ballast Water Management Convention, adopted in 2004, aims to prevent the spread of harmful aquatic organisms from one region to another, by establishing standards and procedures for the management and control of ships' ballast water and sediments. Invasive aquatic species present a major threat to the marine ecosystems, and shipping has been identified as a major pathway for introducing species to new environments. The effects of the introduction of new species have in many areas of the world been devastating.	http://www.imo.org/About/Conventions/ListOfConventions/Pages/International-Convention-for-the-Control-and-Management-of-Ships%27-Ballast-Water-and-Sediments-%28BWM%29.aspx

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Capacity development

85. **What training and extension programmes, or elements of programmes, at all levels, exist that target the conservation and sustainable use of associated biodiversity?**

1. The Norwegian University of Life Science (NMBU) and the University of Nordland (Bodø), through their different faculties and departments offers a broad range of courses involving the conservation and sustainable use of associated biodiversity
2. Relevant educational programmes are also being offered at Bachelor level by several regional colleges of higher education (Distriktshøgskoler).
3. Sogn Jord-og Hagebruksskule is the only high school in Norway that provides practice-oriented education on organic farming. Most of the courses are given on the school's farm. More information is available at: http://sjh.no.
4.OIKOS has a school project to promote organic food.
5. The Norwegian Genetic Resource Centre contributes to enhancing knowledge and raising awareness on the importance of micro-organisms and invertebrates to food and agriculture, like for example, in the form of posters (e.g. the tree species diversity posters - skogtreplakatene) that are distributed for free to students at all levels.
6. School gardens (skolehagen): Bioforsk promotes the establishment of school gardens to provide children with a unique "learning by doing" educational programme to learn more about food production, enjoy nature, respect everything that lives (i.e. earthworms, bees, etc.) and gain insight in ecological processes. In this context, Bioforsk produced a series of thematic sheets on, inter alia, food production, life in soils and plant varieties (http://www.bioforsk.no/ikbViewer/page/prosjekt/tema/artikkel?p_dimension_id=19960&p_menu_id=19975&p_sub_id=19962&p_document_id=107098&p_dim2=19969). More detailed information on the school garden project is available at: http://www.bioforsk.no/ikbViewer/page/prosjekt/hovedtema?p_dimension_id=19960&p_menu_id=19975&p_sub_id=19962&p_dim2=19963.
7. Skoleskogen (forest school) is an educational programme for teachers, school administrators, parents and others interested in interdisciplinary teaching on forests. A selection of teaching materials, courses and local networks, as well as a variety of activities and exercises are available http://www.skoleskogen.no.
8. The Norwegian "Learning with the Forests" programme is a forest education programme based on the international "Learning About Forests" initiative. It aims to encourage school classes and teachers to go to forests, learn from them and in them, and to share experiences with other countries.
9. The Norwegian Ministry of Climate and Environment, in cooperation with different actors, has developed a large range of initiatives to expose school children to environmental issues, including the need to conserve biodiversity. The "Environmental backpack" initiative (Den naturlige skolesekken), for example, funds school projects that promote sustainable development outside the classroom and involve cooperation with local communities. Since April 2014, schools across the country are also given the possibility to invite environmental ambassadors free of charge to give a presentation entitled the "Green Generation" (Generasjon Grønn). By using images and animations this 50 minute presentation shows the linkages between climate change, biodiversity loss and other environmental challenges.
10. In 2010, the Environmental Education Network organized a nationwide school project focusing on the importance of earthworms. Through this initiative, that included the participation of scientists from Bioforsk, more earthworm species in more locations than ever before were registered in Norway (https://www.miljolare.no/kampanjer/forskningskampanjen/2010).
11. URBACT is a European exchange and learning programme promoting sustainable urban development. Norway is an active partner in the URBACT Thematic Network "Sustainable Food in Urban Communities", a project involving 10 European cities, including Oslo, that wish to grow, deliver and enjoy more sustainable food through the development of low-carbon and resource-efficient urban food systems. The network, which enhances the exchange of knowledge across Europe on urban sustainable food strategies, will be active until April 2015. Examples of initiatives undertaken in Oslo in this context include the "Geitmyra School Garden", an area where school children can participate and get insights in gardening and beekeeping, "Bogstad Farm", where the general public can observe farming and the production of vegetables and animal products while enjoying the landscape and the "Hærligheten Wasteland Garden", where wasteland caught in between two streets was transformed into a crop growing area using growing boxes. More information is available at: http://www.sustainable-everyday-project.net/urbact-sustainable-food/category/oslo.

86. **What higher education programmes exist that target the conservation and sustainable use of associated biodiversity genetic resources? List in Table 30 the institutions, as well as the programmes and enrolment, disaggregated by sex, if possible**.

Table 30. Higher education programmes specifically targeting the conservation and sustainable use of associated biodiversity genetic resources in the country.

Institution	**Programme**	**Level**	**Enrolment** (total)	**Enrolment** (male)	**Enrolment** (female)

Institution	Programme	Level	Enrolment (total)	Enrolment (male)	Enrolment (female)
NMBU	Agroecology (taught in English)	Master Degree	83	30	53
NMBU	Ecology (taught in English)	Master Degree			
NMBU	Microbiology (taught in English)	Master Degree			
NMBU	Plant sciences	Bachelor / Master Degree			
NMBU	Environment and natural resources	Bachelor / Master Degree			
NMBU	Forestry	Bachelor / Master Degree			
NMBU	Ecology and nature management	Bachelor / Master Degree			
NMBU	Microbiology	Master Degree			
NMBU	The Soil Science Group provides courses on, inter alia, soil fertility and soil management	Master Degree			
NMBU	Business development based on outlying areas (Næringsutvikling basert på utmarksarealer)	Master Degree			
NTNU					
Norwegian College of Fishery Science	Study programs are tailored to suit the needs of the seafood industry and management. The programs have a multidisciplinary focus with research being undertaken on topics as diverse as the quality of seafood, ecosystem-based management, vaccines for fish, and the development of industry and society.	Professional Study, Bachelor Degree (2) and Master Degree (3)			
University of Tromsø - The Arctic University of Norway	Among others, this university offers a course on physiology and marine ecology	The physiology and marine ecology course is provided at bachelor level			

Institution	Programme	Level	Enrolment (total)	Enrolment (male)	Enrolment (female)
University of Bergen	The University's Master degree programme in Biology includes specializations in: aquaculture biology fisheries biology and management, marine biology biodiversity, evolution and ecology, microbiology and developmental biology and physiology The University's ecology course focuses, among others, on the important processes that influence patterns at specimen, population, community, and ecosystem level. The University's Biology Department includes a Marine biodiversity group that explores a range of marine biological fields and studies a great diversity of marine organisms through multidisciplinary projects, combining classical methods in morphology with molecular biology and marine field research.	Master Degree			
Several regional colleges of higher education and several universities, other than those mentioned (e.g. University of Oslo) provide relevant programmes and courses, including biodiversity and ecology courses.					

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87. List up to 10 major institutions within your country directly involved in research on the conservation and sustainable use of associated biodiversity. Provide a concise description of the institutions, of their key research programmes and, where possible, provide the number of active researchers.

Please note that the list provided below is not exhaustive and that the institutions are listed in alphabetical order and not by importance.

1. Bioforsk
2. Institute of Marine Research (Havforskningsinstituttet)
3. Norwegian Agricultural Economics Research Institute (NILF)
4. Norwegian Institute for Nature Research (NINA): Biodiversity and ecosystem services, as well as effects of land use, climate

change and pollution are amongst NINA's key research themes. In relation to the conservation and sustainable use of associated biodiversity and wild foods in particular, relevant initiatives include projects on reindeer husbandry and predators, the organization of a seminar on ecosystem services and retribution of ecosystem services, the mapping of bees, including bumblebees, and the monitoring of hollow oaks, which provide a habitat for many different elements of associated biodiversity, including insects, fungi and lichen.
5. Norwegian Forest and Landscape Institute: does research and provides information on forests, soils, outlying fields and landscapes. The Institute generates knowledge that is used by the government, the private sector and the broader public to ensure the sustainable management and development of land resources.
6. Norwegian Institute for water research (NIVA): NIVA is an environmental research organisation committed to research, monitoring, assessment and studies on freshwater, coastal and marine environments in addition to environmental technology. Key areas of work include environmental contaminants, biodiversity and climate related issues.
7. Norwegian University of Life Sciences (NMBU): works towards sustainable development of natural resources, including their use and conservation.
8.Norwegian University of Science and Technology (NTNU): NTNU is involved in a broad range of research programmes, some of which are of relevance to the conservation and sustainable use of associated biodiversity. NTNU also houses the Centre for Biodiversity Dynamics (CBD) that aims to develop into an interdisciplinary centre for research into changes in time and space of biological diversity at different organism levels. The three primary research areas of the Centre include population dynamics, evolution and community dynamics (http://www.ntnu.edu).
Sogn og Fjordane University College: programmes/research on landscape planning, as well as on geohazards and climate change.
9. University of Bergen: This university has an extensive marine research programme that focuses, inter alia, on marine and fisheries biology and climate change.
10. University of Oslo
11. University of Tromsø-the Arctic University of Norway
12. Several regional colleges of higher education

Knowledge generation and science for the management and sustainable use of biodiversity for food and agriculture

88. **With respect to information management, national policies, programmes and enabling frameworks that support or influence the conservation and sustainable use of biodiversity for food and agriculture and the provision of ecosystem services, and govern exchange, access and benefits:**
   a. **What are the major gaps in information and knowledge?**
   b. **What are the main capacity or resources limitations?**
   c. **What are the main policy and institutional constraints?**
   d. **What actions are required and what would be the priorities?**

a. There is a lack of knowledge on (associated) species (particularly in soils) and ecosystem functions.
b. There is a lack of species specialists and taxonomists to conduct survey and identification work. Next to the lack of human resources, there are also no financial resources available for conducting such activities.
c. With respect to information management in support of the conservation and sustainable use of biodiversity for food and agriculture, coordination between the different sectors is still inadequate and some challenges remain.

89. **With respect to stakeholder participation and ongoing activities that support maintenance of biodiversity for food and agriculture and collaboration between institutions and organizations:**
   a. **What are the major gaps in information and knowledge?**
   b. **What are the main capacity or resources limitations?**
   c. **What are the main policy and institutional constraints?**
   d. **What actions are required and what would be the priorities?**

This text box is non-expandable. Relevant information is provided in Annex I to this questionnaire.

90. **With respect to capacity development:**
   a. **What are the major gaps in information and knowledge?**
   b. **What are the main capacity or resources limitations?**
   c. **What are the main policy and institutional constraints?**
   d. **What actions are required and what would be the priorities?**

This text box is non-expandable. Relevant information is provided in Annex I to this questionnaire.

91. **With respect to knowledge generation and science for the management and sustainable use of biodiversity for food and agriculture:**

a. **What are the major gaps in information and knowledge?**
b. **What are the main capacity or resources limitations?**
c. **What are the main policy and institutional constraints?**
d. **What actions are required and what would be the priorities?**

This text box is non-expandable. Relevant information is provided in Annex I to this questionnaire.

