COUNTRY REPORTS

THE STATE OF **CROATIA'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: Croatia

National Focal Point: Snježana Španjol

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**.

TABLE OF CONTENT

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.

The FAO contact for the preparation of Country Reports is:
Secretariat
Commission on Genetic Resources for Food and Agriculture
Food and Agriculture Organization of the United Nations
Viale delle Terme di Caracalla

00153 Rome, Italy
Fax: +39 0657055246
Email: SOW-BFA@fao.org

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.

Croatia is situated in Southeast Europe, at the crossroads between the Pannonian Plain and the Mediterranean Sea. Its land area is 56 594 km2 and interior sea waters and territorial sea area is 31 479 km2. Croatia has three geographical regions: Mediterranean, Alpine and Pannonian, with Pannonian region as main agricultural area. Geomorphologic differences between lowland, mountain and coastal Croatia as well as the great diversity of terrestrial, marine and underground habitats have resulted in a wealth of species. Croatia ranks as one of the top five European countries with regard to biodiversity, with some parts being among the richest areas of their kind in the world. There are approximately 40,000 known species in Croatia. The assumed number is considerably higher, with estimates ranging from at least 50,000, to over 100,000 species. The richness of Croatia in terms of wild species lies not only in their diversity, but also in their endemic nature. Certain endemic species are tertiary relics that were left over in areas not greatly affected by glaciation, especially coastal mountains. Also, a number of endemics have developed in isolated habitats like caves, islands and Adriatic rivers. Even 2.79% of species recorded for Croatia are endemic.

According to the 2011 census, Croatia has 4,284,889 inhabitants, 24.92% of whom live in cities situated in urban clusters and 75.08% live in rural and intermediate areas. The total number of agricultural holdings in Croatia is 186,688 where 57,978 are managed by woman farmer. According to the model for the differentiation of Croatian rural areas 99.24% of the territory is defined as rural and intermediate, and only 0.76% as cities situated in urban clusters. Croatia has very diverse physiographic and climatic features and consequently high diversity in agricultural production. However, in modern agriculture many aspects of traditional diversity are being neglected or even lost. Importance of safeguarding biodiversity for food and agriculture is recognised and efforts are taken to prevent permanent loss and increase use of biodiversity. Measures taken include ex situ and in situ conservation, as well as rural development measures.

Limited number of plant breeding programs are active in Croatia at the moment. They include mainly most important arable crops (maize, wheat, barley, oats, sunflower and soybean) and to lesser degree fodder crops (legumes and grasses). Domestic genetic resources are very important for those breeding programmes. Ex situ conservation of plant genetic resources is implemented through the network of gene banks participating in the National Programme for Conservation and Sustainable Use of Plant Genetic Resources for Food and Agriculture. Plant genetic resources are conserved in the form of seed or in the field gene banks (fruits and grape vine). Development of the National Programme started in 2004 and contributed significantly to biodiversity conservation.

Agricultural plant production in Croatia mainly relies on modern improved varieties, especially in large-scale production. Relatively low number of species is produced for the market. On the other hand, in the case of production for family consumption or small-scale market production, higher degree of diversity is used, both in terms of species and varieties, including old traditional varieties.

Native and protected breeds of domestic animals are a Croatian heritage with value visible on the economical, social, natural and cultural level. Some of the native breeds in the Republic of Croatia arrived from other regions as a consequence of industrialisation and globalisation of husbandry. They, also need to be under the observation of expert and wider community, thus if the need occurs, protected adequately. Erosion of a part of native breeds of domestic animals in the Republic of Croatia has been present for centuries on the local, regional and global level, putting their existence in question. However, the very richness of native and protected breeds of domestic animals makes food production safe in the scope of dynamic change of the production environment, especially given the announced and expected climate changes. One should not forget that the native breeds are the very ones which encompass an entire series of direct and indirect benefits. Native breeds are often underestimated in food production, although, especially in economically underdeveloped countries, crucial for sufficient food supply. Adapted to various environments, resistant to different diseases and modest when it comes to their need for food. Native and protected breeds of domestic animals are an incentive for revival of parts of rural areas, ensuring additional income for the local population. They are suitable for use and keeping of pastures, prevention of devastation and succession of habitats (byotope), inclusion in programs of organic (ecological) production and development of recognisable traditional brands. They are a component of the ecosystem upon which numerous other plant and animal species depend. List of Autochthonous and Protected Breeds and Strains of Domestic Animals created on the territory of Croatia (Official Gazette 127/98, 73/03, 39/06, 126/07, 70/09, 80/13) contains following breeds as native and protected: cattle (Istrian cattle; Slavonian Syrmian podolian cattle; Busa cattle), horses (Croatian Posavina horse; Croatian coldblood horse; Murinsulaner horse; Lipizzaner), donkeys (Istrian donkey; Littoral Dinaric donkey; Northern Adriatic donkey), sheep (Dalmatian pramenka; Cres Island sheep; Ruda sheep; Istrian sheep; Krk Island sheep; Lika pramenka sheep; Pag Island sheep; Rab Island sheep; Tzigai sheep), goats (Croatian spotted goat; Croatian white goat; Istrian goat), pigs (Black Slavonian pig, Turopolje pig), poultry (Zagorje turkey, Croatian hen), bees (Grey bee). List of Autochthonous and Protected Breeds of Domestic Animals created on the territory of Republic of Croatia is not closed and can be updated with breeds whose origin will be approved.
Besides production, a part of consumption is based on exploitation of natural resources, such as fungi and marine resources, and gathering of these natural resources can mean extra income for farmers as well as other folk.

The issue of ecosystem services is still quite new concept for Croatia. However, a number of activities related to assessment of the values of biodiversity and economic valuation of its ecosystem services have been initiated recently, mostly connected to implementation of different projects and studies (such as the study of benefits and values of freshwater ecosystems and biodiversity in the Danube basin, implemented in a pilot-area of the Drava River, with the overall aim to strengthen the link between biodiversity of freshwater ecosystems and human well-being as well as their contribution to economic development).

Agricultural use of land, water, plants and other resources is a dynamic process affected by numerous economic, social, biological and other factors. Because of a number of various factors affecting these changes, long-term effects which are hard to measure, the basic activities are aimed of organising and coordinating the inventarisation and monitoring of the state of biodiversity.

Scientific organizations collect, process and compile data on the state of aquatic nature, drafts reports, keep databases and prepare expert bases for the protection of individual components of biological and landscape diversity. In order to ensure that the compiled and organised data serve as a joint foundation for the creation, organisation and planning of nature conservation tasks, since 2004, the State Institute for Nature Protection (From June 2015 Croatian Agency for Environment and Nature) has carried out a series of activities within its regular tasks and international projects in order to establish a single nature protection information system. The obligation to create such a system is laid down in the Nature Protection Act (OG 80/13, Art. 196) by which "the Institute keeps and maintains Nature Protection Information System (NPIS) according to internationally accepted standards and obligations". Over the years, the State Institute for Nature Protection has taken over the regular maintenance of certain databases owned by the Ministry of Environmental and Nature Protection (GIS databases: Protected Areas in Croatia and the Map of Habitats in Croatia) and has coordinated the creation of several thematic databases pertaining to nature protection.

In line with the objectives of the Common Agricultural Policy of the European Union and the specific features of the Croatian agriculture, and its economic, ecological and social roles, objectives of the agricultural policy of the Republic of Croatia are economically of competitive and technologically innovative and modernized agricultural production and food industry based on the principles of economic and environmental sustainability , which provides a stable supply of high-end consumer products, increasing self-sufficiency in agricultural production and improving the balance of trade, ensuring the stability of the income of agricultural economy, sustainable management of natural resources in agriculture to the implementation of the principles of nature conservation, environmental protection and conservation of genetic resources, the balanced development of rural areas while preserving rural landscape and the overall tangible and intangible heritage of rural areas.

In view of these objectives and the Common Agricultural Policy in the new programming period of the European Union (2015 - 2020) Ministry of Agriculture from 2015 onwards introduced a new policy instrument under the first pillar, direct payments - greening . Within this, farmers will receive payment if you follow three compulsory agricultural practices beneficial for the climate and environment, and the maintenance of permanent grassland, if you have ecological focus area on the agricultural area and crop diversification. Respect for agricultural practices beneficial for the climate and the environment is mandatory for farms with

arable land. Greening aims to strengthen the environmental sustainability of agriculture, such as crop diversification, maintenance of grasslands, climate change mitigation and biodiversity conservation.

In the field of forestry The Republic of Croatia has a long-standing tradition of sustainable forest management that dates back over 250 years. Already in 1769, the first Forest Order recognized that forest management should be based on the principles of sustainability. As a result, today Republic of Croatia has some of the most extensive, healthy and naturally self-sustaining forests in Europe. Republic of Croatia enjoys rich biodiversity concentrated on its relatively small territory. 4500 plant species and subspecies, 260 autochthonous tree species and more than 100 forest plant communities exist on approximately 2.7 million hectares of forest and other wooded land.

In Republic of Croatia, forests cover almost half of the land territory. Their value has been recognized a long time ago. Most of this valuable resource is owned by the State, and managed in a “close to nature” practice with the objective of natural regeneration. Furthermore, clear cuts are prohibited by the law, which helps to maintain the forest stands in optimal condition and provides continuous cover over large areas. Consequently, all state forests, managed by state owned enterprise, are accredited with the prestigious Forest Stewardship Council’s certificate (FSC).

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.

After official appointment of the National Focal Point for the preparation of Croatia’s Country Report, a working group was formed with the task to prepare the draft Report. Working group consisted of 11 experts in different fields of biological diversity (plant, animal, aquatic and forest genetic resources, nature protection etc.). Other stakeholders were consulted as well, for example experts from the Institute for Plant Protection of the Croatian Centre for Agriculture, Food and Rural Affairs.

Report on the state of animal genetic resources came after consultations at the level of the National Council for monitoring the implementation of the program of conservation of animal genetic resources. Data regarding associated biodiversity and wild food is extracted mainly from the Report on State of Nature of Republic of Croatia for the period 2008-2012 that was prepared in 2013/14.

Working group had several meetings to discuss the progress in preparation of the Report and also communicated regularly by e-mail. The Government of the Republic of Croatia in its session which was hold on October 1st, 2015 adopted the National Report on the State of the Croatian's Biodiversity for Food and Agriculture for the purpose of preparing The State of the World's Biodiversity for Food and Agriculture.

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.

Croatia, even small country (56.594 km2), covers a diversity of landscapes: Mediterranean, Central European, mountainous and flat, coastal and continental. It ranks as one of the top five European countries with regard to biodiversity, with some parts being among the richest areas of their kind in the world.

Geomorphologic differences between lowland, mountain and coastal Croatia as well as the great diversity of terrestrial, marine and underground habitats have resulted in a wealth of species. The northern part of Croatia is characterized in lowland rivers with well-preserved willow-poplar gallery forests and Common oak forests, wet grasslands and extensive marshes. The mountain karst area of Dinaric Alps is covered with the beech and the mixed beech-fir forests that represent the most western extensive forest complex in this part of the Europe, with significant populations of Brown bear, Wolf and Eurasian lynx. Karst area covers 46% of Croatian territory. Karst ecosystems represent the uniqueness and richness of global value and contain a high level of endemic taxa in underground habitats. There are approximately 40,000 known species in Croatia. The assumed number is considerably higher, with estimates ranging from at least 50,000, to over 100,000 species. The richness of Croatia in terms of wild species lies not only in their diversity, but also in their endemic nature. Certain endemic species are tertiary relics that were left over in areas not greatly affected by glaciation, especially coastal mountains. Also, a number of endemics have developed in isolated habitats like caves, islands and Adriatic rivers. Even 2.79% of species recorded for Croatia are endemic.

Croatia is situated in Southeast Europe, at the crossroads between the Pannonian Plain and the Mediterranean Sea. Its land area is 56 594 km2 and interior sea waters and territorial sea area is 31 479 km2. Croatia has three geographical regions: Mediterranean, Alpine and Pannonian, with Pannonian region as main agricultural area. The coastal region of Croatia has a Mediterranean climate with hot dry summers and mild rainy winters, while continental climate is predominant inland, with hot summers and cold winters. Mean annual quantity of precipitation in Croatia ranges from 600 mm (some Adriatic islands) to 3 500 mm (peaks of Dinara mountain), while most parts receive 800 -1 000 mm. Eastern Slavonia and Baranja, most important cereal-growing areas, are among the driest regions, but the distribution of precipitation during the year is such that most of it falls during the growing season. With average of 2 600 hours of sunshine a year, Croatian Adriatic coast is among sunniest in Mediterranean.

According to the model for the differentiation of Croatian rural areas 99.24% of the territory is defined as rural and intermediate, and only 0.76% as cities situated in urban clusters. According to the 2011 census, Croatia has 4,284,889 inhabitants, 24.92% of whom live in cities situated in urban clusters and 75.08% live in rural and intermediate areas. Croatia has a low average population density of 78 inhabitants/km² (CBS, 2011). However, population density varies greatly between counties ranging from the lowest density in Lika-Senj County (10 inhabitants/km²) and the highest density (1,232 inhabitants/km²) in the City of Zagreb.

In the structure of agricultural holdings,186,688 agricultural holdings are engaged in agricultural activities in Croatia utilizing 1 098 730, 89 ha of agricultural land, i.e. an average agricultural holding in Croatia utilizes 5.8 ha of agricultural land. (LPIS date on July 13rd, 2015).

According to CBS data, in 2012 the prevalent categories of utilised land were arable land and gardens with 903,508 ha (67.9%), Agricultural area under Kitchen gardens, 2 933 ha, (0,2 %), followed by permanent grasslands with 345.561 ha (26.0%), and permanent crops with 78,183 ha (5.9%).

The arable land owned by most family farms is very fragmented and plots are often very distant from one another, one reason underlying the inefficiency of agricultural production; in 2011 the production of an average agricultural holding was conducted on 15 cadastral plots, on average. In terms of organizational structure, in 2011 most holdings functioned as family agricultural holdings, as many as 162,833 (97,4%). With regard to other organisational structures, 2,404 crafts (1.4%), 1,522 companies (0.9%), 307 cooperatives (0.2%), and 150 agricultural holdings with a status of other legal entity (0.1% of holdings) were

registered; Agricultural holdings in the size category under 2 ha dominate (52.6%).

Despite the notable trend of the rising number of holdings in the categories from 20 to 100 ha (36.24% increase) and from 100 to 750 ha (62.5%) in the period 2007-2011, these are still under-represented; in other words, agricultural holdings under 20 ha still dominate the size structure of agricultural holdings.

According to the EU's labour force survey, agriculture, forestry and fishing employed 229200 people aged over 15 in Croatia in 2010, the equivalent of 14.9 % of the total workforce over 15 years old. The farm structure survey carried out in 2010 suggests that a much higher number of people worked regularly in the Croatian agricultural industry (513 680 people). Many of these people were family helping out on the farm but having their main employment elsewhere. After taking into account the amount of time actually worked, the regular agricultural labour force in Croatia was estimated to be the equivalent of 179 290 people working fulltime (in annual work units). With the equivalent of an additional 5 500 full-time workers coming from non-regular agricultural labour and persons not directly employed by the holding, the total workforce in Croatian agriculture was equivalent to 184 480 fulltime workers. This represented 1.9 % of the fulltime equivalent agricultural workforce in the EU27 in 2010. Farming in Croatia is very much a family affair; on average 90.7 % of the labour input for agriculture (measured in annual work units) was carried out by the farmer and/or a member of his/her family in 2010. This was a much higher proportion than the average for the EU27 (76.4 %). Two in every five (40.2 %) regular agricultural workers in Croatia was female, a slightly higher proportion than the corresponding EU27 average (37.5 %). However, the proportion of female sole holders (in whose name the holding was operated) was lower in Croatia than across the EU27 (20.9 % compared with 23.2 %). A relatively small proportion (6.0 %) of holdings in Croatia had another gainful activity in addition to farming. Of the holdings with another gainful activity, about one half (49.7 %) were involved in the processing of farm products with a further quarter (25.7 %) involved in tourism. (Source: Agriculture, forestry and fishery statistics, EUROSTAT).