CHAPTER 6: Future agendas for conservation and sustainable use of biodiversity for food and agriculture

Proposed structure of the chapter and information to be included in the Country Reports

This chapter provides an opportunity to describe plans and priorities to secure and improve the conservation and sustainable use of biodiversity for food and agriculture. Particular attention should be given to future opportunities to enhance the contribution of biodiversity for food and agriculture to food security and nutrition, as well as the elimination of rural poverty. Planned actions and initiatives should be listed that intend to support the following:

- Strengthening the contribution of biodiversity for food and agriculture to secure the multiple benefits of agriculture, including food security and nutrition, rural development, sustainable intensification, and the enhanced sustainability and resilience of production systems;
- Improving recognition and involvement of farmers, pastoralists, fishers and forest dwellers, addressing gender equality, and supporting the roles and contributions of women;
- Contributing to the UN Strategic Plan for Biodiversity and to achieving the Aichi Targets and linking to other related processes undertaken through the Convention on Biological Diversity.

Additionally, Chapter 6 allows an assessment of future needs with respect to policies and legal arrangements, economic frameworks, knowledge creation, capacity development and collaboration.

This part of the Country Report should build on the results presented in earlier Chapters and provide an integrated overview with, where possible, clear priorities for national, regional or global actions. This chapter is structured to benefit countries through an overall synthesis of information provided elsewhere in the report. Countries that previously presented or are currently preparing a Country Report on Forest, Aquatic, Animal or Plant Genetic Resources, may wish to take full advantage of their different sectoral reports to identify an overall perspective.

Enhancing the contribution of biodiversity for food and agriculture

This section provides an opportunity for countries to highlight their plans and priorities, and to describe current constraints to achieving them on enhancing the contribution of biodiversity for food and agriculture to human wellbeing, environmental health and sustainable production. Include any information that might be useful in informing future policies to help strengthen the contribution of biodiversity for food and agriculture to the broader sustainability and development objectives listed below.

92. **Describe planned actions and future priorities to improve the conservation and sustainable use of biodiversity for food and agriculture with specific reference to enhancing its contribution to:**

a. **improving food security and nutrition;**
b. **improving rural livelihoods;**
c. **improving productivity;**
d. **supporting ecosystem function and the provision of ecosystem services;**
e. **improving the sustainability and resilience of production systems;**
f. **supporting sustainable intensification.**

Refer to the future needs and priorities identified in previous Chapters. The different topics may be dealt with jointly or individually as appropriate to country plans and approaches. Replies should include country perspectives on:

- **Ways and means of improving the capacity and operations of the institutions within your country concerned with or affected by the maintenance and use of biodiversity for food and agriculture and particularly of associated biodiversity, including universities, government programmes, NGOs, breeders, private sector entities, organizations and social movements of small-scale producers. Actions to improve collaboration between stakeholders should be included.**

- **Ways and means of supporting the development of new policies or the implementation of the current policies that support the integrated conservation and sustainable use of biodiversity for food and agriculture, and that also specifically target associated biodiversity.**

- **The major information and knowledge gaps that remain to be addressed and options that exist to address them.**

Countries should indicate the ways in which planned actions will contribute to the UN Strategic Plan for Biodiversity and to achieving the Aichi Targets In particular Targets 6, 7, 13. as well as to how they link to other related processes undertaken through the Convention on Biological Diversity.

All of Norway's national environmental targets, the corresponding indicators and information on status can be found on the website State of the Environment Norway (www.environment.no/Goals-andindicators/).

AICHI TARGET 6.
Norway's national environmental targets relevant to achieving Aichi target 6. are targets:
1.1. The structure, functioning, productivity and diversity of marine ecosystems will be maintained or restored and they will provide a basis for value creation through the sustainable use of natural resources and ecosystem services.
1.4. Maintain ecosystem functioning in coral reefs and other vulnerable ecosystems (this target is also of relevance to achieving Aichi target 10.).
1.5. and 2.4. Losses of threatened marine species and threatened species in freshwater will be halted and the status of declining species will be improved by 2020 ((this target is also of relevance to achieving Aichi target 12.).
1.6. Management of all harvested marine species will be ecosystem-based, and they will be harvested sustainably;
2.5. Management of all harvested freshwater animals and plants will be ecosystem-based, and they will be harvested sustainably by 2020.
2.6. Wild stocks of anadromous salmonids (including their genetic diversity) will be viable (this target is also of relevance to achieving Aichi target 12.).

The integrated management plans for the Barents Sea–Lofoten area, the Norwegian Sea, and the North Sea and Skagerrak include management goals that are relevant to Aichi target 6.

For the Norwegian Sea, goals for biodiversity include the following:
- Naturally occurring species will exist in viable populations and genetic diversity will be maintained.
- Management of living marine resources will be based on the principles of sustainable harvesting.
- Populations of endangered and vulnerable species and species for which Norway has a special responsibility will be maintained or restored to viable levels. Unintentional negative pressures on such species as a result of activity in the Norwegian Sea will be avoided.

The second bullet point for the Norwegian Sea is worded as follows in the management plan for the Barents Sea–Lofoten area:
- Harvested species will be managed within safe biological limits so that their spawning stocks have good reproductive capacity.

A number of measures that have been implemented or planned will have an important influence on developments up to 2020.

An ecosystem-based approach is fundamental to the legislation governing Norwegian fisheries management. The fisheries authorities must also regularly assess what measures are needed to safeguard individual stocks that are harvested. A great deal of work has been done at both national and international level to reduce illegal, unreported and unregulated fishing (IUU fishing) through port state controls when catches are landed. Nevertheless, single species management is still the dominant approach in fisheries management. Steps are being taken to learn more about interactions between stocks and develop a more integrated ecosystem-based management regime for marine resources. Thus, some stocks are now being given multi-species based advice for the fishing quotas (e.g. capelin, north-east arctic haddock and north-east arctic cod, as well as herring, mackerel and blue whiting in the Norwegian Sea).

Norway's integrated marine management plans are cross-sectoral, and include other biodiversity goals in addition to those mentioned above. The purpose of this management plan is to provide a framework for the sustainable use of natural resources and ecosystem services derived from the sea areas and at the same time maintain the structure, functioning, productivity and diversity of the area's ecosystems. The management plan is thus a tool for both facilitating value creation and maintaining the environmental values of the sea areas. The management plans are intended to promote integrated, ecosystem-based

management of Norwegian sea areas. They clarify the overall framework and encourage closer coordination and clear management priorities. They increase predictability and facilitate coexistence between industries that are based on the use of these sea areas and their natural resources. The management plans are also intended to be instrumental in ensuring that business interests, local, regional and central authorities, environmental organisations and other interest groups all have a common understanding of the goals for the management of the area in question.

FRESHWATER SPECIES
No harvesting of threatened species or stocks of freshwater fish species is permitted. Salmon stocks are managed on the basis of spawning stock management targets, based on the number of female fish needed for the river to produce the maximum sustainable yield of smolt. The goal is for target levels to be reached in three of every four years, and fishing in each salmon river is regulated with the aim of achieving the defined spawning stock level. This management regime has resulted in an increase in salmon stocks (Forseth 2013). Since 1970, wild salmon stocks have shown a negative trend in all parts of the North Atlantic. The aquaculture-related measures, including those described under Aichi target 7. may in the long term reduce pressure on wild salmon and sea trout from this sector.

ASSESSMENT OF PROGRESS - THE BARENTS SEA - LOFOTEN AREA
Progress towards the biodiversity-related goals mentioned above was evaluated for the Barents Sea–Lofoten area when the first update of the management plan was published in a white paper in 2011 (Meld. St. 10 (2010–2011)). Viable populations have been achieved for cod, haddock, saithe, capelin, herring and marine mammals. Beaked redfish and possibly also Greenland halibut are now under recovery whilegolden redfish, and coastal cod have been at low levels and therefore not reached their full reproductive potential. The target has not been achieved for seabird populations. In 2005, there was extensive illegal, unreported and unregulated (IUU) fishing of Northeast Arctic cod. Norway took the initiative for cooperation with other countries to reduce fishing pressure. This was successful, and IUU fishing has been greatly reduced. The target of maintaining populations of threatened species and species for which Norway has a special responsibility or restoring them to viable levels as soon as possible has not been achieved. Populations of many such species are not considered to be viable at present.

ASSESSMENT OF PROGRESS - THE NORWEGIAN SEA
An assessment of progress towards the targets for the Norwegian Sea will be completed in summer 2014, as part of the first update of the management plan for this area. However, as regards progress towards Aichi target 6, it is already possible to say that most species for which Norway has a special responsibility and important large fish stocks are being soundly managed. A number of endangered and vulnerable species are still under pressure and showing negative trends. The exception is the beaked redfish stock, which is now considered to be at a sustainable level, although the species was red-listed in 2010. This conclusion is based on updated information, and the assessment for this species may well be changed when Norway’s next red list is published in 2015.

General measures implemented by Norway in marine areas include further development of systematic monitoring and management of living marine resources in accordance with the Marine Resources Act and continuing the development of an ecosystem-based management regime for living marine resources. Norway supplies data on fish stocks to the International Council for the Exploration of the Sea (ICES), which collates and analyses data from all countries that harvest and carry out research on these stocks. Norway is also taking part in international efforts to build up knowledge of individual fish stocks so that the overall harvest is sustainable. ICES bases its advice on the best available knowledge and Norway is working actively to ensure that the overall harvest is in accordance with this advice.

AICHI TARGET 7.
Norway's national environmental targets relevant to achieving Aichi target 7. are targets:
4.1. By 2020, the diversity of habitat types in forests will be maintained or restored; this will include safeguarding genetic diversity and important ecological functions and services.
4.2. All forestry areas will be sustainably managed by 2020.
4.5. Management of all harvested stocks of forest animals and plants will be ecosystem-based, and they will be harvested sustainably by 2020.
6.7. All agricultural areas will be sustainably managed by 2020.

To conserve forest genetic resources in situ in Norway, gene conservation units have been established for 10 tree species. The units are placed in 23 already existing nature reserves, in 11 counties. Common European minimum requirements and standards have been developed for the establishment of such units, through the European Forest Genetic Resources Programme (EUFORGEN).

Forestry is the most important factor influencing forest biodiversity. According to the 2010 Norwegian Red List, many forest species that are threatened or near-threatened are believed to be negatively affected by former or current forestry activities. Key biotopes and other environmental values have been registered in a large proportion of forest areas in Norway. Forest owners are required to take this information into consideration, and to plan forestry activities accordingly. Most productive forest is managed in accordance with the Norwegian PEFC standard. The Nature Index for Norway 2010 gives the status for biodiversity in forests through an index value. The most recent Nature Index work is essentially based on assessments made by

experts, while the next version of the Nature Index aims to be based on more factual data.

The way in which logging and climate related measures such as tree planting are carried out will also be of influence on the status of forest biodiversity.