The total number of agricultural holdings in Croatia is 186,688 where 57 978 are managed by woman farmer (source: Paying Agency for Agriculture, Fisherie and Rural Development).
According to Köppen classification for a standard period 1961. to 1990., most of the Croatia has a climate C, moderately warm rainy climate. The average annual temperature in the lowland area of northern Croatian is 10 - 12 ° C, at altitudes above 400 m lower than the 10 °C, while in the mountains 3 - 4 °C. In the coastal area temperature ranges from 12 to 17 °C. The minimum precipitation in Croatia in the open part of the central Adriatic (Palagruža, 304 mm) and in Eastern Slavonia and Baranja (Osijek, 650 mm). Central Croatia has annual precipitation between 800 and 1200 mm. The amount of precipitation in the Pannonian region decreases from west to east. Precipitation increases from the coast to the interior. Most of the precipitation falls on the coastal slopes and peaks of the Dinarides (Paklenica, 3 470 mm), from Gorski Kotar in the northwest to the southern Velebit in the southeast. Croatian fairest part of the annual cloudiness 4 tenths is the coastal area of Dugi Otok to the Prevlaka. Islands of the central and southern Adriatic (Hvar, Vis, Korčula) have approximately 2,700 hours of sunshine. The majority of Croatian land has 1800-2000 hours of sunshine. The largest annual cloudiness in Gorski Kotar (6-7 tenths), and the duration of sunshine is at least about 1700 hours a year.

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.

Croatia has very diverse physiographic and climatic features and consequently high diversity in agricultural production. However, in modern agriculture many aspects of traditional diversity are being neglected or even lost. Importance of safeguarding biodiversity for food and agriculture is recognised and efforts are taken to prevent permanent loss and increase use of biodiversity. Measures taken include ex situ and in situ conservation, as well as rural development measures. Agricultural plant production in Croatia mainly relies on modern improved varieties, especially in large-scale production. Relatively low number of species is produced for the market. On the other hand, in the case of production for family consumption or small-scale market production, higher degree of diversity is used, both in terms of species and varieties,

including old traditional varieties.

Besides production, a part of consumption is based on exploitation of natural resources, such as fungi and marine resources, and gathering of these natural resources can mean extra income for farmers as well as other folk. There are many edible fungi species in Croatia but only several which are considered to be over-harvested and for which some exploitation data is available (Cantharellus cibarius, Craterellus cornucopioides, Boletus aerus, B. edulis, B. pinophilus, B. reticulatus, Hydnum repandum, H. rufescens, Armillaria borealis, A. cepistiped, A.galica, A.mellea, A. ostoaye, Lactarius deliciosus, L. deterrimus, L. hemicyaneus, L. quieticolor, L.salmonicolor, L. sanguifluus, L. semisanguifluus, Tuber asa, T. borchii, T. maculatum, T. magnatum, T. aestivum, T.brumale, T.hiemalbum, T.macrosporum, T.malenconii, T.melanosporum, T. mesentericum, T. uncinatum). As far as marine natural resources go, they are the only source of income for numerous fishermen so their quantity is important for maintenance of their livelihoods, as well as biodiversity conservation. According to data collected by Fishery Directorate, the total catch of fish has increased over the last decade (especially the catch of pelagic fish, mainly Sardina plichardus and Engraulis encrasicolus), while the catch of other sea organisms (various crustacean species, cephalopods and bivalves) has a relatively stable trend (Ministry of Agriculture, 2013). However, since pelagic fish are short-life species and are capable to sustain a higher level of exploitation then long-life species, there is a positive trend for the populations of above mentioned species. Their abundance is dependable on several factors, therefore it is essential for their conservation to have an appropriate management.

The issue of ecosystem services is still quite new concept for Croatia. However, a number of activities related to assessment of the values of biodiversity and economic valuation of its ecosystem services have been initiated recently, mostly connected to implementation of different projects and studies (such as the study of benefits and values of freshwater ecosystems and biodiversity in the Danube basin, implemented in a pilot-area of the Drava River, with the overall aim to strengthen the link between biodiversity of freshwater ecosystems and human well-being as well as their contribution to economic development).

Limited number of plant breeding programs are active in Croatia at the moment. They include mainly most important arable crops (maize, wheat, barley, oats, sunflower and soybean) and to lesser degree fodder crops (legumes and grasses). Domestic genetic resources are very important for those breeding programmes. Ex situ conservation of plant genetic resources is implemented through the network of gene banks participating in the National Programme for Conservation and Sustainable Use of Plant Genetic Resources for Food and Agriculture. Plant genetic resources are conserved in the form of seed or in the field gene banks (fruits and grape vine). Development of the National Programme started in 2004 and contributed significantly to biodiversity conservation. Most of activities in in situ conservation are directed towards protection of habitats.

The strategy of protection of native and protected breeds of domestic animals implemented in the Republic of Croatia is primarily based on the in situ models for preservation. Competent authorities are involved in the protection programmes through condition inventorisation, creation of a main register and exterior, genetic and production characterization of breeding. Establishment of breeding organisations of breeders of native and protected breeds was encouraged. Some breeding organisations encourage the development of a programme of an active self-sustainable protection of native breeds, trying to come up with products on the market that would unite the uniqueness of a genotype, tradition and ecological production.
A part of native breeds of domestic animals in the Republic of Croatia is competitive and economically active. The true value of endangered and protected breeds of domestic animals is in their potential economic advantages (adaptability, resilience to diseases, working capabilities) that have not yet been recognized or do not have an adequate level of significance that would bring about economic advantage (profitability). Modern programmes for preservation of native and protected breeds of domestic animals recognize the need for them to be adapted to the market on which native genotypes make up for their lower level of productivity with attributes such as "ecological", "authentic", "traditional" or "original". Additional options are available through implementation of products from native and protected breeds into supplies labelled "protected authenticity", "geographical origin" or "traditional reputation". We have a few good experiences (Istrian cattle, Black Slavonian pig, Zagorje turkey). Istrian cattle - production of durable and semi durable meat products, "Bakin" salami etc., Black Slavonian pig - production of nautre fat, salami and fresh meat, bacon etc., Zagorje turkey - production of fresh meat.

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		☐
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: Temperate	These production systems have been developed primary in the areas of continental Croatia suitable for plant and livestock production. Sheep and cattle production based on allochthonous and autochthonous breeds mainly prevail in this system. Such production systems are represented in the areas that are not suitable for intensive crop production, i.e. breeding of autochthonous breeds of horses. These systems of livestock production are important for the overall livestock production. In 2012 there was a total of 451,517 head of cattle. According to CBS data for 2012, domestic beef production was 44,532 t, and milk in total of 602,356,733kg. Some milk is also processed by family farms and sold via direct sales. According to demand in Croatia, the country is nearing self-sufficiency with regard to milk products, cream, butter and cream cheese spreads, but it does not fully meet the demand for cheese, processed cheese and powdered milk. In 2012, there were a total of 1,182,347 pigs in Croatia. Pig farming is predominantly conducted on family farms with small production units of up to 10 sows (93.46%) or 10 to 50 sows (5.95%). To a lesser extent, pig farming is conducted in medium-sized production units of 50 to 100 sows (0.23%) and large production systems with full production cycles and more than 100 sows (0.36%). According to CBS data for 2012, domestic pork production was 122,107 t. This level of production does not meet the domestic demand for fresh meat or the processing industry's demand for quality raw materials. The average self-sufficiency was 66.6%. The most important production in the poultry sector pertains to the production of chicken meat, followed by turkey, goose and duck meat, and consumption eggs laid by laying hens. In 2012 there were a total of 10,160,379 units of poultry. The average annual production of poultry was 81,702 t, still insufficient for the domestic demand as well as the demands of the processing industry. Egg production in 2012 was 584,962 million pieces. It was near the self-sufficiency threshold and averaged 94.87% for 2012. The production of hatching eggs also decreased by 3.51%, and production lacks approximately 22,000,000 hard line eggs. According to CBS data for 2012, a total of 680,000 sheep and 72,000 goats were raised. Despite the registered positive trend, sheep and goat production is still conducted by extensive and traditional methods without an organised market approach. A large share of the milk is processed by family farms, often in inadequate conditions. On average 483,830 sheep and 68,486 goats were slaughtered annually. The average domestic production of sheep and goat meat was 6,096 tonnes. Domestic production does not meet the overall demand, and the average self-sufficiency for 2011 was 78.58%. In 2012, the number of registered horses was 20,335. As well as recreational and sporting purposes, horses are raised for meat production. Since horse meat consumption in Croatia is low, it is primarily intended for export. To a lesser extent, horses are raised as protected autochthonous breeds.
Livestock grassland-based systems: Boreal and /or highlands	In this production system include small number of cattle (~5% population), horses (~5% population) and greater share of autochthonous sheep breeds population (~70%). These production systems have been developed primary in the areas of mountain and Mediterranean Croatia that are not suitable for intensive crop production. In such areas maily preveils sheep production (autochthonous breeds) and beef production with lower intensity (fewer farms, grazing management method) based on the allochthonous and autochthonous cattle breeds. Sheep production is largely based on the utilisation of the extensive pastures of the Mediterranean region of Croatia and pastures of the central mountainous region. Sheep sector is therefore less exposed to the market pressures than the cattle sector. The national market (habits, traditional gastronomy) supports traditionally produced meat (lamb meat) and dairy products (cheese, whey cheese). Significant quantities of sheep cheese and meat are offered as part of the tourism industry, with surpluses of certain animal products being sold seasonally. Besides, in the Mediterranean and the mountainous climate, the secondary benefit of sheep production has been recognised by tourism, preservation of the vitality of rural areas, and maintenance of the biodiversity of habitats, which, in addition to lower investment needs, makes sheep farming a favoured branch of livestock production
Livestock landless systems: Temperate	These production systems are mainly related to the conventional animal production (pig and poultry intensive production system). These systems are not directly related to the areas on which food is produced for animals. ~ 95% population of poultry and pigs). These systems have a limited impact on the environment because it attention is given to environmental burdens of agriculture.

Naturally regenerated forests: Temperate	Both forest production systems in Croatia share the same description, since F7 covers less than 4% of forest area and is distributed in small fragments through F3. Environmental features and characteristics Most of Croatia has a moderately warm and rainy continental climate. The coldest parts of the country are Lika and Gorski Kotar where a snowy forested climate is found at elevations above 1,200 meters. The warmest areas of Croatia are at the Adriatic coast and especially in its immediate hinterland, which are characterized by a Mediterranean climate since temperatures are moderated by the sea. The mean annual precipitation is 600 to 3,500 millimeters depending on the geographic region and prevailing climate type. The least precipitation is recorded in the outer islands and in the eastern parts of Slavonia; however, in the latter case it mostly falls during the growing season. The most precipitation is observed on the Dinara mountain range and in Gorski Kotar. Total area of forests and forest land in Croatia amounts to 2.688.687 ha which is 47% of its total land area. Out of that, 2.106.917 ha is state-owned, whereas 581 770 ha are privately owned. Vast majority of state-owned forests is managed by Croatian forests Ltd. (2.018.987ha). The forests in Croatia belong to the first or the second generation after the natural renewal of vast virgin forests in the area between the Sava and Drava Rivers, as well as in the karst region to the south of the Kupa River. According to the composition of trees, they are natural or very similar to the virgin forests from which they originated. The conservation status of Croatian forests is very good compared to the European level. As high as 95% of forest components show a natural composition, this is rare and highly valuable in global proportions. The largest forest complexes can be found in the western Dinaric Alps (Gorski Kotar, Velebit Mountain) where the beech and fir forests predominate, as well as in the Sava River region with the alluvial basins of Spačva and Lonjsko Polje. In the Mediterranean region, most forest vegetation is in macchia form, though there are also areas with nicely preserved holm oak as well as black pine forests. Rural livelihoods and sustainable use: Regarding rural livelihood, 78% of forests are state owned and managed by Croatian forests Ltd. which employs around 7.700 employees through the whole country, but also sub-contracts many small and privately owned businesses for conducting some of the forestry works. It is estimated that private forests are owned by 600.000 different forest owners, which means that most of the forest owners possess less than 1 ha of forest, with exception of a few bigger forest owners who own 100 to 12.000 ha (restitution). The basic principles of the Croatian forestry are the sustainable management, aiming to preserve the natural structure and biodiversity of forests, and the continuous rise of the stability and quality of the commercial functions and ecosystem services of the forest. In 2002 Croatian forests Ltd. gained the right to carry the prestigious FSC certificate for the forest management. According to the definition, "FSC certification means that forests are being managed according to strict ecological, social and economic standards". FSC certificate is an international acknowledgement that the Croatian forests are being managed according to very strict standards, and it is recognition to the whole forestry profession in Croatia which has been a very responsible manager of this extremely significant national resource through many generations.
Planted forests: Temperate	Both forest production systems in Croatia share the same description, since F7 covers less than 4% of forest area and is distributed in small fragments through F3.
Fed aquaculture: Temperate	There are some 200 stakeholders in Croatian marine aquaculture. Marine fish production includes 35, and shellfish 120 stakeholders. Production is realised through 63 fish farms, including three hatcheries, and 223 shellfish farms. Freshwater aquaculture includes 47 stakeholders with 49 fish farms. The majority of carp farms is situated in the continental part of Croatia, covering large production areas, while trout farms can be in general found in the mountainous parts of Croatia where adequate amounts of clean, cold running waters can be provided. The majority of farms are small enterprises, private investments and family run businesses.

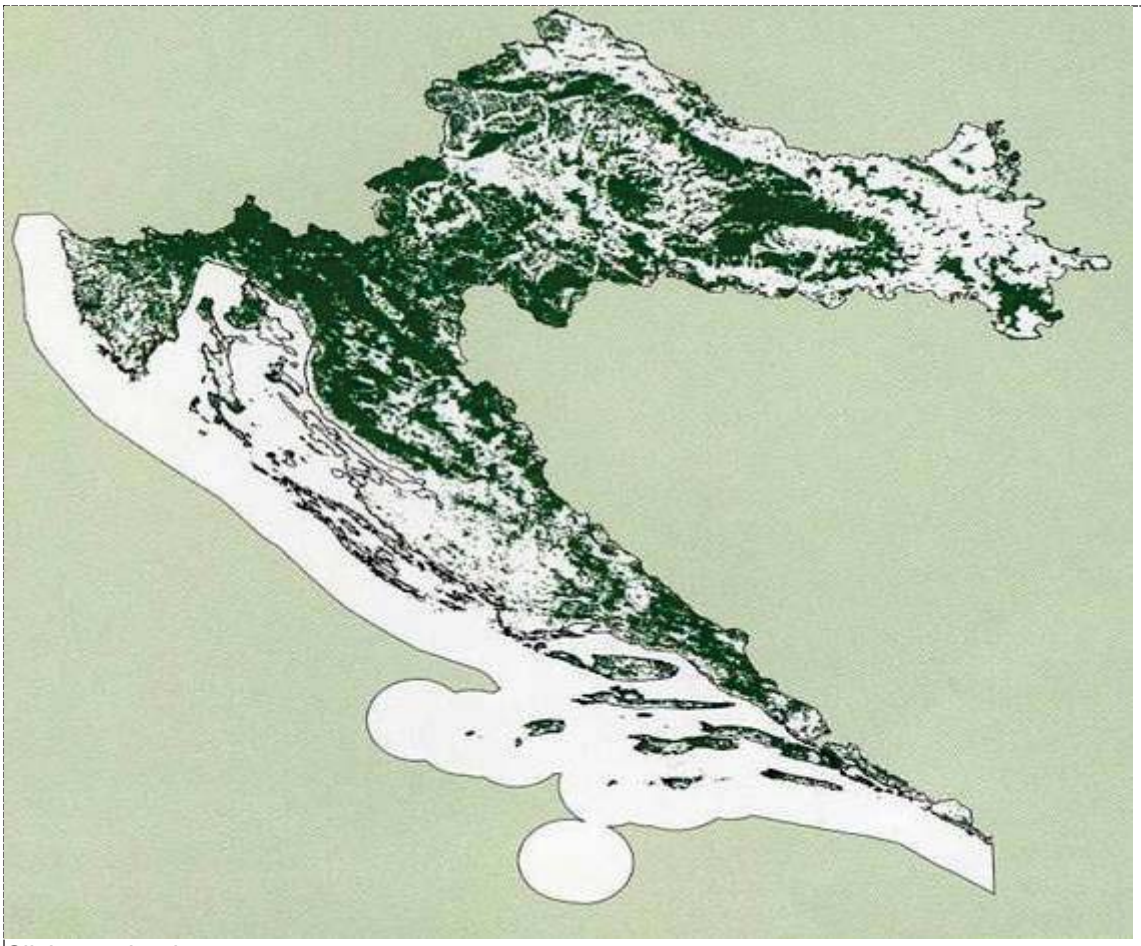
Non-fed aquaculture: Temperate	There are two main shellfish species in marine aquaculture production in Croatia; European flat oyster (Ostrea edulis) and Mediterranean mussel (Mytilus galoprovintialis). They are producing in 225 locations, by 118 producers on area of 1784230 m2. Shalfish production is procuding on small family farms with production less than 50 t per farm annually. It is traditional way of producing, which is characterize by: no hatchery, collection of fry from nature and by floating parks (lines and pergolars). Most of shellfish production in Croatia is conducted in Mali Ston bay (Dubrovnik County). Year production of shellfish in year 2012 was 450546 kg.
Irrigated crops (other) : Temperate	Very small proportion of agricultural land in Croatia is irrigated (0,5-1,0%). Irrigated crops are mainly vegetables and fruits, including glasshouse production. Major project is currently underway with the aim to increase irrigated area.
Rainfed crops : Temperate	Total utilized agricultural area in 2012 was 1 330 973 ha (Statistical Yearbook 2013), out of which 99.0-99.5% is used without irrigation. Approximately 68% of agricultural area is used as arable land and gardens and 26% is permanent grassland. Remaining agricultural area is used as orchards (2.3%), vineyards (2.2%), olive groves (1.4%), kitchen gardens, nurseries, osier willow and Christmas tree plantations. The most important arable crops are cereals (grown on 68% of arable land), fodder crops (14%) and industrial crops (12%). In the structure of cereal production, maize (60.4%), wheat (29.0%) and barley (6.9%) are dominant. Croatia is self-sufficient with regard to wheat, maize and oats production, while barley production is very close to being self-sufficient. With a share of 41.9% of total production, silage maize is dominant fodder crop, followed by clover, alfalfa and fodder grasses. The most important industrial crops are sugar beet and oil crops. In the structure of oil crops production, dominant species are soybean (47.1%), sunflower (33.9%) and oilseed rape (17.9%). Vegetables are grown on 0.8% of arable land with onion and garlic, tomato, cabbage, melon and watermelon, carrot and pepper being the most important species. Mandarins, apples, plums and cherries are dominant fruits (Annual report on the state of agriculture in 2013, Ministry of Agriculture). Reliance upon modern varieties is high. For arable crops and vegetables, certified or verified seed of officially registered modern varieties is the most commonly used, although a certain amount of farm-saved seed is sown as well. The same situation is with fruit species and Vitis regarding establishment of new orchards and vineyards. However, importance of conserving old traditional varieties is recognised. It is especially emphasised in Vitis production, where wine produced from old local varieties is highly valued. Since 2011 vegetable conservation varieties have been registered on the National list, with the aim to preserve genetic diversity. Growing of traditional varieties is supported through rural development measures. Most of the Republic of Croatia has a moderately warm, rainy climate characterised by a mean monthly temperature ranging between -3 and +18° C in the coldest month. The warmest month of the year in continental part of the county has a mean temperature below 22° C, while the area along the Adriatic coast has a mean temperature above 22° C. The mean annual air temperature in the coastal regions ranges from 12 to 17° C. The plains of the northern Croatia have a mean annual temperature of 10 to 12° C. The mean annual quantity of precipitation on the outer Adriatic islands is below 700 mm. In the west part of continental Croatia the quantity of precipitation ranges from 900 mm to 1 000 mm, while in eastern Slavonia and Baranja (most important arable crops growing areas) it is just under 700 mm.

Rainfed crops : Boreal and /or highlands	Hilly and mountainous areas are considered to be areas with average altitude of at least 600 m, or average slope gradient of at least 20%, or average altitude of 500-600 m with average slope gradient of at least 15%. Eligible municipalities in such areas are under special protection with the aim to enhance demographic renewal and population, economic growth, as well as conservation of biological and landscape diversity. Approximately 21% of total surface area of Croatia has elevation above 500 m. Compared with other parts of Croatia, proportion of agricultural area used as arable land is considerably lower, while permanent grassland has more importance. At elevations of more than 400 m above sea level the mean annual temperature is below 10°C. The coldest regions are Lika and Gorski kotar, with the temperatures ranging between 8°C and 10°C at lower elevations and 2°C and 4°C on the highest peaks of the Dinara mountain range. The highest parts of mountains (above 1 200 m) of Lika and Gorski kotar have a snowy forested climate with a mean temperature in the coldest month below -3°C. The mean annual precipitation if higher than in the other parts of Croatia, with maximum quantity of up to 3 500 mm on the peaks of Gorski kotar (Risnjak and Snježnik).
Mixed systems (livestock, crop, forest and /or aquatic and fisheries): Temperate	These production systems are mainly related to the conventional animal production (pig and poultry intensive production system). These systems are not directly related to the areas on which food is produced for animals. These systems have a limited impact on the environment because it attention is given to environmental burdens of agriculture. In this production system include small number of horses (~15% population), sheep and goats (~5% population), pigs (~5% population) and poultry (~5% population) and a greater share of cattle population (~75% population).
Mixed systems (livestock, crop, forest and /or aquatic and fisheries): Boreal and /or highlands	Crop-livestock – family farms or agricultural enterprises growing crops to be used on the farm itself as feed for the livestock. Manure produced on the farm is used for fertilization Surplus crop products may be sold on the market. Agro-pastoralist: livestock-oriented systems that involve some crop production in addition to keeping grazing livestock on rangelands. In this production system include small number of horses (~10% population), sheep and goats (~15% population) and cattle (~10% population)

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

Add

Delete



Click to upload map

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: Temperate	NK	NK	NK	NK	NK	NK
Livestock grassland-based systems: Boreal and /or highlands	NK	NK	NK	NK	NK	NK
Livestock landless systems: Temperate	NK	NK	NK	NK	NK	NK
Naturally regenerated forests: Temperate	1846975	ha	NA		NA	2012
Planted forests: Temperate	74178	ha	NA		NA	2012
Fed aquaculture: Temperate	11400		12000	t		2012

Non-fed aquaculture: Temperate	1784230	m2	450546	kg	NK	2012
Irrigated crops (other) : Temperate	10000	ha	NK	NK	NK	2012
Rainfed crops : Temperate	1200973	ha	NK	NK	NK	2012
Rainfed crops : Boreal and /or highlands	120000	ha	NK	NK	NK	2012
Mixed systems (livestock, crop, forest and /or aquatic and fisheries): Temperate	NK	NK	NK	NK	NK	NK
Mixed systems (livestock, crop, forest and /or aquatic and fisheries): Boreal and /or highlands	NK	NK	NK	NK	NK	NK

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.

Farming of aquatic organisms in Republic of Croatia comprises marine aquaculture and farming in fresh (inland) waters. Marine aquaculture includes farming of finfish, pelagic fish and shellfish. Total production reaches some 12.000 tons annually, with a total value of some 876 millions kuna (120 million €). Total production in marine aquaculture in 2010 was 10.892 tons. Finfish farming involves a closed farming cycle, where the first phases take place in a hatchery, and then in the floating cages at sea. The farming activities are wide-spread in all Croatian coastal counties, but predominantly in Zadar county. Finfish farming is dominated by sea bass (Dicentrarchus labrax) and sea bream (Sparus aurata), with the production of these two species reaching some 5.000 tons annually. Major part of the production is placed on domestic market and the EU-market (Italy). The fish farmer register maintained by the Ministry of Agriculture contains 30 companies that have farming facilities on a total of 47 locations. Three hatcheries are registered for production of fish fry.

Farming of tuna (Thunnus thynnus) is based on capture of smaller wild tunas (8-10 kg) and their subsequent farming to the market size (30 kg and above). Farming takes place in floatig cages at sea, in Split-Dalmatia County and dominantly in Zadar County. Annual production of tuna amounts to 4.000 tons and is exported almost entirely to Japanese market. The fish farmer register maintained by the Ministry of Agriculture contains 5 companies having farming facilities on a total of 10 locations.

Shellfish farming comprises farming of mussels (Mytilus galoprovincialis) and oysters (Ostrea edulis) on long-lines in specially controlled areas as those on the western coast of Istria, Novigrad Sea, Velebit Channel, Krka river mouth, Bay of Mali Ston and Malo more. The production is based on collection of fry and reaches some 3.000 tons of mussels and a 1 million pieces of oysters annually. The production at the moment is placed exclusively on domestic market due to the inability to export to the EU market.

Freshwater aquaculture in Republic of Croatia includes production of warm-water (cyprinid or carp-like) species and cold-water (salmonid, trout-like) species. There are some 50 licensed freshwater farmers, some of which are legal and some are natural persons registered for freshwater farming. Cyprinid aquaculture mainly involves farming of common carp (Cyprinus carpio) either in monoculture or in poly-culture with other species, predominantly grass carp (Ctenopharyngodon idella), bighead carp (Hypophthalmichthys nobilis), silver carp (Hypophthalmichthys molitrix), wels catfish (Silurus glanis), zander (Stizostedion lucioperca), northern pike (Esox lucius) and tench (Tinca tinca). The production is mainly semi-intensive, and a production cycle takes as a rule 3 years. Cold-water species farming mainly involves farming of rainbow trout (Oncorhynchus mykiss), and only in a smaller part farming of brown trout (Salmo trutta m . fario), with a production cycle of 2 years.

Total production of freshwater fish in 2010 amounted to some 9.500 tons, out of which some 6.500 tons of cyprinid species and some 3.000 tons of salmonid species. This represents an increase of some 2.000 tons as compared to the production in 2009. Out of the total production, the production of market-sized fish in 2010 was some 5.000 tons, which is a quantity relatively equal to the one produced in 2009. Dominant species in production are common carp (Cyprinus carpio) and rainbow trout (Oncorhynchus mykiss), followed by herbivorous species and other freshwater species, whose production as a rule remains under 50 tons per year. In 2010 there were 23 warm-water (cyprinid) and 24 cold-water (salmonid) farming facilities. Total production area of warm-water ponds amounted to 10.226 ha, and of cold-water facilities to 50.258 m2.

The most important crop export products are cereals (542 000 t in 2013). Production of some crops is higher than domestic demand and rely on export (for example, mandarin oranges for Russian market). However, there is no crop production specifically destined for export. Proportion of products sold on domestic market and exported usually depends on current situation in a given year.

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.

There has been an increase in the number of known or recorded species of associated biodiversity in Croatia in the last 10 years, although it is difficult to specify the exact number of species due to several factors (for example, a different methodology of presenting species and subspecies or more intensive research that has resulted in the change of nomenclature). One of the main drivers of change for associated biodiversity is the direct destruction of their habitats, either by the change in use and practices, or by habitat loss (succession of grasslands) and pollution.

Main drivers affecting regulating and supporting ecosystem services in Croatia during the last 10 years have been numerous. A change in the use, management and practices around land and water, especially water use and management. Great emphasis is placed on fish farming because of overfishing in Adriatic Sea. Aquaculture in inland waters every few years suffers because of sudden temperature changes and loss of water supply caused by high summer temperature. There have been great changes in policies; regional and national caused by new law legislation and regulations compliance with International treaties and conventions.

Pests, diseases and alien invasive species are considered to be the important drivers affecting biodiversity for food and agriculture at the global level. Global trade of plants and plant products evidently increased the rate and dynamic of introduction

of exotic, invasive alien plant pests (viruses, bacteria, phytoplasmas, fungi and fungal-like organisms, insects, mites and vertebrates) and invasive alien plants in Croatia. Due to administrative changes in plant quarantine systems and different administrative status of such organisms (quarantine-regulated, non-regulated but monitored, not monitored), it is not possible to express the rate of such increment. The general assumption regarding the effect of alien pests, diseases and plants is that their effect on biodiversity of plant genetic resources shall always be considered as negative. However, such effect differ significantly depending on certain invasive organism. Some pests, diseases and plants can potentially have a long-term devastating impact for local, regional or national biodiversity, while other can have no significant effect at all.

In the sector of animal production the most important features affecting the extent and distribution of associated on Animal Genetic Resources are: industrialization of animal production, pressure on profitability as a main criteria of production sustainability, globalization of animal product markets, globalization of markets of genetic material favoring high yielding breeds in conventional production, raise awareness of importance of genetic resources, emphasize the importance of fitness and adaptability of autochtonous breeds, development of new model of breed conservation, preservation of habitat biodiversity, diversification of food production.

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.

Not all effects of many threats to biodiversity in Croatia are completely known and they require further research, especially the issue of climate change effects on biodiversity. We should not disregard the impact of climate change, which is considered to be one of the key causes of threat to biodiversity globally, with recorded influences in terms of, among other things, migrations, reproduction success and changes in species distribution. These effects have already been registered in Croatia, especially change of dates of arrival of certain birds and start of the nesting.

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: Temperate	Changes in land and water use and management			1	
	Pollution and external inputs			0	
	Over-exploitation and overharvesting			0	
	Climate change			0	
	Natural disasters			0	
	Pests, diseases, alien invasive species	-1		0	
	Markets, trade and the private sector			1	
	Policies			1	
	Population growth and urbanization			1	

	Changing economic, socio-political, and cultural factors			1	
	Advancements and innovations in science and technology			1	
	Other [*please specify*]:				
Livestock grassland-based systems: Boreal and /or highlands	Changes in land and water use and management			1	
	Pollution and external inputs			0	
	Over-exploitation and overharvesting			0	
	Climate change			0	
	Natural disasters			0	
	Pests, diseases, alien invasive species	-1		0	
	Markets, trade and the private sector			1	
	Policies			0	
	Population growth and urbanization			0	
	Changing economic, socio-political, and cultural factors			1	
	Advancements and innovations in science and technology			1	
	Other [*please specify*]:				
Livestock landless systems: Temperate	Changes in land and water use and management			0	
	Pollution and external inputs			0	
	Over-exploitation and overharvesting			0	
	Climate change			0	
	Natural disasters			0	
	Pests, diseases, alien invasive species	-1		0	
	Markets, trade and the private sector			1	
	Policies			1	
	Population growth and urbanization			1	
	Changing economic, socio-political, and cultural factors			1	
	Advancements and innovations in science and technology			1	
	Other [*please specify*]:				
Naturally regenerated forests: Temperate	Changes in land and water use and management		-1		
	Pollution and external inputs		-1		
	Over-exploitation and overharvesting		0		
	Climate change		-1		

	Natural disasters		-1		
	Pests, diseases, alien invasive species	-1	-1		
	Markets, trade and the private sector		0		
	Policies		1		
	Population growth and urbanization		0		
	Changing economic, socio-political, and cultural factors		NK		
	Advancements and innovations in science and technology		0		
	Other [*please specify*]:				
Planted forests: Temperate	Changes in land and water use and management		-1		
	Pollution and external inputs		0		
	Over-exploitation and overharvesting		0		
	Climate change		0		
	Natural disasters		-1		
	Pests, diseases, alien invasive species	-1	-1		
	Markets, trade and the private sector		1		
	Policies		1		
	Population growth and urbanization		0		
	Changing economic, socio-political, and cultural factors		NK		
	Advancements and innovations in science and technology		0		
	Other [*please specify*]:				
Fed aquaculture: Temperate	Changes in land and water use and management				1
	Pollution and external inputs				0
	Over-exploitation and overharvesting				1
	Climate change				0
	Natural disasters				1
	Pests, diseases, alien invasive species				-1
	Markets, trade and the private sector				-1
	Policies				-1
	Population growth and urbanization				-1
	Changing economic, socio-political, and cultural factors				1
	Advancements and innovations in science and technology				2
	Other [*please specify*]:				