The proportion of forest area registered as protected from logging in key biotopes (approximately 3,4 % of the total productive forest area according to Tomter and Dalen (Tomter & Dalen, 2014), as well as controlling and avoiding the ongoing spread of non-native tree species will also be of importance. Sustainable agricultural practices, including grazing and management of the cultural landscape, are essential for maintaining biodiversity and it is an ongoing task to ensure that agricultural policy instruments are designed to assist in achieving environmental policy targets. Norway is using a variety of economic and legislative instruments to maintain the diversity of habitat types and species in the cultural landscape; these include the designation of selected habitat types and priority species, measures to control alien species, and cross-sector cooperation on specific environmental measures in agriculture. Nutrient runoff from agricultural areas is a threat to water quality and in this respect measures are also being undertaken.

Norway published its strategy for an environmentally sustainable aquaculture industry in 2009. One of its goals is for the industry to develop a structure and locate facilities in a way that reduces environmental impacts and the risk of spreading disease. Aquaculture has important impacts in coastal waters and fjords, for example as a result of the escape of farmed salmon and the transmission of salmon lice. Indicators and thresholds for determining acceptable levels of impact on wild salmon spawning grounds are being developed. The Aquaculture Act was amended in 2013 to provide a legal basis for introducing requirements to identify/tag aquaculture organisms. This will make it possible to distinguish between wild and escaped farmed salmon, and track the origin of escaped salmon, but the provision has not yet been applied. About one fifth of the entire Atlantic salmon population is found in Norway, and the country therefore has a major international responsibility for managing the species. Since 1970, wild salmon stocks have shown a negative trend in all parts of the North Atlantic. The aquaculture-related measures may reduce pressure on wild salmon and sea trout from this sector. Nevertheless, it is a challenging task to reconcile the national target of ensuring viable wild stocks of anadromous salmonids with the objective of ensuring that the aquaculture industry grows sustainably. The authorities, the industries and interest groups will have to cooperate to find solutions that reduce the overall pressure on wild fish stocks.

AICHI TARGET 13.
No national environmental targets correspond directly to Aichi target 13. However, the overall goals of Norwegian agricultural policy include enhancing the conservation and use of genetic resources for food and agriculture, including safeguarding an as large a proportion as possible of global crop and forest tree seed diversity in the Svalbard Global Seed Vault.
Norway's national environmental targets 2.6. and 6.5. particularly contribute to achieving Aichi target 13:
2.6. Wild stocks of anadromous salmonids (including their genetic diversity) will be viable.
6.5. By 2020, the diversity of habitat types in cultural landscapes will be maintained or restored; this will include safeguarding genetic diversity and important ecological functions and services.

The Norwegian Genetic Resource Centre plays a key role when it comes to achieving Aichi target 13. The Centre is responsible for contributing to the effective management of animal and plant genetic resources for food and agriculture and of forest genetic resources. Its strategic plan and plans of action provide a framework for the three sectors with priorities and activities to conserve and use cultivated plants, farm animals and forest trees that are native to Norway.

Norway has breeding programmes for a total of 13 plant species, including cereals, potatoes, fodder plants, fruits and berries. In 2012, 13 new varieties were included on the Norwegian Official List of Varieties, four of which were developed in Norway. The new varieties list contains plant varieties that have been approved for commercial production in Norway. Before a new variety is included on the list, it has been thoroughly screened to ensure it is different from existing varieties and that it has cultivation potential and use value in Norway.
National field gene banks have been established for the conservation of various fruit crops, berries and potatoes. The Norwegian Genetic Resource Centre has also developed a strategy for in situ conservation of crop wild relatives in the Norwegian flora, which includes the conservation of their semi-natural habitats, such as hay meadows.

Systematic conservation work for endangered livestock breeds in Norway started in 1990. Since then, the status of these breeds has in general improved, even if a number of threatened horse and cattle breeds have known a negative trend. Of the 35 livestock breeds classified as native to Norway, 17 are considered to be critically endangered according to FAO's guidelines on the characterisation of livestock breeds.

To conserve forest genetic resources in situ in Norway, gene conservation units have been established for 10 tree species. The units are placed in 23 already existing nature reserves, in 11 counties. Common European minimum requirements and standards have been developed for the establishment of such units, through the European Forest Genetic Resources Programme (EUFORGEN).

Norway’s fisheries and aquaculture regulations include provisions to safeguard aquatic genetic resources. The need for a

systematic approach to map and control pollution, pests and diseases, and the genetic interaction between farmed aquaculture organisms (e.g. salmon) and wild populations, resulted in the preparation of the Strategy for an Environmentally Sustainable Norwegian Aquaculture Industry and the Aquaculture Act. The fisheries and aquaculture authorities are responsible for identifying relevant indicators and establishing mapping programmes and systematic actions to reduce negative effects on wild populations, and for maintaining and enhancing the genetic resources of farmed aquatic organisms. This work must be carried out in cooperation with other authorities, such as the environmental authorities that are responsible for safeguarding wild populations and the food and agriculture related authorities.
The Norwegian environmental authorities are maintaining the genetic diversity of Atlantic salmon by keeping genetic material from 170 stocks in gene banks. Stock enhancement measures and steps to protect or restore habitats for other threatened and vulnerable aquatic species are also being organised and are relevant to this Aichi target.

As a member of the FAO Commission on Genetic Resources for Food and Agriculture, Norway is committed to the implementation of the Global Plans of Action for plant, animal and forest genetic resources, which were developed under the Commission's umbrella. These action plans directly contribute to the implementation of Aichi target 13, as does the work of the International Treaty on Plant Genetic Resources for Food and Agriculture, to which Norway is a contracting party.
Norway's participation in the forthcoming State of the World Reports on aquatic genetic resources and biodiversity for food and agriculture, respectively, will also contribute to reporting on the the achievement of Aichi targets (particularly targets 7 and 13).

The Nature Diversity Act sets out management objectives for different food and agriculture related species. According to this Act, the genetic diversity of domesticated species is also to be maintained.

Strengthening the conservation and management of associated biodiversity and wild foods

This section provides an opportunity for countries to highlight their plans and priorities, and to describe current constraints to achieving them on the conservation and management of associated biodiversity and of wild foods.

93. **Describe planned actions and future priorities to support conservation and management of the components of associated biodiversity and wild foods including the development of monitoring programmes and of information systems or databases.**

Replies should cover country perspectives on:

- **Ways and means of improving the capacity and operations of the institutions within your country concerned with or affected by the maintenance and use of biodiversity for food and agriculture and particularly of associated biodiversity, including universities, government programmes, NGOs, breeders, private sector entities, organizations and social movements of small-scale producers. Actions to improve collaboration between stakeholders should be included;**

- **Ways and means of supporting the development of new policies or the implementation of the current policies that support the integrated conservation and sustainable use of biodiversity for food and agriculture, and that also specifically target associated biodiversity;**

- **The major information and knowledge gaps that remain to be addressed and options that exist to address them.**

- The Norwegian government is planning to expand the area of protected areas, particularly in the marine environment.
- There is a clear need to expand monitoring activities with respect to biodiversity for food and agriculture, and in particular associated biodiversity components.

94. **Describe planned actions and future priorities with respect to implementing ecosystem approaches for the various components of biodiversity for food and agriculture.**

Sustainable Forest Management
- The Living Forest Standard was a national standard for sustainable forest management in Norway. The standard was jointly developed in 1998 and revised in 2006 by stakeholders in forest management and the forest industry, environmental and outdoor recreation organisations, trade unions and consumer interest groups. The standard promoted sustainable forest management by creating a balance between forest production, environmental protection and social interests. The Living Forest Standard is still an important basis for forest certification in Norway. Although it was formally suspended in June 2012, the forestry sector continues to follow its rules and guidelines, and the Standard has been built into and is maintained as part of Norway's Programme for the Endorsement of Forest Certification scheme (PEFC).
- Norway's PEFC aims to promote sustainable forest management, by certifying forest properties and forest products. The

forest certification system is reviewed every five years. PEFC Norway began its latest review in May 2013 by issuing an open invitation for inputs and for participation in a working committee. The committee reviewed the Norwegian PEFC forest standard and other standards that belong to the certification system between October 2013 to September 2014, and submitted a proposal to revise the standards.
- In 2014, the Norwegian Forest and Landscape Institute published a status report on the sustainable management of forests in Norway (Tomter & Dale, 2014) that is expected to be updated on a yearly basis. The findings of this report will be used for the formulation of policies that will contribute to the implementation of the Sustainable Forest Management approach in Norwegian forests.

Project: Establishment of plant genetic resources in situ conservation in protected areas in Norway
In the framework of this project 200 crop wild relative (CWR) species have been prioritized for in situ conservation, including species that are either directly and/or indirectly relevant to the delivery of ecosystem services in and around production systems.

The Norwegian government is committed to continue with the application of an ecosystem approach in its forest and fish related production systems. With respect to agriculture, the government aims to increase the production and consumption of organic food to 15% by 2020 (White paper Nr.9 (2011-2012)).

Improving stakeholder involvement and awareness

This section provides an opportunity for countries to highlight their plans and priorities, and to describe current constraints to achieving them with respect to stakeholder involvement in the conservation and sustainable use of biodiversity for food and agriculture with specific reference to the recognition and involvement of farmers, pastoralists, fishers and forest dwellers, addressing gender equality, and supporting the roles and contributions of women.

95. **Describe planned actions and future priorities to improve stakeholder awareness, involvement and collaboration in the conservation and sustainable use of biodiversity for food and agriculture. Include a description of the major challenges that will need to be overcome.**

This text box is non-expandable. Relevant information is provided in Annex I to this questionnaire.

96. **Describe planned actions and future priorities to support the role of farmers, pastoralists, fisher folk, forest dwellers, and other rural men and women dependent on local ecosystems in the conservation and use of biodiversity for food and agriculture. Replies should include information on recognizing and enhancing the role of indigenous peoples. Include a description of the major challenges that will need to be overcome.**

Through the Árbediehtu ("inherited knowledge") project the Sámi University College aims to collect, document and systematize the traditional knowledge and methods Sámi have been using for generations to manage the natural resources that are key to their livelihood. So far, this knowledge has essentially been transferred from one generation to the next through verbal communication and by practice. The project's long-term goal is to support Sámi communities in developing a sustainable livelihood, through: (i) the preservation of traditional knowledge; (ii) the inclusion of traditional knowledge in educational programmes; and (iii) the use of traditional knowledge in decision making processes on the conservation and sustainable use of biological diversity. The project's work is aligned with the conventions and declarations that were ratified by Norway and are of relevance to Indigenous Peoples and Local Communities.

Among others, local museums, some of which are currently teaching schoolchildren about food production and related traditions in the context of the "Environmental backpack" initiative (see question 85. for more detailed information on this initiative), could contribute to strengthening the knowledge and recognition of the role of farmers, fishermen and foresters, as well as of indigenous peoples and local communities, in the conservation and use of biodiversity for food and agriculture (Akershusmuseet, Årsrapport 2009). Farm field trips could also be an important awareness raising tool (http://www.torvabarnehage.no/index.php?artID=1225&navB=80).