Non-fed aquaculture: Temperate	Changes in land and water use and management				0
	Pollution and external inputs				0
	Over-exploitation and overharvesting				0
	Climate change				0
	Natural disasters				0
	Pests, diseases, alien invasive species				0
	Markets, trade and the private sector				1
	Policies				0
	Population growth and urbanization				0
	Changing economic, socio-political, and cultural factors				0
	Advancements and innovations in science and technology				0
	Other [*please specify*]:				0
Irrigated crops (other) : Temperate	Changes in land and water use and management				
	Pollution and external inputs				
	Over-exploitation and overharvesting				
	Climate change				
	Natural disasters				
	Pests, diseases, alien invasive species	-1			
	Markets, trade and the private sector				
	Policies				
	Population growth and urbanization				
	Changing economic, socio-political, and cultural factors				
	Advancements and innovations in science and technology				
	Other [*please specify*]:				
Rainfed crops : Temperate	Changes in land and water use and management				
	Pollution and external inputs				
	Over-exploitation and overharvesting				
	Climate change				
	Natural disasters				
	Pests, diseases, alien invasive species	-1			
	Markets, trade and the private sector				
	Policies				

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

	Over-exploitation and overharvesting				
	Climate change				
	Natural disasters				
	Pests, diseases, alien invasive species	-1			
	Markets, trade and the private sector				
	Policies				
	Population growth and urbanization				
	Changing economic, socio-political, and cultural factors				
	Advancements and innovations in science and technology				
	Other [*please specify*]:				

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: Temperate	Changes in land and water use and management	1	1	-1	0	1	0	-1	-1	0
	Pollution and external inputs	0	1	-1	0	0	0	0	0	0
	Over-exploitation and overharvesting	0	0	0	0	0	0	0	0	0
	Climate change	0	0	-1	1	1	0	0	-1	-1
	Natural disasters	0	-1	0	0	0	0	0	0	0
	Pests, diseases, alien invasive species	??								
	Markets, trade and the private sector	0	0	0	0	0	0	0	0	0

	Policies	1	1	1	1	0	0	0	1	0
	Population growth and urbanization	0	-1	-1	-1	-1	0	1	0	0
	Changing economic, socio-political, and cultural factors	0	0	0	0	0	0	1	0	0
	Advancements and innovations in science and technology	0	1	1	1	0	0	0	0	0
	Other [*please specify*]:									
Livestock grassland-based systems: Boreal and /or highlands	Changes in land and water use and management	0	1	0	0	1	0	1	0	0
	Pollution and external inputs	0	0	0	0	0	0	0	0	0
	Over-exploitation and overharvesting	0	0	0	0	0	0	0	0	0
	Climate change	0	0	0	0	0	0	0	0	0
	Natural disasters	0	1	0	1	0	1	1	1	1
	Pests, diseases, alien invasive species	??								
	Markets, trade and the private sector	0	0	0	0	0	0	0	0	0
	Policies	1	1	1	1	1	0	1	1	0
	Population growth and urbanization	-1	-1	-1	-1	0	0	-1	-1	-1
	Changing economic, socio-political, and cultural factors	0	0	0	1	0	0	0	1	0
	Advancements and innovations in science and technology	1	1	1	1	1	0	0	1	0
	Other [*please specify*]:									
Livestock landless systems: Temperate	Changes in land and water use and management	-1	0	-1	1	-1	-1	-1	-1	0
	Pollution and external inputs	-1	-1	-1	1	-1	-1	-1	-1	-1
	Over-exploitation and overharvesting	-1	-1	-1	0	-1	-1	-1	-1	1
	Climate change	0	0	0	0	0	0	0	0	0
	Natural disasters	0	-1	0	1	0	-1	-1	-1	0
	Pests, diseases, alien invasive species	??								
	Markets, trade and the private sector	0	0	0	0	0	0	0	0	0
	Policies	1	1	1	1	0	1	0	1	0
	Population growth and urbanization	-1	-1	-1	0	-1	-1	-1	-1	-1
	Changing economic, socio-political, and cultural factors	0	0	1	0	1	0	1	1	0
	Advancements and innovations in science and technology	1	1	1	0	1	0	1	1	0
	Other [*please specify*]:									
Naturally regenerated forests: Temperate	Changes in land and water use and management	NA	NA	0	0	1	1	-1	-1	-1
	Pollution and external inputs	-1	-1	NK	NK	0	0	-1	0	NK

	Over-exploitation and overharvesting	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Climate change	NK	-1	NK	-1	NK	NK	0	-1	NK
	Natural disasters									
	Pests, diseases, alien invasive species	NK	-1	NA	NK	NA	NA	NA	-1	NA
	Markets, trade and the private sector	NA	NA	NA	NA	NA	NA	NA	1	1
	Policies	NA	1	1	1	0	1	1	2	1
	Population growth and urbanization	NK	-1	-1	-1	0	0	-1	0	0
	Changing economic, socio-political, and cultural factors	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Advancements and innovations in science and technology	NK	2	0	0	1	0	0	0	0
	Other [*please specify*]:									
Planted forests: Temperate	Changes in land and water use and management									
	Pollution and external inputs									
	Over-exploitation and overharvesting									
	Climate change									
	Natural disasters									
	Pests, diseases, alien invasive species	NK	-1	NA	NK	NA	NA	NA	-1	NA
	Markets, trade and the private sector									
	Policies									
	Population growth and urbanization									
	Changing economic, socio-political, and cultural factors									
	Advancements and innovations in science and technology									
	Other [*please specify*]:									
Fed aquaculture: Temperate	Changes in land and water use and management	NA	0	0	NA	1	NA	1	1	NA
	Pollution and external inputs	NA	0	0	NA	1	NA	1	-1	NA
	Over-exploitation and overharvesting	NA	0	0	NA	1	NA	0	-1	NA
	Climate change	NA	0	0	NA	0	NA	0	0	NA
	Natural disasters	NA	0	0	NA	1	NA	-1	-1	NA
	Pests, diseases, alien invasive species	NK	-1	NA	NK	NA	NA	NA	-1	NA
	Markets, trade and the private sector	NA	1	0	NA	0	NA	0	1	NA
	Policies	NA	1	0	NA	0	NA	0	0	NA
	Population growth and urbanization	NA	2	0	NA	0	NA	1	-1	NA
	Changing economic, socio-political, and cultural factors	NA	0	0	NA	0	NA	1	0	NA

	Advancements and innovations in science and technology	NA	1	0	NA	1	NA	1	1	NA
	Other [*please specify*]:									
Non-fed aquaculture: Temperate	Changes in land and water use and management									
	Pollution and external inputs									
	Over-exploitation and overharvesting									
	Climate change									
	Natural disasters									
	Pests, diseases, alien invasive species									
	Markets, trade and the private sector									
	Policies									
	Population growth and urbanization									
	Changing economic, socio-political, and cultural factors									
	Advancements and innovations in science and technology									
	Other [*please specify*]:									
Irrigated crops (other) : Temperate	Changes in land and water use and management									
	Pollution and external inputs									
	Over-exploitation and overharvesting									
	Climate change									
	Natural disasters									
	Pests, diseases, alien invasive species	NK	-1	NA	NK	NA	NA	NA	-1	NA
	Markets, trade and the private sector									
	Policies									
	Population growth and urbanization									
	Changing economic, socio-political, and cultural factors									
	Advancements and innovations in science and technology									
	Other [*please specify*]:									
Rainfed crops : Temperate	Changes in land and water use and management									
	Pollution and external inputs									
	Over-exploitation and overharvesting									
	Climate change									
	Natural disasters									
	Pests, diseases, alien invasive species	NK	-1	NA	NK	NA	NA	NA	-1	NA

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

Drivers affect aquatic ecosystem services and human well-being at different spatial and temporal scales, which makes both their assessment and their management complex. Climate change may operate on a global or a large regional spatial scale; political change may operate at the scale of a nation or a municipal district. Sociocultural change typically occurs slowly, on a time scale of decades (although abrupt changes can sometimes occur, as in the case of wars or political regime changes), while economic changes tend to occur more rapidly. As a result of this spatial and temporal dependence of drivers, the forces that appear to be most significant at a particular location and time may not be the most significant over larger (or smaller) regions or time scales. In Croatia urban demographic and economic growth has been increasing pressures on marine aquatic ecosystems and for marine aquaculture.

Changes in land use and water management, as well as, over-exploitation and overharvesting of natural resources seriously affect many components of associated biodiversity (e.g. many plant species and fungi), while pollution and invasive alien species are recorded to have a negative effect on marine natural resources (SINP, 2014).

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	2	0	2

Drivers	Effect of drivers (2, 1, 0,-1, -2, NK, NA)		
Pollution and external inputs	-1	0	-1
Over-exploitation and overharvesting	-1	0	-1
Climate change	0	0	0
Natural disasters	-1	0	-1
Pests, diseases, alien invasive species	-1	0	0
Markets, trade and the private sector	1	1	1
Policies	-1	0	1
Population growth and urbanization	-1	-2	0
Changing economic, socio-political, and cultural factors	1	1	1
Advancements and innovations in science and technology	0	2	0
Other [*please specify*]:			

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.

In Croatia aquatic animals continue to form a significant proportion of the national food basket, and while a variety of social and ecological drivers are acting to reduce wild food use, their importance may be set to grow as pressures on agricultural productivity increase. The continued contribution of wild species to food and nutritional security is threatened by some of the processes that seek to increase agricultural production and enhance economic development. The decline of traditional ways of life and decreased wild food use are interlinked. Wild foods provide substantial health and economic benefits to those who depend on them. It is now clear that efforts to conserve biodiversity and preserve traditional food systems and farming practices need to be combined and enhanced.

Over 1.000 species of edible wild plants (Encyclopedia of Edible Wild Plants, Lj. Grlić, 2005) and over 100 species of edible fungi (Encyclopedia of Fungi, R. Božac, 2005) are recorded in Croatia. However, only a smaller portion of this number is regularly gathered, usually for medicinal (herbal tea) and aromatic purposes. Limited number of wild plant species is used for food and include mainly fungi, wild fruits and leafy vegetables. The list of most important wild food species is provided in Table 14.

Wild plant food is gathered for family consumption, often as a hobby, or for selling on the market. Parts of Croatia near Adriatic coast have more important tradition of wild plants gathering compared to the continental parts of the country. Most popular wild plant species are often available on fresh markets. Availability is usually very local and seasonal, for example, bilberry (Vaccinium myrtillus) in Gorski Kotar, wild asparagus (Asparagus officinalis) on northern Adriatic coast, “mišancija” (mixture of wild leafy vegetable species) in Dalmatia, truffles (Tuber sp.) in Istria etc. On the other hand, the availability of marine resources is defined mainly by the intensity of fishing (harvesting aquatic resources), which can be well managed by regulating the time period for fishing (e.g. prohibition of fishing during the hatchering).

The most important drivers affecting the availability, knowledge and diversity of wild foods during the last ten years were socio-economic ones, as well as changes in policies.

The unemployment rate has increased, leaving more people in need to supplement their income by gathering and selling wild food. This is very noticeable with fungi, where the main threat is biological resources use (more specifically, wild mushrooms gathering) – more than 50% of wild mushrooms are endangered by this threat (Tkalčec et al., 2008).

Population growth and urbanization significantly decrease direct availability of wild food to urban population. On the other hand, increased interest in wild food results in diversification of products available to urban population on the market.

Demining of areas previously inaccessible due to landmines increased availability and diversity of wild foods. The growth of tourism has also influenced wild foods. Knowledge of wild foods is often promoted along with touristic promotion. Many touristic and culinary events are regularly organized, such as Days of Wild Asparagus, Truffle Days etc. Such events target not only

foreign tourists, but also local community.

New culinary trends, as well as revival of old local recipes, and especially increased popularity of culinary programs on television and other media in recent years, led to promotion of some almost forgotten or very locally used types of wild food, for example Crithmum maritimum or Allium ursinum. Media promotion and popularity increase knowledge of wild food. On the other hand, it can lead to over-harvesting of some species or gathering by persons with insufficient knowledge (cases of poisoning with Colchicum autumnale eaten instead of bear's garlic in 2012). Special attention is given to the knowledge of wild mushrooms and training courses are organized by mushroom hunting clubs.

To prevent over-exploitation and overharvesting, collecting of wild food species is regulated by the Nature Protection Law as well as the Forest Law. Since 2013 a special licence is needed for gathering of wild food species in state forests. Private farms have to be officially registered by the Ministry of Agriculture to be allowed to gather and process wild food. Such changed policies favour conservation and diversity of wild food, but decrease availability.

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?

In Croatia there is an active participation by women, as partners, decision-makers and beneficiaries in the maintenance and use of biodiversity for food and agriculture, based on innovations in science and technology. There was no significant change in this area in the last decade.

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

The drivers that have the most significant effect on the maintenance and use of traditional knowledge relating to biodiversity for food and agriculture are over-exploitation of fish stocks in marine environment and changing economic and policies, where some of traditional fishing tools are now prohibited for use. Traditional fishing is based on long established knowledge and practices that help to ensure food security in a small local communities.
In animal production the most important initiatives are: the preservation of tradition knowledge in agriculture, increase the competitiveness, market positioning producers the use breeds with a better level of adaptability.

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

Drivers that have the most significant effect on the role of biodiversity for food and agriculture in improving food security and sustainability are advancements and innovations in science and technology. Especially advances in fish breeding and reproduction cycle, also tools for monitoring open waters and biotechnology applications.
Not applicable for forestry in Croatia. Sustainable forest management in Croatia has not been structured in a way to produce food from the forest. One possible driver could be the market demand for certain products, e.g. truffles, but the biological niche needed for truffles production is very narrow.
In animal production are: the preservation of traditional values of rural areas, increasing the competitiveness of production.

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.

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.

The basic activities are aimed of organising and coordinating the inventarisation and monitoring of the state of biodiversity. Scientific organizations collect, process and compile data on the state of aquatic nature, drafts reports, keep databases and prepare expert bases for the protection of individual components of biological and landscape diversity. In order to ensure that the compiled and organised data serve as a joint foundation for the creation, organisation and planning of nature conservation tasks, since 2004, the State Institute for Nature Protection has carried out a series of activities within its regular tasks and

international projects in order to establish a single nature protection information system. The obligation to create such a system is laid down in the Nature Protection Act (OG 80/13, Art. 196) by which "the Institute keeps and maintains Nature Protection Information System (NPIS) according to internationally accepted standards and obligations". Over the year, the State Institute for Nature Protection (From July 2015 Croatian Agency for Environment and Natural Protection) has taken over the regular maintenance of certain databases owned by the Ministry of Environmental and Nature Protection (GIS databases: Protected Areas in Croatia and the Map of Habitats in Croatia) and has coordinated the creation of several thematic databases pertaining to nature protection.

Management of Water Protected Areas may sometimes seem very simple, and sometimes truly complicated or even pointless. It is actually a complex process that, if carried out appropriately usually makes sense. To simplify – management of Protected Areas is a cyclic process for achieving set objectives through certain predefined activities. This process includes the assessment and evaluation of the area, defining management objectives and the planning of activities required for their achievement, implementation and monitoring of those activities, as well as their adaptation if necessary, after which the whole process starts again.

The strategy of protection of native and protected breeds of domestic animals implemented in the Republic of Croatia is primarily based on the in situ models for preservation. Competent authorities are involved in the protection programmes through condition inventarisation, creation of a main register and exterior, genetic and production characterization of breeding. Establishment of breeding organisations of breeders of native and protected breeds was encouraged. Some breeding organisations encourage the development of a programme of an active self-sustainable protection of native breeds, trying to come up with products on the market that would unite the uniqueness of a genotype, tradition and ecological production. The greatest part of genetic resources on the territory of the Republic of Croatia is included in certain action programmes, yet there is a small number of breeds in the monitoring process for which there are indications that they might be native breeds. By constantly monitoring trends in populations of native breeds, it is possible to notice problems on time and activate plans for crisis so they could be preserved. Action plans for crisis are periodically coordinated on a national level, taking into account global events and recommendations (diseases, loss of breeding interests, etc.). Establishing and including the gene bank into the existing and new programmed for preservation of the native and protected breeds of domestic animals has a great significance in the sustainability of the total genetic resources in the republic of Croatia. Development of a programme for economic utilization and competitiveness of native breeds is one of basic assumptions of their long-term sustainability. Finding and establishing models for better competitiveness makes the programme less dependent on incentives. One of the strategic guidelines of the Programme for the protection of native and protected breeds is to develop cooperation on a regional level through the exchange of experiences and genetic materials in the framework of programme for preservation of native breeds. By exchanging genetic materials, especially for the critically endangered populations, it is easier to maintain genetic diversity.

Significance in the sustainability of the total genetic resources in the Republic of Croatia . Development of a programme for economic utilization and competitiveness of native breeds is one of basic assumptions of their long-term sustainability. Finding and establishing models for better competitiveness makes the programme less dependent on incentives. One of the strategic guidelines of the Programme for the protection of native and protected breeds is to develop cooperation on a regional level through the exchange of experiences and genetic materials in the framework of programme for preservation of native breeds. By exchanging genetic materials, especially for the critically endangered populations, it is easier to maintain genetic diversity.

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: Temperate	1	1	1	1
Livestock grassland-based systems: Boreal and /or highlands	1	1	1	1

Livestock landless systems: Temperate	-1	-1	-1	-1
Naturally regenerated forests: Temperate	NK	NK	0	0
Planted forests: Temperate	NK	NK	0	0
Fed aquaculture: Temperate	??			
Non-fed aquaculture: Temperate				
Irrigated crops (other) : Temperate	0	0	NK	0
Rainfed crops : Temperate	0	0	NK	0
Rainfed crops : Boreal and /or highlands	0	0	NK	0
Mixed systems (livestock, crop, forest and /or aquatic and fisheries): Temperate	0	0	NK	0
Mixed systems (livestock, crop, forest and /or aquatic and fisheries): Boreal and /or highlands	??			

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.

Agricultural use of land, water, plants and other resources is a dynamic process affected by numerous economic, social, biological and other factors. In such dynamic process, it can be supposed that changes in components of associated biodiversity for different production systems in Croatia are constant. Because of a number of various factors affecting these changes, long-term effects which are hard to measure and scattered scientific data focused on specific topics, it is difficult to evaluate trends in components of the associated biodiversity in Croatia. Only general remarks can be given, based on overall valuation.

Trends regarding microorganisms, invertebrates and plants within different production systems in Croatia are considered to be stable.

Population of brown bear (Ursus arctos) in Croatia has increased in the last 10 years, mainly due to legislative protection. The same can be said for beaver (Castor fiber), the species that has been reintroduced in Croatia nearly 20 years ago. In that time, the beaver has spread across the whole continental part of Croatia and, since there is a closed season for beaver the entire year, the population has increased.

As for wolf (Canis lupus) and Eurasian lynx (Lynx lynx), although these species are strictly protected under the Nature Protection Law, the legislative protection has not led to population increase. During the last 9 years, the wolf population has slightly decreased (stabile and increasing from 2005 to 2010, since 2011 to 2013 decreasing) (SINP, 2013a) The report on the status of Eurasian lynx population in 2011 and 2012, points to the renewed threat of extinction of this species so it was included among critically endangered species (CR) in Croatian Red List (SINP, 2013b).

In Croatia legal framework is very well organized and a good relationship with industry exists. In fish production good and skilled personnel is engaged. During the last 10 years a cooperation with EU become much more interconnected to regional and other international bodies. Long term aquatic production experience has resulted in development of strategically documents and well experience in aquaculture planning.

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: Temperate	1	0	1	0	1	0	1	1	0
Livestock grassland-based systems: Boreal and /or highlands	1	0	1	0	1	0	1	1	1
Livestock landless systems: Temperate	1	1	0	1	-1	1	-1	-1	0
Naturally regenerated forests: Temperate	0	0	0	0	0	0	1	1	0
Planted forests: Temperate	0	0	0	0	0	0	0	0	0
Fed aquaculture: Temperate	??								
Non-fed aquaculture: Temperate									
Irrigated crops (other) : Temperate		0							
Rainfed crops : Temperate		0							
Rainfed crops : Boreal and /or highlands		0							
Mixed systems (livestock, crop, forest and /or aquatic and fisheries): Temperate	1	1	0	1	1	0	1	0	1
Mixed systems (livestock, crop, forest and /or aquatic and fisheries): Boreal and /or highlands		0							

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.

Trends in pest and disease regulation in different production systems in Croatia are considered to be stable during the last 10 years. Ecosystem services enrich human life by making it possible for humans to live. There are broad categories of ecosystem services, they include: provisioning, which are products that are obtained from the aquatic ecosystem, they include things such as aquatic food and water production; regulating, such as climate regulation; supporting, which are services that are needed for the success of all other ecosystem services, this would be something such as soil formation and water cycling; and cultural services, these are services that are non-material but provide benefits to people, such as, recreation enhancement. The services that ecosystems provide for us are vital to our being, but their importance is often overlooked. Diverse food chains as well as aquatic habitats are other examples of a regulating service; these are so important because we are all a part of the wood web, and the disturbance of a food chain could have negative aspect on our own species. Aquatic habitats are so important because they also “cleanse” the water and reduce toxins; this allows better access to clean drinking water, as well as healthier aquatic species. On a very broad scale, climate is regulated by ecosystems. Because of regulatory systems such as soil organisms, land cover, and phytoplankton, the climate of the entire earth is stabilized. Due to rural depopulation and natural succession on abandoned agricultural land, area of forests increased (FAO FRA), thus production of oxygen and provision of habitat increased. In regards on genetic resources we don't have clear indicators of their effect on the environment. But in areas where those animals are present, smaller level of succession habitats is present.

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: Temperate	Changes in animal genetic resources	1	0	1	1	1	0	0	1	0
	Changes in crop genetic resources		NK							
	Changes in forest genetic resources		NK							
	Changes in aquatic genetic resources		NK							
	Changes in micro-organism genetic resources (associated biodiversity)		NK							
	Changes in invertebrates genetic resources (associated biodiversity)		NK							
	Changes in vertebrates genetic resources (associated biodiversity)		NK							
	Changes in plants genetic resources (associated biodiversity)		NK							
Livestock grassland-based systems: Boreal and /or highlands	Changes in animal genetic resources	1	0	1	1	1	0	0	1	0
	Changes in crop genetic resources		NK							
	Changes in forest genetic resources		NK							
	Changes in aquatic genetic resources		NK							
	Changes in invertebrates genetic resources (associated biodiversity)		NK							
	Changes in vertebrates genetic resources (associated biodiversity)		NK							
	Changes in plants genetic resources (associated biodiversity)		NK							
	Changes in plants genetic resources (associated biodiversity)		NK							

Livestock landless systems: Temperate	Changes in animal genetic resources	0	1	-1	1	-1	-1	-1	-1	0
	Changes in crop genetic resources		NK							
	Changes in forest genetic resources		NK							
	Changes in aquatic genetic resources		NK							
	Changes in micro-organism genetic resources (associated biodiversity)		NK							
	Changes in invertebrates genetic resources (associated biodiversity)		NK							
	Changes in vertebrates genetic resources (associated biodiversity)		NK							
	Changes in plants genetic resources (associated biodiversity)		NK							
Naturally regenerated forests: Temperate	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	NK	NK	NK	NK	NK	NK	NK	NK	NK
	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
Planted forests: Temperate	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	NK	NK	NK	NK	NK	NK	NK	NK	NK
	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
Fed aquaculture: Temperate	Changes in animal genetic resources		NK							
	Changes in crop genetic resources		NK							
	Changes in forest genetic resources		NK							
	Changes in aquatic genetic resources		NK							
	Changes in micro-organism genetic resources (associated biodiversity)		NK							

	Changes in invertebrates genetic resources (associated biodiversity)		NK							
	Changes in vertebrates genetic resources (associated biodiversity)		NK							
	Changes in plants genetic resources (associated biodiversity)		NK							
Non-fed aquaculture: Temperate	Changes in animal genetic resources									
	Changes in crop genetic resources									
	Changes in forest genetic resources									
	Changes in aquatic genetic resources									
	Changes in micro-organism genetic resources (associated biodiversity)									
	Changes in invertebrates genetic resources (associated biodiversity)									
	Changes in vertebrates genetic resources (associated biodiversity)									
	Changes in plants genetic resources (associated biodiversity)									
Irrigated crops (other) : Temperate	Changes in animal genetic resources		NK							
	Changes in crop genetic resources		NK							
	Changes in forest genetic resources		NK							
	Changes in aquatic genetic resources		NK							
	Changes in micro-organism genetic resources (associated biodiversity)		NK							
	Changes in invertebrates genetic resources (associated biodiversity)		NK							
	Changes in vertebrates genetic resources (associated biodiversity)		NK							
	Changes in plants genetic resources (associated biodiversity)		NK							
Rainfed crops : Temperate	Changes in animal genetic resources		NK							
	Changes in crop genetic resources		NK							
	Changes in forest genetic resources		NK							
	Changes in aquatic genetic resources		NK							
	Changes in micro-organism genetic resources (associated biodiversity)		NK							
	Changes in invertebrates genetic resources (associated biodiversity)		NK							
	Changes in vertebrates genetic resources (associated biodiversity)		NK							
	Changes in plants genetic resources (associated biodiversity)		NK							
Rainfed crops : Boreal and /or highlands	Changes in animal genetic resources		NK							

	Changes in crop genetic resources		NK							
	Changes in forest genetic resources		NK							
	Changes in aquatic genetic resources		NK							
	Changes in micro-organism genetic resources (associated biodiversity)		NK							
	Changes in invertebrates genetic resources (associated biodiversity)		NK							
	Changes in vertebrates genetic resources (associated biodiversity)		NK							
	Changes in plants genetic resources (associated biodiversity)		NK							
Mixed systems (livestock, crop, forest and /or aquatic and fisheries): Temperate	Changes in animal genetic resources	1	0	0	0	1	1	0	0	0
	Changes in crop genetic resources		NK							
	Changes in forest genetic resources		NK							
	Changes in aquatic genetic resources		NK							
	Changes in micro-organism genetic resources (associated biodiversity)		NK							
	Changes in invertebrates genetic resources (associated biodiversity)		NK							
	Changes in vertebrates genetic resources (associated biodiversity)		NK							
	Changes in plants genetic resources (associated biodiversity)		NK							
Mixed systems (livestock, crop, forest and /or aquatic and fisheries): Boreal and /or highlands	Changes in animal genetic resources		NK							
	Changes in crop genetic resources		NK							
	Changes in forest genetic resources		NK							
	Changes in aquatic genetic resources		NK							
	Changes in micro-organism genetic resources (associated biodiversity)		NK							
	Changes in invertebrates genetic resources (associated biodiversity)		NK							
	Changes in vertebrates genetic resources (associated biodiversity)		NK							
	Changes in plants genetic resources (associated biodiversity)		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.

There is no evidence that the eventual changes in pest and disease regulation have impacted ecosystem services in different production systems in Croatia.
Aquacultures as monocultures have been developed in the last decades, from keeping fish in ponds for easier harvesting to

high technological fish farms extensively using feed, hormones and often antibiotics with a known impact on the environment. To achieve sustainability, it is necessary to intensify the production using technologies such as water recirculation systems and proper treatment to optimize this valuable resource. Further, is it important to reduce the pressure on the coastlines and produce large amounts of fish also in inland aquaculture systems close to consumers. Pollution generated by aquaculture, nitrogen and phosphorus are considered as waste components of fish farming, causing serious environmental problems. In addition, several fish excrete nitrogenous waste products by diffusion and ion exchange through the gills, urine and feces. Decomposition and reuse of these nitrogenous compounds is especially important in aquaculture using recirculation systems due to the toxicity of ammonia and nitrite and the chance of hypertrophication of the environment by nitrate.

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**
Pollination				
Pest and disease regulation	Aphidius rhopalosiphi Typhlodromus pyri	Fed aquaculture: Temperate Irrigated crops (other): Temperate Rainfed crops: Temperate		
Water purification and waste treatment				
Natural hazard regulation				
Nutrient cycling				
Soil formation and protection				
Water cycling				
Habitat provisioning				
Production of oxygen/ Gas regulation				
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.

Some activities on monitoring of natural enemies (insects and mites) are conducted in Reporting and Early Warning System in Agriculture (“IPP”) established in Croatia. However, this type of monitoring is not systematic.

All freshwater monitoring is done by scientific organizations from Croatia, but there is considerable diversity in the intensity of monitoring, the variables which are covered, the protocols used.

The methodology basically consists of four separate parts, covering the three broad zones of river environments (river channel, banks/riparian zone and floodplain):
1. General data about the survey unit and survey site;

2. Hydrological regime assessment;
3. Longitudinal connectivity affected by artificial structures;
4. Morphology, incl. channel geometry, substrates, channel vegetation and organic debris, erosion/deposition character, bank structure and modifications, vegetation type/structure on banks and adjacent land, land-use and associated features and channel-floodplain interactions.

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

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

Add row
Delete row

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	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

Add row

Delete row

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.

There are numerous examples that illustrate the good use of traditional knowledge in developing cost-effective and sustainable strategies to enhance poverty alleviation and income generation, in Croatia. Indigenous knowledge principles can be used to promote environmentally friendly aquaculture practices in small family fish ponds. Traditional knowledge of associated biodiversity has not been used to inform conservation and use decisions in Croatia.

Traditional technologies and products represent an important potential for development of the animal production sector in Croatia. To a significant extent, sheep production relies on traditional technologies in the production of meat and milk, as well as recognisable traditional products. For instance, Pag Island cheese and Pag Island lamb meat produced on Pag Island are traditional products, valued and in demand both on the domestic and the international markets. Their certification as food products is pending, and the goal is to acquire for those products the geographical origin label. In cattle production, the procedure to ratify the origin of the beef from Istrian cattle is pending, with the aim of earning the Protected Designation of Origin status for those food products. There is awareness of the need to design a baby beef brand, which has been produced in the Pannonian region of Croatia for over half a century, using technology based on an increased share of energy from corn grain in the ration. That is why such beef is recognisable and highly appreciated for its bright pink colour, juiciness and tenderness, and small quantities of such meat are already exported to neighbouring markets.

Many components of associated biodiversity are very dependent on traditional agriculture practices, therefore it is essential to maintain traditional knowledge. That is why the nature protection sector is implementing traditional agriculture practices activities in management and action plans for Public Institutions for Management of Protected Areas as well as species management plans (such as specific mowing practices), where it is appropriate. Also, when Croatian Rural Development Programme is adopted, it will ensure payments for conservation of biodiversity for eligible beneficiaries.

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.

In Croatia there is an equal gender engagement in the maintenance of and knowledge about associated biodiversity, this includes maintaining particular resources, monitoring their state, overseeing their management at different stages of production or ecosystem management.