The increasing popularity and establishment of Community Supported Agriculture (Andelslandbruk) continues to contribute to supporting the role of farmers in the conservation and use of biodiversity for food and agriculture. In this form of agriculture, farmers sell their produce directly to the consumer and the consumer engages him/herself to buy a share of the farmers' production for a determined period of time (for example for a year). The sharing possible risks related to annual weather variation and crop yields are shared between the farmers and the consumers. Community Supported Agriculture contributes to linking producers and consumers and to raising awareness on what it takes to produce food, including the importance of (associated) biodiversity for food and agriculture (http://andelslandbruk.origo.no/?ref=checkpoint).

97. **Describe planned actions and future priorities to improve recognition of the contribution of women to the conservation and use of the different components of biodiversity for food and agriculture, including associated biodiversity. Include a description of the major challenges that will need to be overcome.**

Generally speaking, the contribution of both women and men in the conservation and use of the different components of biodiversity for food and agriculture is recognized. An important percentage of women farmers are believed to be particularly interested in conserving traditional farming practices, which are in general favorable to the conservation and use of associated biodiversity for food and agriculture. In this respect the role of women is both acknowledged and strengthened when opportune (e.g. special funds are allotted to secure and increase the participation of women in reindeer farming activities to ensure the preservation of traditional knowledge related to Sámi reindeer herding is preserved).

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ANNEX 1: Recommended scope of the Country Report

Biodiversity for food and agriculture

Biodiversity for food and agriculture includes the variety and variability of animals, plants and micro-organisms at the genetic, species and ecosystem levels that sustain the ecosystem structures, functions and processes in and around production systems, and that provide food and non-food agriculture products. Production systems, as defined for the purposes of this report, include the livestock, crop, fisheries and aquaculture and forest sectors. The diversity found in and around production systems has been managed or influenced by farmers, pastoralists, forest dwellers and fisherfolk over many hundreds of generations and reflects the diversity of both human activities and natural processes.

The present Guidelines for the SoWBFA mainly focus on those areas not covered by completed or on-going Country Reports on Animal, Forest, Plant and Aquatic Genetic Resources, e.g. the biological diversity associated with different supporting and regulating ecosystem services within production systems or of importance to them, referred to hereinafter as associated biodiversity, and wild resources used for food.

Associated biodiversity

For the scope of this report, associated biodiversity comprises those species of importance to ecosystem function, for example, through pollination, control of plant, animal and aquatic pests, soil formation and health, water provision and quality, etc., including *inter alia*:

a) Micro-organisms (including bacteria, viruses and protists) and fungi in and around production systems of importance to use and production such as mycorrhizal fungi, soil microbes, planktonic microbes, and rumen microbes;

b) Invertebrates, including insects, spiders, worms, and all other invertebrates that are of importance to crop, animal, fish and forest production in different ways, including as decomposers, pests, pollinators, and predators, in and around production systems;

c) Vertebrates, including amphibians, reptiles, and wild (non-domesticated) birds and mammals, including wild relatives, of importance to crop, animal, fish and forest production as pests, predators, pollinators or in other ways, in and around production systems;

d) Wild and cultivated terrestrial and aquatic plants other than crops and crop wild relatives, in and around production areas such as hedge plants, weeds, and species present in riparian corridors, rivers, lakes and coastal marine waters that contribute indirectly to production.

Note that domesticated species may also provide ecosystem services other than provisioning ones and affect crop, animal, fish and forest production in different ways. However since these species are already addressed in other State of the World Reports, countries may choose whether or not they want to include them in their Country Reports for the SoWBFA.

Integrated analysis of biodiversity for food and agriculture

The scope of the Report builds upon the contribution of individual sector reports by providing an integrative analysis of interactions, including synergies, interlinkages and trade-offs, between genetic resources of the different sectors. This is achieved through the identification of production systems within the country (Annex 2), and particular focus upon ecosystem perspectives in relation to biodiversity for food and agriculture. Questions addressing overall biodiversity for food and agriculture target information that would build upon what may be available in previous or ongoing country reports.

ANNEX 2: Production systems

Table 1. Climatic zones definitions

Climatic zone	Definition
Tropics	All months with monthly mean temperature, corrected to sea level, above 18°C.
Subtropics	One or more months with monthly mean temperatures, corrected to sea level, below 18°C but above 5 °C.
Temperate	At least one month with monthly mean temperatures, corrected to sea level, below 5 °C and four or more months above 10 °C.
Boreal	At least one month with monthly mean temperatures, corrected to sea level, below 5 °C and more than one but less than four months above 10 °C.

Table 2. Production systems descriptions

Name of production system	Climatic zone	Description
Livestock grassland-based systems	Tropics	Systems in which the animals obtain a large proportion of their forage intake by grazing natural or sown pastures, includes: • Ranching: grassland-based systems in which livestock is kept on privately owned rangeland • Pastoralist: grassland-based systems in which the livestock keepers move with their herds or flocks in an opportunistic way on communal land to find feed and water for their animals (either from or not from a fixed home base)
	Subtropics	
	Temperate	
	Boreal and /or highlands[1]	
Livestock landless systems	Tropics	Systems in which livestock production is separated from the land where the feed given to the animals is produced.

[1] High elevation montane environments where climate differs significantly from surrounding lower elevation areas, including alpine and sub-alpine zones, tropical highlands, dryland mountains, etc.

	Subtropics	
	Temperate	
	Boreal and /or highlands	
Naturally regenerated forests	Tropics	Includes: • Primary: Forests of native species, where there are no clearly visible indications of human activities and the ecological processes are not directly disturbed by humans • modified natural: Forests of naturally regenerated native species where there are clearly visible indications of significant human activities • semi-natural (assisted natural regeneration): Silvicultural practices in natural forest by intensive management (weeding, fertilizing, thinning, selective logging)
	Subtropics	
	Temperate	
	Boreal	
	Boreal and /or highlands	
Planted forests	Tropics	Includes : • semi-natural (planted component) : Forests of native species, established through planting or seeding, intensively managed • Plantations (productive) : Forests of introduced and/or native species established through planting or seeding mainly for production of wood or non-wood goods • Plantations (protective) : Forests of introduced and/or native species, established through planting or seeding mainly for provision of services
	Subtropics	
	Temperate	
	Boreal	
	Boreal and /or highlands	
Self-recruiting capture fisheries	Tropics	Includes capture fisheries in marine, coastal and inland areas that can involve • Natural ecosystems • Modified ecosystems e.g. reservoirs and rice paddies;
	Subtropics	
	Temperate	
	Boreal	
Culture-based fisheries	Tropics	Fisheries on resources, the recruitment of which originates or is supplemented from cultured stocks (i.e., populations chosen for culture and not stocks in the same sense as that term is used for capture fisheries) raising total production beyond the level sustainable through natural processes.
	Subtropics	
	Temperate	
	Boreal and /or highlands	
Fed aquaculture	Tropics	The farming of aquatic organisms including fish, mollusks, crustaceans, aquatic plants, crocodiles, alligators, turtles and amphibians. Farming implies some sort of intervention in the rearing process to enhance production, such as regular stocking, feeding, protection from predators etc. Farming also implies individual or corporate ownership of the stock being cultivated; i.e., the population chosen for culture and not a stock in the same sense as that term is used for capture fisheries. Fed aquaculture production utilizes or has the potential to utilize aquafeeds of any type in contrast with the farming of filter-feeding invertebrates and aquatic plants that relies exclusively on natural productivity. Also defined as "farming of aquatic organisms utilizing aquafeeds in contrast to that deriving nutrition directly from nature".
	Subtropics	
	Temperate	
	Boreal and /or highlands	
Non-Fed aquaculture	Tropics	The farming of aquatic organisms including fish, mollusks, crustaceans, aquatic plants that do not need supplemental feeding. Farming implies some sort of intervention in the rearing process to enhance production, such as regular stocking, feeding, protection from predators etc. Farming also implies individual or corporate ownership of the stock being cultivated; i.e., the population chosen for culture and not a stock in the same sense as that term is used for capture fisheries. In non-fed aquaculture systems culture is predominately dependent on the natural environment for food, e.g. aquatic plants and mollusks.
	Subtropics	
	Temperate	
	Boreal and /or highlands	
Irrigated crops (rice)	Tropics	Irrigated rice refers to areas where rice is cultivated purposely provided with water, including land irrigated by controlled flooding.
	Subtropics	
	Temperate	
	Boreal and /or highlands	
Irrigated crops (other)	Tropics	Irrigated crops other than rice refers to agricultural areas purposely provided with water, including land irrigated by controlled flooding.
	Subtropics	
	Temperate	
	Boreal and /or highlands	

Rainfed crops	Tropics	Agricultural practice relying exclusively on rainfall as its source of water.
	Subtropics	
	Temperate	
	Boreal and /or highlands	
Mixed production systems (livestock, crop, forest and /or aquatic and fisheries mixed)	Tropics	Production systems with multiple components. They include: • Crop-livestock: mixed systems in which livestock production is integrated with crop production. • Agro-pastoralist: livestock-oriented systems that involve some crop production in addition to keeping grazing livestock on rangelands; they may involve migration with the livestock away from the cropland for part of the year; in some areas, agropastoral systems emerged from pastoral systems • Agroforestry-livestock: mixed system in which livestock production is integrated with the production of trees and shrubs[36] • Integrated aquaculture: mixed systems in which aquaculture is integrated with crop and livestock production. May involve ponds on farms, flooded fields, enrichment of ponds with organic waste, etc. • Other combinations
	Subtropics	
	Temperate	
	Boreal and /or highlands	

ANNEX 3: Drivers of change

Table 1. Drivers of change and descriptions.

Drivers	Description, Subcategories and Examples
Changes in land and water use and management	A change in the use, management and practices around land and water (e.g., deforestation; fragmentation; modification of water regimes; forest degradation; land conversion for agriculture; ecosystem restoration; the role of women and men in land and water use and management, etc.)
Pollution and external inputs	The mismanaged, excessive or inappropriate use of external inputs (e.g., over application of fertilizer and pesticides; excessive use of antibiotics or hormones; nutrient loading, including from use of imported feed; ocean acidification, CO_2 fertilization; chemical and particulate pollutants, etc.
Over-exploitation and overharvesting	Unsustainable extraction practices (e.g., overfishing; overhunting; overgrazing; logging and extractive activities exceeding replacement rates or affecting species of uncertain and at-risk conservation status, etc.)
Climate change	The impacts and effects of progressive climate change (e.g., alterations in precipitation regimes; temperature changes; loss of water supply; increased variability; sea level rise; shifts in flowering time or seasonality, etc.)
Natural disasters	Climate shocks, extreme weather events and other natural disasters that threaten agricultural production and resilience of production systems (e.g., hurricanes, earthquakes, floods, fires).
Pests, diseases, alien invasive species	New and emerging threats from pests, diseases and invasive species affecting biodiversity for food and agriculture (e.g., shifting ranges; introductions; increased suitability; loss of predator, etc.)
Markets, trade and the private sector	**Trade**- Changing terms of trade, globalization of markets, commercialization of products, retailing, the separate capacities of women and women to commercialize products, etc. **Markets and consumption** - Demand driven changes in production or practices including the tastes, values or ethics of consumers that may impact directly or indirectly biodiversity for food and agriculture, product quantity or quality **Private sector** - The changing role and influence of private sector and corporate interests
Policies	**Policies** - Global, regional, national, and subnational legislation and regulations (e.g., conservation regulations, participation and compliance with International treaties and conventions); **Economic and policy interventions** - Interventions that impact biodiversity for food and agriculture directly or indirectly (e.g., taxes, subsidies, charges for resource use, payments for ecosystem services) **Intellectual Property Rights (IPR), Access and Benefit Sharing (ABS)** - Direct or indirect impacts of IPR and ABS policy and regulations on biodiversity for food and agriculture.
Population growth and urbanization	**Population** - Changes in population metrics (e.g., growth, fertility, composition, mortality, migration, health and disease, including different affects on men and women.) **Urbanization**- (e.g., shifts in proportion of urban and rural; change in urbanization trends, including different effects on men and women)
Changing economic, socio-political, and cultural factors	**Economic development** - A change in economic circumstances of countries, industries, households (e.g., change in GDP and economic growth; structural change of economy; income diversification, and the different economic circumstances of men and women.) **Changing socio-political, cultural or religious factors** - Variation in the forces influencing decision-making of men and women, e.g., public participation, shifts in the influence of the state vs. private sector, changes in levels of education and knowledge, shifts in the beliefs, values and norms held by a group of people. **Participatory actions** – the role of collective action toward conservation and use of biodiversity by stakeholders
Advancements and innovations in science and technology	The development and diffusion of scientific knowledge and technologies, (e.g., advances in breeding; improvements in mobile extension; tools for monitoring; biotechnology applications, access of men and women to information).