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
Medvjeđi luk	Allium ursinum	Forests	NK		Encyclopedia of Edible Wild Plants, Lj. Grlić, 2005 (Grlić, 2005)
Maginja	Arbutus unedo	Adriatic Coast, islands	NK		Grlić, 2005
Primorska šparoga	Asparagus acutifolius	Adriatic Coast, shrubs	NK		Grlić, 2005
Divlja šparoga	Asparagus officinalis	Riverside, sandy soil	NK		Grlić, 2005
Mekolisna šparoga	Asparagus tenuifolius	Forest	NK		Flora Croatica Database, 2014, http:// hirc.botanic.hr/ fcd/ (FCD, 2014)
Kapari	Capparis spinosa	Adriatic Coast, islands	NK		Grlić, 2005
Pitomi kesten	Castanea sativa	Forests	NK		FCD, 2014
Rogač	Ceratonia siliqua	Adriatic Coast, islands	NK		Grlić, 2005
Drijenak	Cornus mas	Forests, calcareous soil	NK		Grlić, 2005
Lijeska	Coryllus avelana	Forests			FCD, 2014
Motar	Crithmum maritimum	Seashore	NK		Grlić, 2005
Komorač	Foeniculum vulgare	Karst, maquis	NK		Grlić, 2005
Šumska jagoda	Fragaria vesca	Forests	NK		Grlić, 2005
Orah	Juglans sp.	Forests			FCD, 2014
Borovica	Juniperus communis	Forests, rocky soil	NK		FCD, 2014
Šmrika	Juniperus oxycedrus	Forests, rocky soil	NK		FCD, 2014

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
Divlja jabuka	Malus sylvestris	Forests			FCD, 2014
Pinija	Pinus pinea	Forests			FCD, 2014
Tušt	Portulaca oleracea	Raodside, gravel soil	NK		Grlić, 2005
Divlja trešnja	Prunus avium	Forests			FCD, 2014
Trnina	Prunus spinosa	Forest margins, riverside	NK		Grlić, 2005
Divlja kruška	Pyrus pyraster	Forests			FCD, 2014
Divlja ruža	Rosa canina	Forest margins	NK		Grlić, 2005
Ostruga	Rubus caesius	Forests, cleared land, roadside	NK		Grlić, 2005
Kupina	Rubus fruticosus	Forests, cleared land, roadside	NK		Grlić, 2005
Bazga	Sambucus nigra	Forests, roadside	NK		Grlić, 2005
Mukinja	Sorbus aria	Forests, calcareous soil	NK		Grlić, 2005
Jarebika	Sorbus aucuparia	Forests, rocky soil	NK		Grlić, 2005
Oskoruša	Sorbus domestica	Forests, calcareous soil	NK		Grlić, 2005
Bljušt	Tamus communis	Forests	NK		Grlić, 2005
Maslačak	Taraxacum officinale	Meadows, roadside	NK		Grlić, 2005
Vodeni orašac	Trapa natans	Marsh, shallow lakes	NK		Grlić, 2005
Kopriva	Urtica dioica	Field, forest, roadside	NK		Grlić, 2005
Borovnica	Vaccinium myrtillus	Forests	NK		Grlić, 2005
Brusnica	Vaccinium vitis - idaea	Forests			FCD, 2014
Puze	Armillaria borealis, A. cepistiped, A.galica, A.mellea, A. ostoaye	Forests	NK		The report on the state of nature of Republic of Croatia for the period 2008-2012, State Institute for Nature Protection, 2014 (SINP, 2014)
Pravi vrganj	Boletus aerus, B. edulis, B. pinophilus, B. reticulatus	Forests	NK		SINP, 2014

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
Obična lisičica	Cantharellus cibarius	Forests	NK		SINP, 2014
Mrka trubača	Craterellus cornucopioides	Forests	NK		SINP, 2014
Prosenjaci	Hydnum repandum, H. rufescens	Forests	NK		SINP, 2014
Rujnice	Lactarius deliciosus, L. deterrimus, L. hemicyaneus, L. quieticolor, L. salmonicolor, L. sanguifluus, L. semisanguifluus	Forests	NK		SINP, 2014
Veliki bijeli tartufi	Tuber asa, T. borchii, T. maculatum, T. magnatum	Forests	NK		SINP, 2014
Crni tartuf	Tuber aestivum, T.brumale, T.hiemalbum, T. mesentericum, T.macrosporum, T.malenconii, T.melanosporum, T. uncinatum	Forests	NK		SINP, 2014
Smokvenjak	Cantareus apertus	Forests, Crops	NK		SINP, 2014
Obični smeđi hrapavac	Cornu aspersum aspersum	Forests, Crops	NK		SINP, 2014
Obični poljar	Helix cincta cincta	Forests, Crops	NK		SINP, 2014
Dugonac	Helix lucorum	Forests, Crops	NK		SINP, 2014
Vinogradnjak	Helix pomatia	Forests, Crops	NK		SINP, 2014
Brdar	Helix secernenda	Forests, Crops	NK		SINP, 2014
Mediteranska pužica	Eobania vermiculata	Forests, Crops F3, F7, C7, M3	NK		SINP, 2014

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
Bukva	Boops boops	Adriatic Sea	-1		First releases "Seawater Fisheries" for 2003-2012 (no. 1.4.1.), Croatian Bureau of Statistics, 2013 (CBS, 2013) Preliminary assessment of the status and pressures of marine environment of Croatian part of the Adriatic Sea. Institute of Oceanography and Fisheries, 2012 (IOF, 2012)
Ugor	Conger conger	Adriatic Sea	NK		CBS, 2013; IOF, 2012
Lubin	Dicentrarchus labrax	Adriatic Sea	NK		CBS, 2013; IOF, 2012
Muzgavac	Eledone moschata	Adriatic Sea	-1		CBS, 2013; IOF, 2012
Bijeli muzgavac	Eledone cirrhosa	Adriatic Sea	-1		CBS, 2013; IOF, 2012
Kirnja	Epinephelus marginatus	Adriatic Sea	NK		CBS, 2013; IOF, 2012
Veliki morski crv	Eunice gigantea	Adriatic Sea	NK		CBS, 2013; IOF, 2012; SINP, 2014
Inćun	Engraulis encrasicolus	Adriatic Sea	1		CBS, 2013; IOF, 2012
Lignja	Loligo vulgaris	Adriatic Sea	NK		CBS, 2013; IOF, 2012
Oslić	Merluccius merluccius	Adriatic Sea	NK		CBS, 2013; IOF, 2012
Cipal glavaš	Mugil cephalus	Adriatic Sea	NK		CBS, 2013; IOF, 2012
Trlja blatarica	Mullus barbatus	Adriatic Sea	0		CBS, 2013; IOF, 2012
Trlja kamenjarka	Mullus surmuletus	Adriatic Sea	NK		CBS, 2013; IOF, 2012
Pas mekaš	Mustelus asterias	Adriatic Sea	NK		CBS, 2013; IOF, 2012
Dagnja	Mytilus galloprovincialis	Adriatic Sea	NK		CBS, 2013; IOF, 2012
Škamp	Nephrops norvegicus	Adriatic Sea	-2		CBS, 2013; IOF, 2012

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
Kamenica	Ostrea edulis	Adriatic Sea	NK		CBS, 2013; IOF, 2012
Hobotnica	Octopus vulgaris	Adriatic Sea	NK		CBS, 2013; IOF, 2012
Arbun	Pagellus erythrinus	Adriatic Sea	0		CBS, 2013; IOF, 2012
Pagar	Pagrus pagrus	Adriatic Sea	0		CBS, 2013; IOF, 2012
Jastog	Palinurus elephas	Adriatic Sea	NK		CBS, 2013; IOF, 2012
Srdela	Sardina pilchardus	Adriatic Sea	1		CBS, 2013; IOF, 2012
Sipa	Sepia officinalis	Adriatic Sea	NK		CBS, 2013; IOF, 2012
List	Solea solea	Adriatic Sea	NK		CBS, 2013; IOF, 2012
Komarča	Sparus aurata	Adriatic Sea	NK		CBS, 2013; IOF, 2012
Gira oblica	Spicara smaris	Adriatic Sea	NK		CBS, 2013; IOF, 2012
Tuna	Thunnus thynnus	Adriatic Sea	NK		CBS, 2013; IOF, 2012
Deverika	Abramis brama		0		
Bolen	Aspius aspius		0		
Šaran	Cyprinus carpio				
Jez	Leuciscus idus		1		
Potočna pastrva	Salmo trutta				
Smuđ	Sander lucioperca		-1		

Add row

Delete row

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
Castanea sativa	Vulnerable (VU)	Cryphonectria parasitica	
Epinephelus marginatus	Endangered (EN)	Spear fishing, longline fishing, gillnets, habitat degradation caused by fishing	Jardas, I., Pallaoro, A., Vrgoč, N., Jukić-Peladić (2008): Red book of saltwater fish. Ministry of Culture and State Institute for Nature Protection, Zagreb
Mugil cephalus	Vulnerable (VU)	Overfishing in estuaries and coastal lagoons during their migrations from rivers to sea, pollution	Jardas, I., Pallaoro, A., Vrgoč, N., Jukić-Peladić (2008): Red book of saltwater fish. Ministry of Culture and State Institute for Nature Protection, Zagreb
Mustelus asterias	Vulnerable (VU)	Overfishing caused by bottom trawl and longlines, as target species or bycatch species, habitat degradation caused by fishing, pollution	Jardas, I., Pallaoro, A., Vrgoč, N., Jukić-Peladić (2008): Red book of saltwater fish. Ministry of Culture and State Institute for Nature Protection, Zagreb
Pagrus pargus	Vulnerable (VU)	Commercial fishing, sports and recreational fishing, coastal fishing tools, habitat degradation	Jardas, I., Pallaoro, A., Vrgoč, N., Jukić-Peladić (2008): Red book of saltwater fish. Ministry of Culture and State Institute for Nature Protection, Zagreb
Aspius aspius	Vulnerable (VU)	Overfishing, prey reduction, river pollution, water stream regulation, alien species introduction	Mrakovčić, M., Brigić, A., Buj, I., Ćaleta, M., Mustafić, P., Zanella, D. (2006): Red book of freshwater fish. Ministry of Culture and State Institute for Nature Protection, Zagreb
Leuciscus idus	Vulnerable (VU)	Water stream regulation and pollution, river barriers	Mrakovčić, M., Brigić, A., Buj, I., Ćaleta, M., Mustafić, P., Zanella, D. (2006): Red book of freshwater fish. Ministry of Culture and State Institute for Nature Protection, Zagreb

Add row

Delete row

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.

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
Allium ursinum	small	live specimens and seed collections		Botanical garden (active management)
Arbutus unedo	1 live specimen	live specimen (outdoor)		Botanical garden (active management)
Ceratonia siliqua		seed collection		Botanical garden (active management)
Cornus mas	small	live specimens and seed collections		Botanical garden (active management)
Crithmum maritimum	small	live specimens and seed collections		Botanical garden (active management)
Foeniculum vulgare	small	live specimens and seed collections		Botanical garden (active management)
Fragaria vesca	small	live specimens and seed collections		Botanical garden (active management)
Pinus pinea	1 live specimen	live specimen (outdoor)		Botanical garden (active management)
Portulaca oleracea	1 live specimen	live specimen (outdoor)		Botanical garden (active management)
Prunus avium	3 ha	Clonal seed orchard	Enrichment of forest stands, gene conservation	Active management for seed production
Rosa canina	small	live specimens and seed collections		Botanical garden (active management)
Rumex acetosa	small	live specimens and seed collections		Botanical garden (active management)
Sambucus nigra	small	seed collection		Botanical garden (active management)
Sorbus aria	small	live specimens and seed collections		Botanical garden (active management)
Sorbus domestica	small	live specimens and seed collections		Botanical garden (active management)
Tamus communis	small	live specimens and seed collections		Botanical garden (active management)

Wild food species conserved (scientific name)	Size of collection (number of accessions and quantities)	Conservation conditions	Objective(s)	Characterization and evaluation status
Taraxacum officinale	small	live specimens and seed collections		Botanical garden (active management)
Trapa natans	small	live specimens and seed collections		Botanical garden (active management)
Urtica dioica	small	live specimens (outdoor)		Botanical garden (active management)

Add row

Delete row

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
Pinus pinea	Forst Administaration Split: Bašćanski gaj and Kuna	31,5 ha	Basic material for forestry, gene conservation	Active management for seed production
Pyrus pyraster	Forest Administarstion Koprivnica: repaš – Gabajeva greda	11,76 ha	Basic material for forestry, gene conservation	Active management for seed production
Malus sylvestris	Forest Administarstion Koprivnica: repaš – Gabajeva greda	11,76 ha	Basic material for forestry, gene conservation	Active management for seed production

Add row

Delete row

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?

The heart of the summer there are a lot entertainment and cultural offer consists of events – such as „Fishermen's Night“ in late July in Tribunj, intended to promote the Mediterranean fisherman's lifestyle. In small Adriatic town Fažana takes place recognized artistic manifestations Park of sardines, also School of salting sardines and Sardines party. This manifestations and many others all over Croatia by popular food and fun approaching old traditional skills and customs to modern people.

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.

In forestry, there is no relation between gender dimensions with respect to the maintenance of and knowledge about wild food species.

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)
Flood	Crop production, livestock production, fruit and vegetable production, fed aquaculture	-1	-1
Draught	Crop production, fruit and vegetable	-2	-1
Ice-breaks	Forests	0	-1
Storm	Mariculture	0	-1

Add row

Delete row

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.

In 2008 and 2012 storms have ruined several cages in tuna fish farms.

In Croatia in 2012 we had natural disaster such as draught and flood. Draught was present in 15 of 21 counties and caused damages more than 300 mil. euros. Only three counties were affected by flood and the damage amount was about 10 mil euros. In 2014 we had significant flood damages in most counties of Croatia, but these data are not available yet.

Natural disasters in winter 2013/2014 (ice-breaks, torrents, floods) that affected five Croatian counties caused significant damage on forest stands and forest infrastructure. forests of Primorsko-goranska County are the most affected by the overall damage caused by ice-storm. Major damages occurred both on the forest and on forest roads. Ice-storm also caused serious damages on forests and on forest roads in Ličko-senjska County and Karlovačka County, while floods and torrents caused damages on forest roads in Zagrebačka County, Sisačko-moslavačka County and Karlovačka County. Money-wise, the total forest damage amounts 942 252 183 €. Furthermore, these natural catastrophes have also significantly violated forest ecosystem services.

EU directives emphasize the importance of an integrated approach to managing waters. Although the rivers Sava, Drava and Danube are part of which flows through Croatia among the best preserved in Europe, and the solution of Srednje Posavlje is world-famous example of the successful use of natural retention, Croatian water management and nature conservation must establish even better cooperation. It should be focus on preserving natural areas along rivers and their extension merging separate sleeves and defensive lapses buildings. Natural ecosystems diversity of habitats, provide mitigation extreme meteorological and hydrological events. Preserved wet meadows and pastures along the river, are extremely important for biodiversity. Their overgrowth due disappearance of extensive livestock production, reduces bandwidth space along the river and jeopardize the effectiveness and safety of the dam.

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.

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.**

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)
Abutilon theophrasti	C11	-2	-1
Ailanthus altissima	L3	-1	-1
Amaranthus retroflexus	C11	-1	NK
Ambrosia artemisiifolia	C11	-1	-2
Amorpha fruticosa	L3, F3, F7	-2	1
Asclepias syriaca	C11, L3	-1	NK
Conyza canadensis	C11	-1	NK
Datura stramonium	C11	-1	-1
Echinocystis lobata	F3, F7 (forest margins)	-1	NK
Erigeron annuus	C11	-1	NK
Galinsoga parviflora	C11	-1	NK
Helianthus tuberosus	C11, F3, F7 (forest margins)	-1	NK
Impatiens glandulifera	F3, F7 (forest margins)	-1	NK
Oenothera biennis		-1	NK
Reynoutria japonica	F3, F7 (forest margins)	-1	NK
Robinia pseudoacacia	F3, F7	0	1
Solidago gigantea	C11 (field margins, neglected fields)	-1	1
Sorghum halepense	C11	-1	-1
Xanthium strumarium ssp. italicum	C11	-1	-1
Oncorhynchus mykiss	A11	-1	0

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)
Salmo trutta (At1)	A11	-1	-2
Cyprinus carpio	A11	-1	-2
Cerassius gibelio	A11	-1	-1
Bactrocera oleae	C11	NK	NK
Bemisia tabaci	C11	NK	NK
Cacopsylla fulguralis	C11	NK	NK
Ceratitis capitata	C11	NK	NK
Harmonia axyridis	C7, C11	-1	NK
Liriomyza huidobrensis	C11	NK	NK
Parectopa robiniella	C11	NK	NK
Phyllonorycter robiniella	C11	NK	NK
Rhagoletis cingulata	C11	NK	NK

Add row

Delete row

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.