ANNEX 4: Ecosystem services

The SoWBFA Guidelines focus primarily on regulating and supporting ecosystem services, described below. Provisioning services relating to biodiversity for food and agriculture are the focus of sectoral State of the World Reports, and are addressed in these guidelines only in relation to associated biodiversity and wild foods, which often fall outside of traditional sectoral reporting. Countries may choose to address additional ecosystem services, including cultural services, for the completion of national reports, particularly where they are directly relevant to the objectives of the SoWBFA Report[2].

Table 1. Regulating and supporting ecosystem services.

Category	Ecosystem services	Description	Relevant ecosystem functions
Regulating services	Pollination	Role ecosystems play in transferring pollen from male to female flower parts	Agricultural productivity; production of food and goods.
	Pest and disease regulation	Influence ecosystems have on the prevalence of crop and livestock pests and diseases	Biological control; the maintenance and feedback mechanisms preventing outbreaks of pests and diseases, including invasive species.
	Water purification and waste treatment	Role ecosystems play in the filtration and decomposition of organic wastes and pollutants in water; assimilation and detoxification of compounds through soil and subsoil processes	Filtering function performed by vegetation cover, soil and aquatic biota.
	Natural hazard regulation	Capacity for ecosystems to ameliorate and reduce the damage caused by natural disasters	Vegetative structure can alter potentially catastrophic effects of storms, floods and droughts through its storage capacity and surface resistance; coral reefs buffer waves and protect adjacent coastlines from storm damage. The services provided by this function relate to providing safety of human life and human constructions.
Supporting services	Nutrient cycling	Flow of nutrients (e.g., nitrogen, sulfur, phosphorus, carbon) through ecosystems	Maintenance of fertility; regulation of excess nutrients; climate regulation; regulation of biotic communities
	Soil formation and protection	Degradation of ecosystems, such as decomposition of organisms or weathering of substrate, to form soil	Maintenance of crop productivity on cultivated lands and the integrity and functioning of natural ecosystems.
	Water cycling	Flow of water through ecosystems in its solid, liquid, or gaseous forms	Regulation of hydrological flows at the earth surface. Maintenance of natural irrigation and drainage, buffering of extremes in discharge of rivers, regulation of channel flow, and provision of a medium for transportation.
	Habitat provisioning	Role of ecosystems in creating and maintaining habitats for a wide variety of organisms	Providing diverse and suitable habitats for species; nursery function for migratory species and as breeding areas.
	Production of oxygen/ Gas regulation	The creation of atmospheric oxygen through photosynthesis	Gas regulation functions include the maintenance of clean, breathable air, and the prevention of diseases (e.g. skin cancer, asthma) May include regulation of the CO_2/O_2 balance, maintaining ozone-layer (O_3), and regulation of SOx levels.

ANNEX 5: Management practices supporting the use and conservation of biodiversity for food and agriculture

Table 1. Management practices supporting the use and conservation of biodiversity for food and agriculture.

Management practices supporting the use and conservation of biodiversity for food and agriculture	Description/ examples of management practices
Integrated Plant Nutrient Management (IPNM)	Soil, nutrient, water, crop, and vegetation management practices undertaken with the aim of improving and sustaining soil fertility and land productivity and reducing environmental degradation, often tailored to a particular cropping and farming system. May include the use of farmyard manures, natural and mineral fertilizers, soil amendments, crop residues and farm wastes, agroforestry and tillage practices, green manures, cover crops, legumes, intercropping, crop rotations, fallows, irrigation, drainage, plus a variety of other agronomic, vegetative and structural measures designed to conserve both water and soil.
Integrated Pest Management (IPM)	Pest control techniques and subsequent integration of appropriate measures that discourage the development of pest populations and keep pesticides and other interventions to levels that are economically justified and reduce or minimize risks to human health and the environment by encouraging natural pest control mechanisms that include: crop rotation; inter-cropping; seedbed sanitation, sowing dates and densities, under-sowing, conservation tillage, pruning and direct sowing; where appropriate, use of pest resistant/tolerant cultivars, push-pull strategies and standard/certified seed and planting material; balanced soil fertility and water management, making optimum use of organic matter; prevent spreading of harmful organisms by field sanitation and hygiene measures; protection and enhancement of important beneficial organisms.
Pollination management	Practices that accomplish or enhance pollination of a crop, to improve yield or quality, by understanding of the particular crop's pollination needs, and by knowledgeable management of pollenizers, pollinators, and

[2] Including those described in the Millennium Ecosystem Assessment, or subsequent adaptations by the TEEB or other sources.

	pollination conditions. Pollinator-friendly practices include minimizing the use of agrochemicals, integrated pest management and mixed cropping to include pollinator friendly crops, preserving wild habitats, maintaining flower-rich field margins, buffer zones and permanent hedgerows to ensure habitat and forage, cultivating shade trees, managing for bee nest sites, and establishing landscape configurations that favor pollination services.
Landscape management	Practices that support the maintenance of biodiversity friendly farming systems, or the diversity of landscape mosaics within and surrounding production systems over particular geographic areas. Examples include riparian corridors, hedges, margins, woodland patches, clearings in forests, ponds or other biodiversity friendly features characteristic of the production environment that may be the result of national or regional policies such as the EU set aside schemes.
Sustainable soil management practices	Management of soil biodiversity to enhance agricultural production by both direct and indirect means, including alteration of the abundance or activity of specific groups of organisms through inoculation and/or direct manipulation of soil biota. Indirect interventions may include manipulation of the factors that control biotic activity (habitat structure, microclimate, nutrients and energy resources) rather than the organisms themselves such as the maintenance of soil cover with organic mulch including crop residues, green manure/cover crops including legumes, and compost to increase soil organic matter, irrigation and liming, as well as cropping system design and management.
Conservation agriculture	Conservation Agriculture (CA) aims to achieve sustainable and profitable agriculture and improve livelihoods of farmers through the application of the three CA principles: no or minimal soil disturbance through direct seeding into untilled soils, maintenance of permanent soil mulch cover, and crop diversification through rotations, associations and sequences.
Water management practices, water harvesting	Water harvesting and management through rain water retention or modification of the landscape (e.g., bunds, zais, terracing) for the restoration and improvement of degraded lands, and to allow cultivation of additional crops with higher water requirements, and improving water productivity of crops.
Agroforestry	Agroforestry is a collective name for land-use systems where woody perennials (trees, shrubs, palms, etc.) are integrated in the farming system.
Organic agriculture	Organic agriculture is a production management system which promotes and enhances agro-ecosystem health, including biodiversity, biological cycles, and soil biological activity. It emphasizes the use of management practices in preference to the use of off-farm inputs, taking into account that regional conditions require locally adapted systems. This is accomplished by using, where possible, agronomic, biological, and mechanical methods, as opposed to using synthetic materials, to fulfill any specific function within the system.
Low external input agriculture	Production activity that uses synthetic fertilizers or pesticides below rates commonly recommended for intensive industrial tillage agriculture. It does not mean elimination of these materials. Yields are maintained through greater emphasis on agronomic practices, IPM, and utilization of on-farm resources (especially labor) and management.
Home gardens	An integrated system which comprises different components in a small area around the homestead, including staple crops, vegetables, fruits, medicinal plants, livestock and fish both for home consumption or use and for income. May include the family house, a living/playing area, a kitchen garden, a mixed garden, a fish pond, stores, an animal house, etc.
Areas designated by virtue of production features and approaches	These include areas recognized nationally or internationally by virtue of their landscape and agricultural features. In addition to Satoyama, GIAHS, national parks (IUCN categories), they also include areas recognized for specific agricultural products (e.g. DOP, IGP or Slow Food).
Ecosystem approach in capture fisheries	Approach promoting the diversity of the whole ecosystem in order to support the target species. Considerations include sustainable harvesting of the retained species (target and by-product species); managing the direct effects of fishing (especially on non-retained by-catch and habitat); and managing the indirect effects of the fishery on ecosystem structure and processes.
Conservation hatcheries	Hatcheries and production systems that optimize natural levels and organization of genetic diversity over production. Often for rebuilding depleted populations of commercially important species, (e.g. Atlantic and Pacific salmon).
Reduced-impact logging	A series of practices to improve logging practices such as vine removal, directional felling, limiting skid trails, logging roads and stumping grounds, restrictions on the size and number of trees felled, and post felling removal of waterway blockages, to reduce the residual damage, biodiversity loss and excess CO_2 emissions associated with conventional logging practices.