According to Flora Croatica Database (2014, http://hirc.botanic.hr/fcd/) 613 alien plant species are recorded in Croatia, out of which 74 are considered invasive. There has not been much research on IASs in Croatia and so far only a preliminary check–list of invasive alien plant species exist (Boršić et al., 2008).

However, the most important plant IASs have been thoroughly investigated, especially species important as noxious weeds in agricultural crops. Some of those species have been major noxious weeds for decades, while some have become problem relatively recently. For example, A. theophrasti was first recorded as weed in eastern part of Croatia in 1980's. For the last 10-15 years it has been spreading very fast and today is one of the most aggressive weeds of row crops and vegetables in the whole continental part of Croatia, with sporadic records on the Adriatic coast as well. In addition to being a major noxious weed, A. artemisiifolia is allergenic plant which has recently became a serious public health problem, especially in the continental part of Croatia. S. gigantea grows in different habitats, but is very common on neglected and abandoned agricultural soils. Increased incidence of noxious weeds in the fields requires increased use of herbicides, which influence other components of biodiversity and pollute soil and water.

Very aggressive spreading of A. fruticosa has been recorded in some parts of Croatia, especially in the region of Novska-Jasenovac, where hundreds of hectares are covered by monoculture of this species. A. fruticosa is extremely dangerous because it supresses development of native forest species and destroys lowland pastures. Spreading of A. fruticosa was favoured by change in agricultural practises and decreasing number of grazing cattle on the pastures.

On the forest margins spreading of IASs such as H. tuberosus, I. glandulifera, E. lobata and R. japonica often prevents development of young native forest plants. R. pseudoacacia is alien species which is commonly grown in continental part of Croatia for timber and firewood, but if unchecked it easily becomes invasive and supresses native species.

Unlike other mentioned IASs, which are more important in the continental part of Croatia, A. altissima is very aggressive in costal part and on islands, due to its resistance to drought and high temperatures, as well as its ability to thrive on stony soil. A. altissima releases allelopathic chemicals which suppress growth of native plants. In addition, it contains poisonous chemicals that cause contact dermatitis in sheep, the most important farm animals on the Adriatic coast and islands. Island of Cres is the most seriously affected.

In contrast to their detrimental impact on biodiversity, some IASs are nectar and pollen rich plants and are very important for honey production (especially R. pseudoacacia, A. fruticosa and S. gigantea). The negative impact of recently identified H. axyridis in Croatia has not been scientifically evaluated yet.

Regulations concerning stocking and exploitation of populations exist, but are not at genetic conservation level. So it is necessary to undertake all precautionary measures to avoid introduction of brown trout of any non-indigenous haplotype brown trout in rivers with endemic trouts. Also there is a big problem with hatchery populations of common carp, and common carp translocation (feral or hatchery populations) in their non-native area. It is important to inform both official management agencies and fishermen about the value and the conservation needs of the native haplotypes and native species, so that future management take into consideration the genetic population structure.

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.

Attempts have been made to control the spreading of Amorpha fruticosa, especially in the Lonjsko polje Nature Park, as well as in protected landscape Gajna near Slavonski Brod, through re-establishment of traditional ways of livestock farming. Grazing by cattle has proved to be effective, although on limited area. Unfortunately, this species has massively spread throughout the country so that it is nearly impossible to extinct it. For alien invasive insects, it can be supposed that natural fauna can have an impact in their regulation. For the alien invasive plants, it can be supposed that naturally present invertebrates and pathogenic microorganisms can contribute to their control. For pests of agricultural crops and weeds in agriculture, specific studies conducted in Croatia are lacking. Pumpkinseed sunfish, rainbow trout, black bullhead and Gambusia affinis from North America, and crucian carp, grass carp, white and silver carp from Asia are some of the 22 so far recorded by the freshwater fish species in inland waters of Croatia. There are two main categories of entries of those species, intentional and unintentional introduction. Deliberate introduction is carried out for the purpose of stocking species attractive for fishing, and of course it can be legally or illegally. In addition, the deliberate introduction may be in order biocontrol of other types. The second category is unintentional or accidental intake, and as a consequence of human activities. In this way, entered the goby and Kesler goby. These three types of Ponto-Caspian gobies sticky eggs are laid on the hull of ships, which were also extended from the Black Sea Danube River upstream. The accident alien species are one of those who have to cross the barrier between the two river left to take advantage of artificially constructed canals or tunnels to transport water. Some species are spread by chance as was mentioned among the younger types with which ranched. It should also be pointed out instances where the species under controlled conditions entered in Croatia, for aquaculture and aquarium, and then they accidentally escaped or illegally released into nature.
Among the many foreign species adversely affect the ecological systems in which they are incorporated and are therefore considered invasive. As a clear example of the negative impact of entry by invasive fish species on native fish fauna of Croatia is often cited intake of rainbow trout in the river Ljuta in Konavle.

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.

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?**

Development of a programme for economic utilization and competitiveness of autochthonous breeds is one of basic assumptions of their long-term sustainability. Finding and establishing models for better competitiveness makes the programme less dependent on incentives. One of the strategic guidelines of the Programme for the protection of native and protected breeds is to develop cooperation on a regional level through the exchange of experiences and genetic materials in the framework of programme for preservation of native breeds. By exchanging genetic materials, especially for the critically endangered populations, it is easier to maintain genetic diversity.
The biggest problem regarding the state and trends of associated biodiversity and ecosystem services is the lack of data about many associated biodiversity species, without which it is not possible to properly evaluate the state of those species. After data gathering, it is essential to establish monitoring in order to evaluate trends of the species. Although Croatia is making an effort to protect its biodiversity, only with data collecting can the conservation be adequate. Since there are over 40.000 wild species in Croatia (although not as many for food and agriculture), it is necessary to have a large number of experts, scientists and researchers to gather species and ecosystem data. Croatia has many of them, but not enough to cover the extent of work needed.

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?**

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?

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?**

Invasive alien species have had a negative impact on ecosystem services, which is reflected in damage caused to agriculture, fisheries, forestry and the like.

There is a tendency towards the settlement of new invasive alien species and the further expansion of the ones already present, which causes an increase in damages and management expenses. There is no estimate of the total extent of financial damage to Croatia, but individual cases have been shown to have created a substantial financial burden. The Analysis of the 2008 – 2012 State of the Environment in Croatia indicated that amphibians, freshwater fish, reptiles, sea fish and dragonflies are threatened the most by invasive alien species, whose number was on the rise.

A 2013 survey showed that the public is insufficiently informed and educated about invasive alien species, and that more than 60% of the population was unfamiliar with the term. For this reason, educational campaigns were launched with the intent of raising public awareness of invasive alien species; two picture books and two posters designed for preschoolers and primary school children were handed out, along with an intended-for-all poster explaining the rules of conduct if invasive alien species

are encountered. In November of 2014, the First Croatian Symposium on Invasive Species was held, featuring Croatian scientists and experts who deal with the issue of invasive alien species. (http://www.ekolosko-drustvo.hr/IHSIV-Book-ofabstracts.pdf).

The absence of a systemic understanding of the ways by which invasive alien species spread to Croatia and the consequences thereof, and of a unified register and a prioritizing pattern of invasive alien species constitutes an obstacle to an effective management the problem. In addition, there are indications that the present condition will worsen unless a coordinated effort to tackle the issue at the national level is made on the part of all stakeholders, and if additional financial, human and technical resources are not allocated. Furthermore, it is necessary to establish a unified system of management for alien and invasive alien species and coordinate the inter-directorate activities within the national legislative framework, which would create a basis for participation of a range of stakeholders in the process, including state, local and regional administrations, institutes for research, experts, private entrepreneurs, non-governmental organizations and the general public. The undeveloped regional cooperation remains an additional matter for concern.

In contrast, it is encouraging that Croatia is involved in a EU project BALMAS (Ballast Water Management for Adriatic Sea Protection), the purpose of which is to establish a system for a seamless international incorporation of all Adriatic-related research and bring together the researchers and the research institutions in hope of reducing the risks involved to humans and the environment from the transfer of invasive alien species. Activities that have been undertaken thus far have served to create a framework of precautionary policies concerning future biological invasion risk management.

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: Temperate	Integrated Plant Nutrient Management (IPNM)	NK	0	1
	Integrated Pest Management (IPM)	NK	NK	NK
	Pollination management	NK	1	1
	Landscape management	NK	1	1
	Sustainable soil management practices	NK	1	0
	Conservation agriculture	NK	1	1
	Water management practices, water harvesting	NK	0	1
	Agroforestry	NK	0	0
	Organic agriculture	NK	1	1
	Low external input agriculture	NK	1	1
	Home gardens	NK	1	1
	Areas designated by virtue of production features and approaches	NK	0	0
	Ecosystem approach to capture fisheries	NK	1	1
	Conservation hatcheries	NK	1	1
	Reduced-impact logging	NK	0	0
	Other [*please specify*]:	NA		
Livestock grassland-based systems: Boreal and /or highlands	Integrated Plant Nutrient Management (IPNM)	NK	0	1
	Integrated Pest Management (IPM)	NK	0	0
	Pollination management	NK	1	1
	Landscape management	NK	1	1
	Sustainable soil management practices	NK	1	0
	Conservation agriculture	NK	1	1
	Water management practices, water harvesting	NK	0	1
	Agroforestry	NK	0	1
	Organic agriculture	NK	1	1

	Low external input agriculture	NK	1	1
	Home gardens	NK	1	1
	Areas designated by virtue of production features and approaches	NK	1	1
	Ecosystem approach to capture fisheries	NA		
	Conservation hatcheries	NK	1	1
	Reduced-impact logging	NK	1	1
	Other [*please specify*]:	NA		
Livestock landless systems: Temperate	Integrated Plant Nutrient Management (IPNM)	NK	0	-1
	Integrated Pest Management (IPM)	NK	0	-1
	Pollination management	NK	1	-1
	Landscape management	NK	0	-1
	Sustainable soil management practices	NK	0	0
	Conservation agriculture	NK	-1	--1
	Water management practices, water harvesting	NK	0	0
	Agroforestry	NK	-1	-1
	Organic agriculture	NK	-1	-1
	Low external input agriculture	NK	-1	-1
	Home gardens	NK	0	-1
	Areas designated by virtue of production features and approaches	NK	0	-1
	Ecosystem approach to capture fisheries	NA		
	Conservation hatcheries	NK	-1	-1
	Reduced-impact logging	NK	0	-1
	Other [*please specify*]:	NA		
Naturally regenerated forests: Temperate	Integrated Plant Nutrient Management (IPNM)	NA		
	Integrated Pest Management (IPM)	100%	2	0
	Pollination management	NK		
	Landscape management	NK		
	Sustainable soil management practices	100%	1	0
	Conservation agriculture	NA		
	Water management practices, water harvesting	NA		
	Agroforestry	NA		
	Organic agriculture	NA		
	Low external input agriculture	NA		

	Home gardens	NA		
	Areas designated by virtue of production features and approaches	NA		
	Ecosystem approach to capture fisheries	NA		
	Conservation hatcheries	NA		
	Reduced-impact logging	100%	2	1
	Other [*please specify*]:	NA		
Planted forests: Temperate	Integrated Plant Nutrient Management (IPNM)	NA		
	Integrated Pest Management (IPM)	100%	2	0
	Pollination management	NK		
	Landscape management	NK		
	Sustainable soil management practices	100%	1	0
	Conservation agriculture	NA		
	Water management practices, water harvesting	NA		
	Agroforestry	NA		
	Organic agriculture	NA		
	Low external input agriculture	NA		
	Home gardens	NA		
	Areas designated by virtue of production features and approaches	NA		
	Ecosystem approach to capture fisheries	NA		
	Conservation hatcheries	NA		
	Reduced-impact logging	100%	2	1
	Other [*please specify*]:	NA		
Fed aquaculture: Temperate	Integrated Plant Nutrient Management (IPNM)	NK		
	Integrated Pest Management (IPM)	NK	2	NK
	Pollination management	NA		
	Landscape management	NK		
	Sustainable soil management practices	NK		
	Conservation agriculture	NK		
	Water management practices, water harvesting	NK		
	Agroforestry	NA		
	Organic agriculture	1	0	0
	Low external input agriculture	NA		
	Home gardens	NK		
	Areas designated by virtue of production features and approaches	NK		

	Ecosystem approach to capture fisheries	1	0	0
	Conservation hatcheries	2	0	1
	Reduced-impact logging	NA		
	Other [*please specify*]:	NA		
Non-fed aquaculture: Temperate	Integrated Plant Nutrient Management (IPNM)			
	Integrated Pest Management (IPM)			
	Pollination management			
	Landscape management			
	Sustainable soil management practices			
	Conservation agriculture			
	Water management practices, water harvesting			
	Agroforestry			
	Organic agriculture			
	Low external input agriculture			
	Home gardens			
	Areas designated by virtue of production features and approaches			
	Ecosystem approach to capture fisheries			
	Conservation hatcheries			
	Reduced-impact logging			
	Other [*please specify*]:			
Irrigated crops (other) : Temperate	Integrated Plant Nutrient Management (IPNM)	NK		
	Integrated Pest Management (IPM)	NK	2	NK
	Pollination management	NK	2	NK
	Landscape management	NK		
	Sustainable soil management practices	NK		
	Conservation agriculture	NK		
	Water management practices, water harvesting	NK		
	Agroforestry	NA		
	Organic agriculture	NK		
	Low external input agriculture	NK		
	Home gardens	NK		
	Areas designated by virtue of production features and approaches	NA		
	Ecosystem approach to capture fisheries	NA		

	Conservation hatcheries	NA		
	Reduced-impact logging	NA		
	Other [*please specify*]:	NA		
Rainfed crops : Temperate	Integrated Plant Nutrient Management (IPNM)	NK		
	Integrated Pest Management (IPM)	7,3%	2	NK
	Pollination management	NK	2	NK
	Landscape management	NK		
	Sustainable soil management practices	NK		
	Conservation agriculture	NK		
	Water management practices, water harvesting	NK		
	Agroforestry	NK		
	Organic agriculture	3,1%	2	1
	Low external input agriculture	NK		
	Home gardens	0,2%	-1	0
	Areas designated by virtue of production features and approaches	NA		
	Ecosystem approach to capture fisheries	NA		
	Conservation hatcheries	NA		
	Reduced-impact logging	NA		
	Other [*please specify*]:	NA		
Rainfed crops : Boreal and /or highlands	Integrated Plant Nutrient Management (IPNM)	NK		
	Integrated Pest Management (IPM)	NK	2	NK
	Pollination management	NK	2	NK
	Landscape management	NK		
	Sustainable soil management practices	NK		
	Conservation agriculture	NK		
	Water management practices, water harvesting	NK		
	Agroforestry	NA		
	Organic agriculture	NK		
	Low external input agriculture	NK		
	Home gardens	NK	-1	0
	Areas designated by virtue of production features and approaches	NA		
	Ecosystem approach to capture fisheries	NA		
	Conservation hatcheries	NA		
	Reduced-impact logging	NA		

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

	Reduced-impact logging	NA	NK	NK
	Other [*please specify*]:	NA	NA	NA

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.

The most important management practices in agricultural production that are considered to favor the maintenance and use of biodiversity in Croatia are organic agriculture and integrated production.

Organic agriculture practices are implemented according to domestic and EU legislation (Regulation on organic production OG 86/13, Council Regulation (EC) No 834/2007 on organic production and labelling of organic products). A total of 1 609 agricultural holdings producing organic agricultural products were registered in Croatia in 2013. The share of area under organic farming in total utilized agricultural area in 2013 amounted to 3.12%. The average growth rate of organic production in the period 2007 - 2013 was 234%. As regards livestock, organic production growth in 2013 was recorded in pig, goat and sheep production, as well as in beekeeping (Annual report on the state of agriculture in 2013, Ministry of Agriculture).