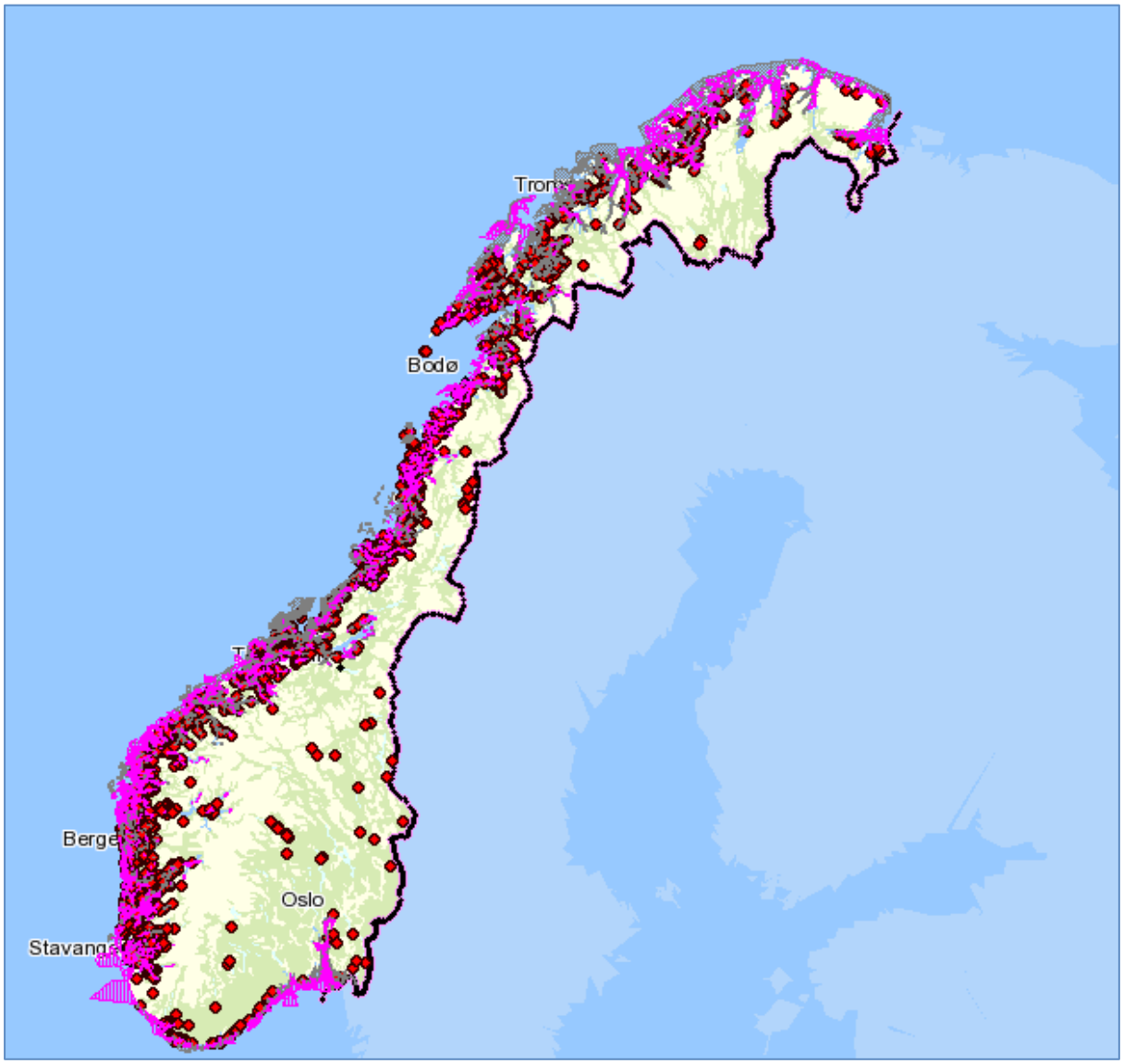
ANNEX 6: Diversity based interventions

Table 1. Diversity based practices and interventions

Diversity based practices	Description/ examples of interventions
Diversification	The introduction of new varieties, species, and groups of organisms (e.g., livestock, crops, trees, fish) into a production system or managed environment without replacement or abandonment of other groups, or the maintenance of already-existing diversity in the case of traditionally diverse production systems. May include introductions for restoration or IPM objectives, including fish introduced to control reproduction.
Base broadening	Increasing the amount of genetic diversity used to produce new varieties or breeds used in agricultural production.
Domestication	The development of new crop, aquatic, forest and animal species through deliberate breeding programmes or the continued selection and improvement of existing species from their wild progenitors. These activities may be carried out by national breeding programmes or by farmers and communities themselves.
Maintenance or conservation of landscape complexity	Maintenance or management of components of a landscape mosaic including hedges, waterways, road margins, corridors, windbreaks, living fences, native grasses wild patches of vegetation in the farming landscape, etc.
Restoration practices	Restoring functionality and productive capacity to ecosystems, forests, landscapes, waterways, grasslands and rangelands in order to provide food, fuel, and fiber, improve livelihoods, store carbon, improve adaptive capacity, conserve biodiversity, prevent erosion and improve water provisioning and quality.

Management of micro-organisms	The intentional incorporation, management or maintenance of microbes, fungi and other micro-organisms into a production system or organisms; e.g., inoculation of plants and seeds with arbuscular mycorrhizal fungi, the addition of probiotics in aquaculture and livestock, etc.
Polyculture/Aquaponics	Integrated multi-trophic aquaculture, utilization of different trophic and spatial niches of an aquaculture system in order to obtain maximum fish production per unit area, utilizing natural resource availability.
Swidden and shifting cultivation agriculture	Rotation of plots from intensive cultivation to extended fallow periods for the replenishment of soil fertility.
Enriched forests	Selective logging and enrichment planting to increase the abundance of useful species for food, medicine and timber, often a feature of traditional management practices.

NORWEGIAN FISHERIES AND AQUACULTURE (2014)

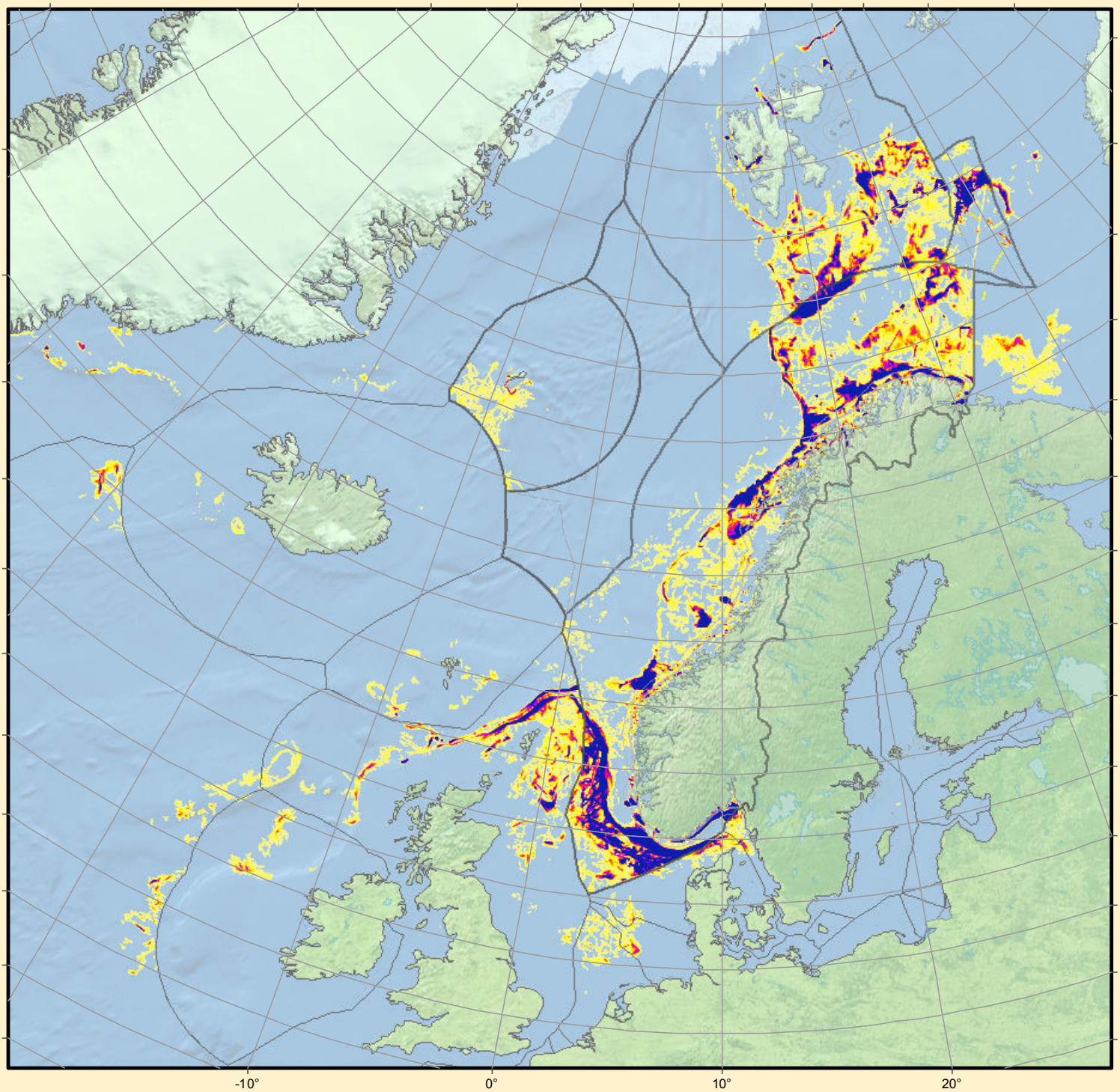


Source: Kystinfo, Kystverkets map service (see: http://kart.kystverket.no/default.aspx?gui=1&lang=1)

Fishing areas (active fishing gear)

Fishing areas (passive fishing gear)

Active aquaculture permits



Intensitet

Høy

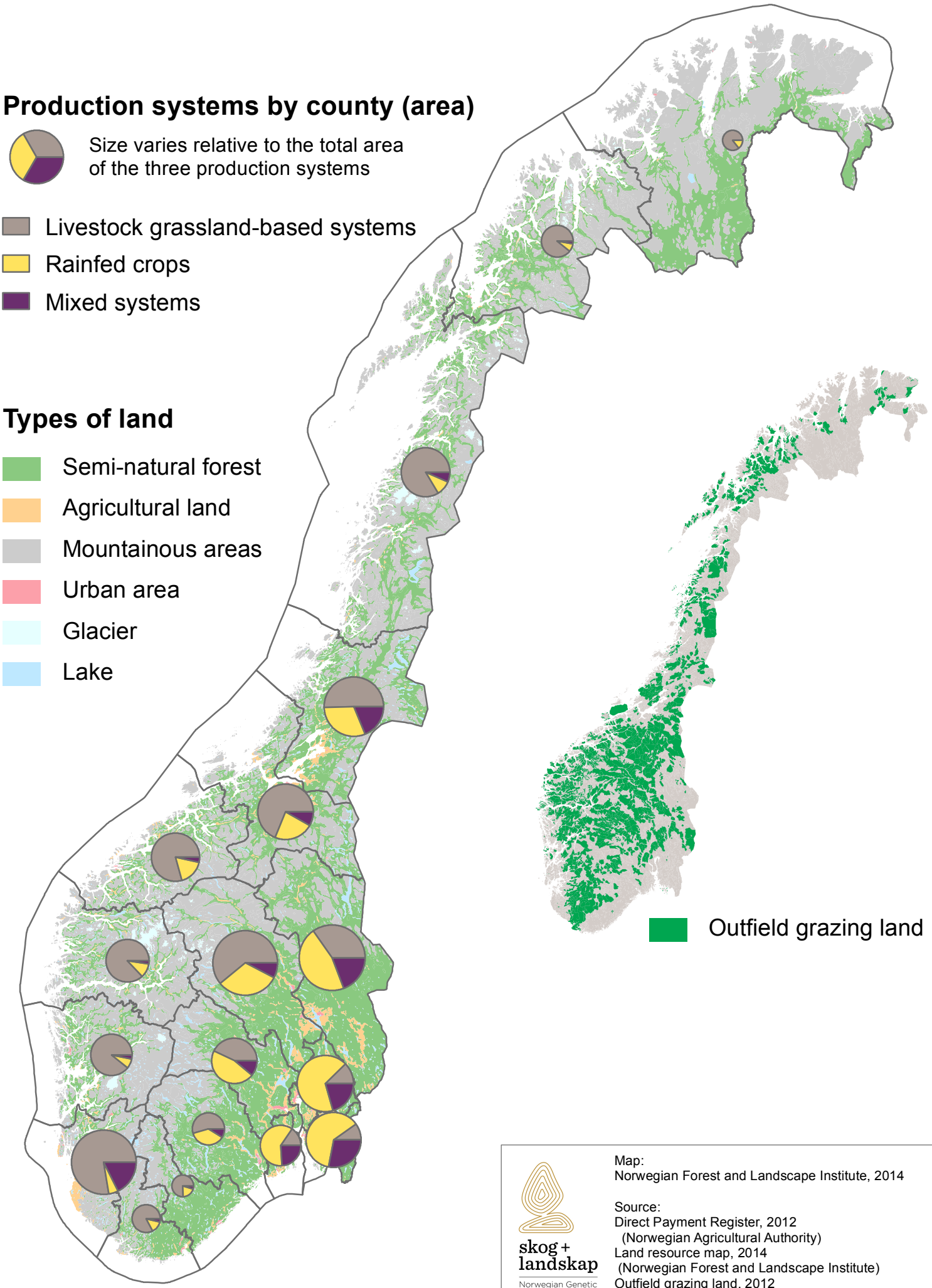
Lav

Fiskeriaktivitet i 2014 for norske og utenlandske fartøy (over 15m)

Periode: 01.01.2014 00:00:00 to 01.01.2015 00:00:00
Område: NW: 61°4'37"W 67°41'37"N
SE: 26°38'34"E 49°9'50"N
Data: Fiskerisporing og fangstrapportering Projeksjon: North Pole LAEA

FISKERIDIREKTORATET
Statistikkavdelingen
- Norsk FMC -

Main production systems in Norway



Map:
Norwegian Forest and Landscape Institute, 2014

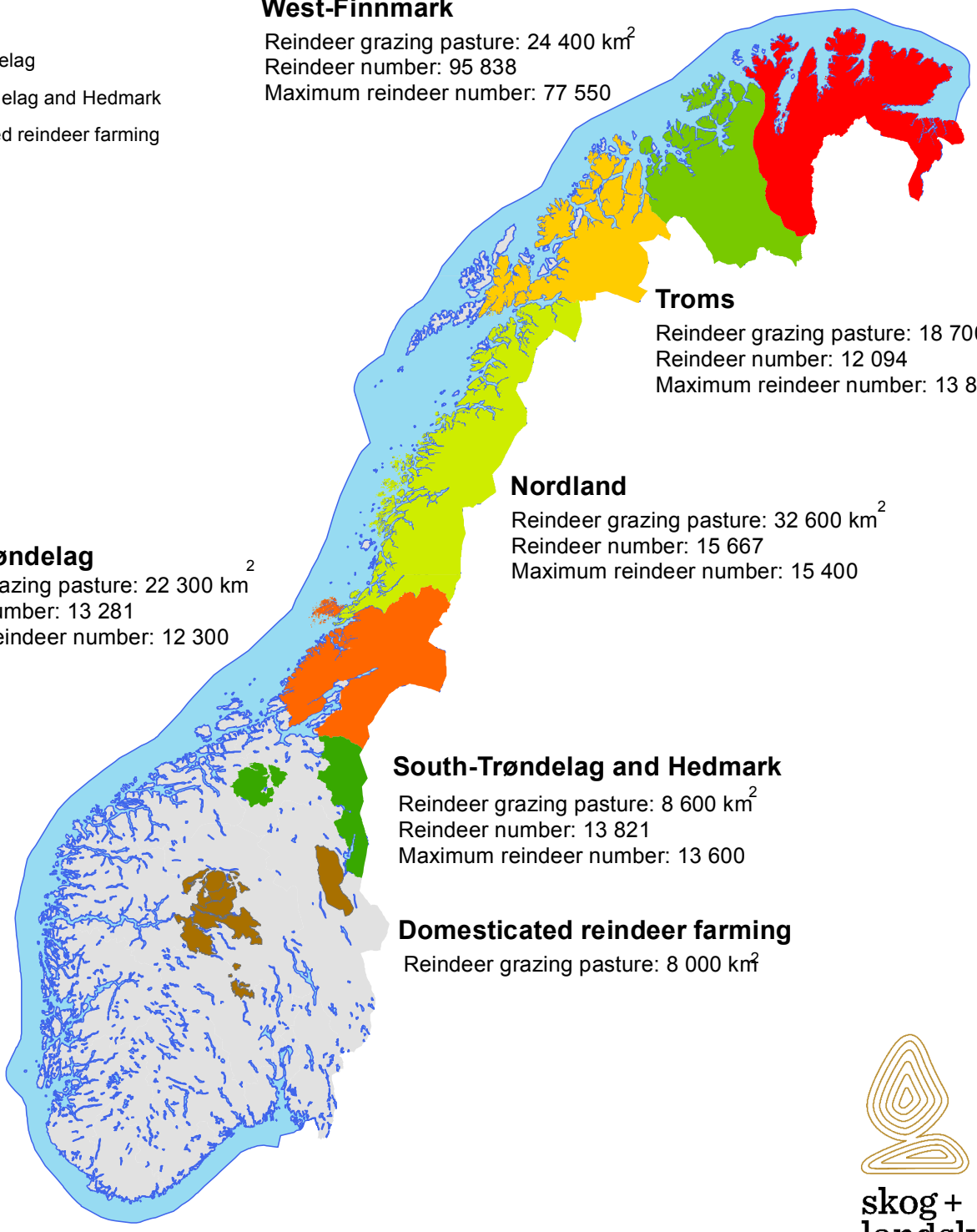
Source:
Direct Payment Register, 2012
(Norwegian Agricultural Authority)
Land resource map, 2014
(Norwegian Forest and Landscape Institute)
Outfield grazing land, 2012
(Kilden, Norwegian Forest and Landscape Institute)

skog + landskap
Norwegian Genetic Resource Centre

Reindeer farming in Norway

Reindeer areas

- East-Finnmark
- West-Finnmark
- Troms
- Nordland
- North-Trøndelag
- South-Trøndelag and Hedmark
- Domesticated reindeer farming



East-Finnmark
Reindeer grazing pasture: 300 700 km^2
Reindeer number: 69 103
maximum reindeer number: 70 650

West-Finnmark
Reindeer grazing pasture: 24 400 km^2
Reindeer number: 95 838
Maximum reindeer number: 77 550

Troms
Reindeer grazing pasture: 18 700 km^2
Reindeer number: 12 094
Maximum reindeer number: 13 800

Nordland
Reindeer grazing pasture: 32 600 km^2
Reindeer number: 15 667
Maximum reindeer number: 15 400

North-Trøndelag
Reindeer grazing pasture: 22 300 km^2
Reindeer number: 13 281
Maximum reindeer number: 12 300

South-Trøndelag and Hedmark
Reindeer grazing pasture: 8 600 km^2
Reindeer number: 13 821
Maximum reindeer number: 13 600

Domesticated reindeer farming
Reindeer grazing pasture: 8 000 km^2

skog + landskap
Norwegian Genetic Resource Centre

Scale: 1:8 000 000

Sources:
Reindeer Administration (Reindriftsforvaltningen):
- Map (modified by Norwegian Genetic Resource Centre)
- Regional data (2010); data for West and East Finnmark (31.03.2014)

Norwegian Agricultural Economics Research Institute (NILF):
Notat 2012-2013: Gjennomgang av de direkte og kostnadskrevende tilskuddene over reindriftsavtalen - NILF

ANNEX I

ADDITIONAL TEXT FOR MISSING AND NON-EXPANDABLE TEXT BOXES

Question 11. Table 4. In the absence of an explanatory text box, we would like to add a few clarifications:

- Self-recruiting capture fisheries: Shallow bottoms near the coasts play an important role in the different life stages of many demersal fish species. Changes in land and water use are expected to affect these coastal recruitment areas, thereby also affecting aquatic genetic resources. The effects of bottom trawling on benthic prey species (e.g reductions of biomass, diversity and body size) may negatively affect prey availability for demersal fishes, potentially leading to reduced food intake, body condition and yield of fishes in chronically trawled areas (http://rspb.royalsocietypublishing.org/content/282/1799/20142336). Climate change seems to be leading to rising numbers of parasite species and diseases that are threatening aquatic genetic resources both in the marine environment and in fish farms.

- Fed aquaculture: The expansion of aquaculture, in particular of open fish farms, and competition for area could have a negative effect on wild fish resources (for example escaped farmed fish might compete with wild salmon for habitat and food). Climate change seems to be leading to rising numbers of parasite species and diseases that are threatening fish resources both in the marine environment and in fish farms.

- Rainfed crops:

  - Climate change is likely to have both a negative and positive impact on plant genetic resources. Regional and local climate scenarios developed for Norway assume that rising temperatures will increase the length of growing seasons by one to two months in most lowland areas and by two to four months in most high-mountain areas. Changes like these could be favorable to Norway's agricultural productivity. At the same time, unstable onsets of spring, higher frequency of heavy precipitation and floods and increased pest loads are also expected.
  - Population growth and land use changes are assumed to have a negative impact on plant genetic resources. Rising population pressures in the country's most productive agricultural regions, as well as economic growth is expected to lead to increasing land use conflicts. The socio-economic changes Norway has experienced over the past decades have already led to the expansion of infrastructure and building projects (e.g. roads, housing, shopping areas, etc.) in the vicinity of urban areas, leading at times to the loss of prime agricultural land.

Question13.

Table 5. was filled in based on expert views and/or assumptions. The provided data should therefore be treated with caution. Due to the large number of table entries, please note that only a limited number of issues are addressed in this text box.

At present, there is limited information available on drivers affecting ecosystem services (Naturens goder NOU 2013: 10, chapter V, use conclusions from sub-chapters 5.7 and 5.8). While the National Biodiversity Information Centre is documenting drivers affecting species and their habitat, a large share of the available information is assumption-based. In addition, the Centre does not systematically document the functions the species (may) have in their respective habitats.

Changes in land use can cause landscape and habitat fragmentation, which can lead to the loss of different components of associated biodiversity at both local and regional levels, including of pollinators. Ultimately, this could affect the pollination of crops, wild plants and forest trees (Totland, Hovstad, Ødegaard & Åström, 2013). There are relatively few studies on how landscape fragmentation affects pollination, gene flow in the landscape and genetic diversity in plant populations, but poor access to pollinators has been shown to have a direct negative effect on seeding in some populations (Sletvold & Ågren, 2010). Several species-rich types of habitat now mainly survive as isolated patches in the landscape, processes that can create gene flow between such habitats will become more important. Such knowledge forms an important basis for the management of nature and land use. The reduction in the number of managed honey bee colonies (reduced by 40% over the past decade, B. Dahle, personal comment) might also have a negative effect on seeding in some populations.

As a result of the commercialization of microbial strains and invertebrate species in countries outside Norway, species similar to those that are present and native to the country are being imported to be used in agricultural production systems. The imported strains are marketed as being of superior quality to the native ones. This has lead, among others, to the introduction of bumble bee strains from the Netherlands in Norwegian greenhouses.

Particularly in marine environments, acidification (mainly caused by excessive carbon dioxide) is believed to reduce the resilience of marine living organisms to pests and diseases.

Question24.

Table 5. was filled in based on expert views and/or assumptions. The provided data should therefore be treated with caution. Due to the large number of table entries, please note that only a limited number of issues are addressed in this text box.

To date, the trends of regulating and supporting services have not been systematically monitored or evaluated in the country's different production systems. However, the importance of these services to food production and the need to monitor their status and trends is recognized.

In recent years, the number and species diversity of pollinators in Europe has been declining. This may also apply to Norway. The main causes behind the declining number of pollinators are believed to be habitat loss, climate change, the use of pesticides, the introduction of species and other environmental changes that threaten the biodiversity of insect pollinators and the plants they collect food from. In Norway, knowledge about the complex interactions between insects and plants and how these are affected by changes in species composition is still lacking (Horg, 2013), however

monitoring has recently been initiated. In addition, over the past decade, there has been a drastic reduction in the number of managed honey bee colonies (B. Dahle, personal comments), which might strengthen the negative effect on seeding and gene flow that is believed to be caused by the reduction in number and species diversity of wild pollinators.

Climate change seems to be causing a negative trend with respect to pest and disease regulation in all production systems. In aquaculture, the industry itself has also negatively contributed to the production system's pest and disease regulation (e.g. sea lice outbreaks on salmon and trout farms).

Nutrient cycling in all production systems is assumed to have been negatively affected over the past ten years, even if little is known as to how and why.

Partial drainage of wetlands and overgrowth resulting from reduced grazing have led to the disappearance of many species from previously well-known habitats. For endangered species to survive and spread, more lands must be kept open through grazing and more wetlands reinstated. In forests, the increasing volume of standing and lying dead wood is believed to positively contribute to habitat provisioning for a large number of forest- associated biodiversity species.

Question 30. Table 12.

At present, there is no complete inventory of the microbial collections that are housed in Norway.

Norwegian food processing companies, such as for example dairy companies, mostly have storage facilities to keep the microbial strains they use for their produce. Little is known about the nature and size of such collections as most of this information is not publically available.

None of the yeast strains used in Norwegian breweries is stored in Norway. Yeast strains owned by the major Norwegian breweries and the commercial strains they use, are kept in the largest yeast strain collections in Denmark (Alfred Jørgensen and Carlsberg) and in Germany (Hefebank Weihenstephan and VLB Berlin). It is assumed that most Norwegian craft breweries use dried yeast, provided by yeast producers in the United Kingdom and the United States of America.

Question 34. Table 14.

Besides the rich diversity of forage plants, the genetic resources of wild berry plants are considered to be the richest with respect to plant genetic resources in the Norwegian flora. Several species of the *Fragaria*, *Rubus*, and *Ribes* genera are distributed in the wild flora, some genuinely wild, but some escaped from cultivated fields. In addition a broad range of wild growing berry species is distributed throughout the country with representatives from the following genera: *Vaccinium*, *Empetrum*, *Oxycoccus*, *Sambucus* and *Hippophae*. About 20 rare blackberry (*Rubus fruticosus*) species have been collected and a long term collection was established in the first phase of the national plant genetic resources programme (2001-2005). The collection of specimens and establishment of a national variety collection for berries has however not yet been completed (Asdal, 2008).

The aquatic related wild food species include the most common fish species that are being caught through recreational fishing (angling and touristic fishing).

Question 35. Text box beneath Table 15.

Please note that there is no evidence of a significant threat of extinction or loss of a number of important wild food populations. The information inserted in Table 15. gives examples of threats to wild food components, but the mentioned threats are relatively stable and often under control.

The status of many wild food species is monitored by a range of national monitoring systems, such as the National monitoring program for wild cervids, the Species Map System (Artskart) and the Species Observation System (Artsobservasjoner). These systems tend to indicate that the status of the country's wild food species has remained relatively stable over the past years. Between 2006 and 2010, for example, while some wild food species on Norway's Red List were downgraded in terms of "threat category", others were upgraded. The livelihood of Norway's reindeer herding Sámi depends to a large extent on resources provided by nature, including wild foods. In situations where access to these resources came under threat (e.g. following the Chernobyl contamination), the Government implemented a series of measures to ensure the sustainability of the Sámi's livelihood.

Question 53. – Text box beneath Table 21.

<u>Livestock grassland-based systems</u>
* Maintenance or conservation of landscape complexity/Restoration practices:
REGIONAL ENVIRONMENT PROGRAMME FOR AGRICULTURE (RMP)
This environment programme promotes specific environmental goals in agriculture, such as the:
- reduction of water and air pollution
- reduction in pesticide use
- maintenance of cultural landscapes and cultural heritage sites
- facilitation of outdoor life
- maintenance and increase of biological diversity
To reach these goals, a series of diverse specific actions are being promoted at regional level in favor of sustainable agriculture. This includes elements of diversity based practices, such as the maintenance or conservation of landscape complexity and restoration practices. In 2013, approximately 50%, or 22,000 Norwegian farm entities, participated in the RMP (Miljøstatus i landbruket for 2013, Norwegian Agricultural Authority). The area covered by practices such as those mentioned above has not been calculated as is requested for in this questionnaire.

<u>Rainfed crops</u>
**Base broadening: Within plant breeding, a Public Private Partnership for Pre-breeding was established in 2011 at the regional level by the Nordic Council of Ministers to increase genetic diversity so as to enhance the development of new crop varieties. The partnership supports Nordic plant breeding programmes for barley, rye grass and apple to meet long-term needs of the agricultural and horticultural industries, specifically regarding adaptation to climate change, setting targets for environmental policies, and responding to demands from consumers, markets, etc.

<u>Fed aquaculture</u>
Polyculture/Aquaponics: A pilot scale aquaponics system has been established in Evje (Aust-Agder county). This project aims to provide an economic and practical analysis for cold water aquaponics, providing technological solutions and business models (Liltved et al., 2012).

<u>Semi-natural forests:</u>

*** Maintenance or conservation of landscape complexity/Restoration practices:
Sustainable forest management is Norway's general forestry management regime. Many tools and instruments have been developed and are being used to ensure the successful implementation of this management approach, including certification schemes (i.e. the Norwegian Programme for the Endorsement of Forest Certification and the Forest Stewardship Council), subsidies enhancing sustainable forestry activities and the forest fund agreement, compelling forest owners to save some of their earnings for long term investments (Tomter & Dalen, 2014). Such schemes contribute, inter alia, to the maintenance or conservation of landscape complexity and restoration practices
The area covered by forest-related practices, such as those mentioned in Table 21., has not been calculated separately for each practice, as is requested for in this questionnaire.

Enriched forests: Forest management to maintain a percentage of at least 10% of broadleaved trees in coniferous stands.

Question 69.

- Forestry Act 2005: regulates protective forests (34% of Norway's total forest area) with the objective to protect climatically vulnerable forests and other forests against damage (mostly forests bordering mountain areas) (Skrøppa, T., 2012).

- White paper Nr21 (2012) and Nr.34 (2007).

Question 76.

Information on traditional knowledge on biodiversity for food and agriculture is available among informal and more formal networks (e.g Norsk Landbruksrådgiving).

The Nordic Genetic Resource Center (NordGen) is exploring possibilities to document traditional knowledge related to the conservation and use of old and traditional plant varieties more systematically.

Question 80. Table 28.

Please note that some protected areas incidentally happen to cover biodiversity for food and agriculture. I.e. some protected areas were not established to protect or recognize biodiversity hotspots. Forest reserves and protected areas covering semi-natural ecosystems (e.g. coastal heathlands, traditionally maintained meadows and grazing land) are recognized as areas with particular significance for biodiversity for food and agriculture.

Question 89.

The Norwegian Genetic Resource Centre raises awareness on, strengthens stakeholder participation in and initiates/supports activities and networks for the maintenance of biodiversity for food and agriculture. With more human and financial resources the Centre's outreach could be improved.

With respect to the management and sustainable use of biodiversity for food and agriculture, coordination between the different sectors is still inadequate and some challenges remain. For example, the within and between species diversity tends to be dealt with by different institutions,

using different monitoring and documenting systems. Such incoherencies are a hurdle to the application of a holistic approach in the sustainable management of biodiversity for food and agriculture.

Question 90.

Financial resources to ensure capacity development in support of the maintenance and sustainable use of biodiversity for food and agriculture are lacking.

With respect to the management and sustainable use of biodiversity for food and agriculture, still some challenges remain. In particular, the within and between species diversity tends to be dealt with by different institutions, each of which has their own approach in terms of monitoring and documenting this diversity. This is one of the hurdles to apply a holistic approach in the sustainable management of biodiversity for food and agriculture.

Question 91.

There is quite some expertise with respect to knowledge generation and science for the management and sustainable use of biodiversity for food and agriculture. However, with respect to the less commercialized species, varieties and breeds and to associated biodiversity species, there are still some major knowledge and information gaps. Some of these gaps are the result of the fact that there still is a general lack of understanding of the importance and value of these species, both outside and within the farming community and among the relevant authorities. This is an overriding limitation that needs to be addressed.

Among others, knowledge on how to optimally manage biodiversity in and around production systems in a changing climate is missing. There is also no information available on how farmers balance trade-off between ecosystem services and disservices in their production system.

As mentioned in the previous question, better collaboration and more coherency is required in terms of the monitoring and documenting of the within and between species diversity.

Question 95.

The Norwegian Genetic Resources Centre's strategic plan and its sectoral action plans lay out the many activities that are being/will be undertaken to improve stakeholder awareness, involvement and collaboration in the conservation and sustainable use of animal, plant and forest genetic resources. With more human and financial resources the Centre’s outreach could be improved.

The Government is currently in the process of drawing up an action plan to halt the loss of biodiversity and to implement relevant national goals, including those related to the Aichi biodiversity targets (Norwegian Ministry of Climate and Environment, 2014). This action plan should contribute to improving stakeholder awareness, involvement and collaboration in the conservation and sustainable use of biodiversity for food and agriculture.

The report on the natural benefits-on the value of ecosystem services (NOU, 2013), that was published by the Ministry of Climate and Environment in 2013, includes recommendations that could positively contribute to the future management of biodiversity for food and agriculture and of the ecosystem services it provides.

The goal of the Norwegian Biodiversity Information Centre (NBIC) is to serve as a national source of information on species and ecosystems in Norway, and to make up-to-date information on biodiversity widely available and easily accessible to society. NBIC's knowledge is continuously expanding through interaction with the scientific community, and close cooperation with policymakers, managers and other data users, thereby also contributing, among others, to improved stakeholder awareness, involvement and collaboration in the conservation and sustainable use of biodiversity for food and agriculture.

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