Integrated production as defined in the Law on Agriculture establishes a balanced application of agro-technical measures with a minimal use of agrochemicals, aiming to protect the health of people, animals, nature and the environment. Integrated production has been increased in recent years. There were 740 agricultural producers registered for integrated production in 2013 on 96.986,81 ha (7.28% of total utilized agricultural area). One of the most important aspects of integrated production is integrated pest management, implemented according to the National Action Plan to Achieve the Sustainable Use of Pesticides (Ministry of Agriculture 2013, http://ec.europa.eu/food/plant/pesticides/sustainable_use_pesticides/docs/nap_croatia_en.pdf).

National Action Plan also addresses pollination management and includes measures aimed to ensure that application of pesticides does not impact populations of bees (honey bees, solitary bees and bumble bees) and other non-target arthropods. In addition, Regulation on the establishment of an action framework to achieve sustainable use of pesticides (OG 142/12), prescribes specific measures which have to be followed in foliar application of pesticides as well as during sowing of treated seeds in order to protect bees.

Area under home gardens has decreased in recent years (0,2% of utilized agricultural area in 2012 compared with 0,4% in 2008, Statistical Yearbook 2013). However, home gardens continue to be very biodiversity-rich.

Republic of Croatia has a long-standing tradition of sustainable forest management that dates back over 250 years. Already in 1769, the first Forest Order recognized that forest management should be based on the principles of sustainability. As a result, today Republic of Croatia has some of the most extensive, healthy and naturally self-sustaining forests in Europe. Republic of Croatia enjoys rich biodiversity concentrated on its relatively small territory. 4500 plant species and subspecies, 260 autochthonous tree species and more than 100 forest plant communities exist on approximately 2.7 million hectares of forest and other wooded land.

In Republic of Croatia, forests cover almost half of the land territory. Their value has been recognized a long time ago. Most of this valuable resource is owned by the State, and managed in a “close to nature” practice with the objective of natural regeneration. Furthermore, clear cuts are prohibited by the law, which helps to maintain the forest stands in optimal condition and provides continuous cover over large areas. Consequently, all state forests, managed by state owned enterprise, are accredited with the prestigious Forest Stewardship Council’s certificate (FSC).

Today, sustainable forest management is prescribed by Forest Law (OG 140/05., 82/06., 129/08., 80/10., 124/10., 25/12., 68/12., 148/13. and 94/14.) and related secondary legislation.

Organic marine production: http://www.cromaris.hr/en/organic-sea-bass-p20
Croatian Centre for Indigenous Species of Fish and Crawfish in Karstic Waters – Otočac work on breeding of brown trout fry and crustaceans for stocking of the Gacka and other karst rivers in Croatia: http://www.pastrveituristi.otocac.hr/index.php?option=com_content&view=article&id=11&Itemid=20&lang=en

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: Temperate	Integrated Plant Nutrient Management (IPNM)	NK	1	1
	Integrated Pest Management (IPM)	NK	0	0
	Pollination management	NA	0	0
	Landscape management	NK	1	1
	Sustainable soil management practices	NK	1	1
	Conservation agriculture	NK	1	1
	Water management practices, water harvesting	NK	0	1
	Agroforestry	NK	0	1
	Organic agriculture	NK	1	1
	Low external input agriculture	NK	1	1
Livestock grassland-based systems: Boreal and /or highlands	Diversification	NK	1	1
	Base broadening	NK	1	1
	Domestication	NA	0	0
	Maintenance or conservation of landcape complexity	NK	1	1
	Restoration practices	NK	0	1
	Management of microorganisms	NK	1	1
	Polyculture/Aquaponics	NK	0	1
	Swidden and shifting cultivation agriculture	NK	1	0
	Enriched forests	NK	0	0
	Other [*please specify*]:	NA		
Livestock landless systems: Temperate	Diversification	NK	0	-1
	Base broadening	NK	0	0
	Domestication	NA	0	0

	Maintenance or conservation of landcape complexity	NK	1	1
	Restoration practices	NK	1	1
	Management of microorganisms	NK	0	-1
	Polyculture/Aquaponics	NK	0	-1
	Swidden and shifting cultivation agriculture	NK	1	0
	Enriched forests	NA	0	0
	Other [*please specify*]:	NA	NA	NA
Naturally regenerated forests: Temperate	Diversification	NA		
	Base broadening	NA		
	Domestication	NA		
	Maintenance or conservation of landcape complexity	NK		
	Restoration practices	100	2	1
	Management of microorganisms	NA		
	Polyculture/Aquaponics	NA		
	Swidden and shifting cultivation agriculture	NA		
	Enriched forests	100	2	2
	Other [*please specify*]:	NA		
Planted forests: Temperate	Diversification	NA		
	Base broadening	NA		
	Domestication	NA		
	Maintenance or conservation of landcape complexity	NK		
	Restoration practices	NK		
	Management of microorganisms	NA		
	Polyculture/Aquaponics	NA		
	Swidden and shifting cultivation agriculture	NA		
	Enriched forests	NA		
	Other [*please specify*]:	NA		
Fed aquaculture: Temperate	Diversification	NK	1	1
	Base broadening	NK	0	0
	Domestication	NA		
	Maintenance or conservation of landcape complexity	NK	0	
	Restoration practices	NK		
	Management of microorganisms	NA		

	Polyculture/Aquaponics	NK		
	Swidden and shifting cultivation agriculture	NA		
	Enriched forests	NA		
	Other [*please specify*]:	NA		
Non-fed aquaculture: Temperate	Diversification			
	Base broadening			
	Domestication			
	Maintenance or conservation of landcape complexity			
	Restoration practices			
	Management of microorganisms			
	Polyculture/Aquaponics			
	Swidden and shifting cultivation agriculture			
	Enriched forests			
	Other [*please specify*]:			
Irrigated crops (other) : Temperate	Diversification	NK		
	Base broadening	NK		
	Domestication	NK		
	Maintenance or conservation of landcape complexity	NK		
	Restoration practices	NK		
	Management of microorganisms	NK		
	Polyculture/Aquaponics	NA		
	Swidden and shifting cultivation agriculture	NK		
	Enriched forests	NA		
	Other [*please specify*]:	NA		
Rainfed crops : Temperate	Diversification	NK		
	Base broadening	NK		
	Domestication	NK		
	Maintenance or conservation of landcape complexity	NK		
	Restoration practices	NK		
	Management of microorganisms	2.8%	0	NK
	Polyculture/Aquaponics	NA		
	Swidden and shifting cultivation agriculture	NK		
	Enriched forests	NA		

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

	Other [*please specify*]:	NA	NA	NA

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.

Widely used practice of management of microorganisms in crop production is inoculation of soybean seed with root nodulating bacterium Bradyrhizobium japonicum. (see Annex)

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.**

1. Organic agriculture and integrated production are supported through rural development measures. Support for other practices that are considered to favor the maintenance and use of biodiversity is also planned through rural development measures. Examples include pollination management practices (support for establishment of flower stripes with primary function of providing habitat and attracting pollinators) and landscape management practices (preservation of hedges and stone walls).

2. Sustainable forest management practices demanded by Forest Law.

3. “Genetics, nutrition and ecology in freshwater fisheries” MZOŠ in Faculty of Agriculture
EU project Phare 2005 BRI - Croatian Centre for Indigenous Species of Fish and Crawfish in Karstic Waters

4. "National Programme for the Protection of autochthonous - native and protected breeds of domestic animals in the Republic of Croatia" adopted in 2011

Purposes of the programme are promoting the existing and designing new parts of the programme for the preservation of native and protected breeds through the system of managing protected breeds, developing a programme for the economic utilization and inclusion into programmes for managing protected areas and guiding scientific and professional programmes and research. Main key points of the programme are: improvement of an organizational framework, connection of the national programme to the regional and global network, improvement of a monitoring system, improvement of in situ programmes, improvement of ex situ programmes, development of measures and action plans in case of a crisis, development of supporting measures for preserving native and protected breeds, improvement of research and development support.

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	N		
Over-use of chemical control mechanisms (e.g. disease control agents, pesticides, herbicides, veterinary drugs, etc.)	N		
Inappropriate water management	N	Changes in water regime have endangered some habitats	SINP, 2014
Practices leading to soil and water degradation	N	Soil and water pollution by different types of waste and waste waters	SINP, 2014

Over-grazing	N		
Uncontrolled forest clearing	N		
Fishing in protected areas	N		
Overharvesting	N	Direct loss of some components of biodiversity (commercial use of plants, animals and fungi)	SINP, 2014
Other [*please specify*): Habitat loss and degradation	Y	Habitat endangered by human activities (urbanization) as well as natural vegetation succession (abandonment of traditional extensive livestock breeding)	SINP, 2014
Other [*please specify*):Pouching	Y	Lonjsko polje, in the area where the flood area, has ideal conditions for spawning all lowland species of fish. At the time of the flood water is not deep, the bottom is covered with grass and temperatures suitable for spawning. This area is endangered by pouching.	http://www.zsru-sisak.hr/index.php/o-nama/zabranjen-tradicionalni-ribolov

Add row

Delete row

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

Intensive agriculture, with increasing market demands, relies on use of artificial fertilizers and pesticides.

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

Under the Nature Protection Law (OG 80/13), many species are strictly protected and it is obligatory to acquire the permission from the Ministry of Environmental and Nature Protection if derogation is necessary. For some species that are used for commercial purposes and are in danger of unsustainable use (such as Helichrysum italicum), the Ministry gives annual permissions with compulsory nature protection measures – it is punishable by law if the permission carrier does not comply with it.

Furthermore, in state-owned forests, additional efforts are taken to limit unsustainable use of associated biodiversity and wild foods. In accordance with the provisions of the Forest Law and internal act of Croatian Forests Ltd. - Ordinance on the use of non-wood forest products (http://portal.hrsume.hr/images/dok/proizvodi/Nedrvni%20proizvodi.pdf), each collector/user must obtain a permission to collect/use non-wood forest products. The permission prescribes location, time and allowed amount of product. These provisions apply to forest fruits, mushrooms, plants for food, medicinal, aromatic plants and herbs, humus, resin, as well as to paturing and livestock feeding with acorns, leaves and shoots in forests. List of species can be found on http://portal.hrsume.hr/images/dok/proizvodi/Nedrvni%20proizvodi%20cjenik_n.pdf.

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

Add row

Delete row

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.

In order to protect and improve biodiversity on farms, the Common Agricultural Policy 2015th-2020th has established a provision for the establishment of ecological focus areas. Ecological focus areas consist of areas that directly or indirectly (through the reduced use of farm inputs) affect biodiversity. Where arable land covers more than 15 hectares of the farm, ecological focus areas must represent at least 5% of arable land. It was decided that this would be considered as ecological focus areas in Croatia: abandoned land, landscape features, buffer zone, acceptable clarify hectare forest edges, areas with short rotation without the use of fertilizers and / or use of plant protection products, areas with a catch crop and areas with nitrogen-fixing crops.

Also, the provision relating to the diversification of crops. Where arable land covers between 10 and 30 hectare farm, on the arable land should be at least two different cultures. The main crop shall not cover more than 75% and arable land. Where arable land covers more than 30 hectares of the farm, on the arable land should be at least three different cultures .. The main crop shall not cover more than 75% of arable land and the two main crops together shall not cover more than 95% and arable land. The objective of diversification of crops is to increase the number of crops grown on farms so that farmers are not dependent on one crop to generate their income. When a farmer cultivates only one type of crop is then exposed to high risks in the event of unforeseen climatic catastrophe that may seriously affect agricultural production, such as pest and the sudden appearance of frost or drought. A greater range of crops makes farmers dependent on crop rotation, which reduces harmful insects, as well as problems with diseases and weeds. It also leads to diversification of agricultural production, which can increase the natural biodiversity, strengthening the capacity of agro-ecosystems in response to emergencies, reducing the risk of total crop failure and enable manufacturers načinine alternative income generation. Crop diversification increases the possibilities for resolving the uncertainty and / or changes caused by climate change. This is because the crops will respond to climate scenarios in different ways. While the cold can affect one crop negatively, the production of another culture can increase yield.

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.

There are no exact data on the proportion of the population in Croatia that uses wild food. It can be estimated that the proportion is relatively high, but wild food is mostly used only occasionally and not on a regular basis. Wild food is used for supplementing and diversifying of nutrition and not for subsistence. Wild food is either gathered / hunted by family members themselves or bought on the market.
Within the last decade we did not have any significant disasters that would influence dependence on wild food. However, increased unemployment rate has resulted in increased number of people who gather and sell wild food to supplement their income.
There are no gender differences in consumption of wild food. On the other hand, higher proportion of men compared to women participate in activities such as recreational fishing and hunting.

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)
F3	Sustainable forest management	2	2
	Sustainable agicultural development		
Adriatic Sea	Sustainable exploitation of marine resources	2	2

Add row
Delete row

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.**

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?**

Information about management practices that favor the maintenance and use of biodiversity for food and agriculture largely depend on policies and legislation regulating use of such practices and support given by the state.

Practices such as organic agriculture in crop production, integrated pest management in crop production and forestry, as well as sustainable soil management practices and reduced-impact logging in forestry are regulated by Law on Agriculture and Forest Law. Those practices are well implemented in Croatia and reliable data on trends and percentage of area under the practice exist. Organic agriculture and integrated production are supported by the state, and Paying agency for agriculture, fisheries and rural development keeps records on the production. Maintenance of home gardens is not supported by the state, but area under the practice is recorded in annual reports on the state of agriculture.

Pollination and landscape management practices are already partially implemented and further actions are planned, mostly within the framework of rural development measures. Although the use of the practices is increased, exact percentage of area involved is not known yet.

Some other practices or measures that favor the maintenance and use of biodiversity are to some degree prescribed by different laws and regulations (Marine Fishery Law, Freshwater Fishery Law, Water Law etc.), but due to capacity limitations no monitoring activities are established. Therefore the extent to which such practices have been adopted is not known.

Use of biodiversity-friendly practices should not depend only on law enforcement and state support, but public awareness regarding importance of implementation of such practices has to be risen. Some of this work is already done by NGOs and farmers associations and should be encouraged further. (see Annex)

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?**

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?**

Republic of Croatia is making efforts in preserving biodiversity especially to maintain the quality of life, sustainable development and increasing competitiveness. In long-term, sustainable development is possible throughout the optimal use of available resources in preserved, especially in rural areas where biodiversity is sleek, traditional experiences, production systems, and diversified production. During the last two decades in the Republic of Croatia animating of general public in terms of fostering biodiversity in all segments and its sustainable use as a valuable resource was done. We believe that in Croatia there is enough knowledge and information how to conserve and use biodiversity in order to improve food production, security of production systems and protection of existing ecosystems. There are significant capacities for development of these programs. The available financial resources in one way represent a constraint in the current time of economic crisis. The institutional framework is well-done and will be upgraded in accordance with the potential needs. Biodiversity conservation priority in the Republic of Croatia is to keep the existing level of biodiversity, and improve it in the segments in which it is justified. In addition, the goal is to preserve traditional experiences, and climate specificity.

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?**

Croatia has a sustainable forest and marine resources management as well as sustainable agricultural development. Since ecosystem approaches combine integrated management of all ecosystem components (resources), it is necessary to have a good legislative background and well established management of ecosystems to prevent their degradation in production

systems. Some of the official national management plans for sustainable use of natural resources (plant genetic resources, animal genetic resources) were adopted in the last period, and they can be integrated in ecosystem approaches for production systems. For example, most of Croatian indigenous breeds are still kept predominantly in traditional way and have an important role in maintaining certain threatened habitat types. There is a need for more research on the influence of the role of livestock to certain habitat types, in order to provide the best practice, but due to lack of resources and researchers the process is slow. There is also a lack of appropriate management for some ecosystems that should be provided by the state through capacity building and knowledge transfer. Marine resources are exploited sustainably, supported by management plans for systematic groups of fish and relevant legal and subordinate regulations.

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.**

For establishing long-term sustainable exploitation and ensure the protection of marine biological resources, a draft Management plan for surrounding purse seine nets has been prepared. The most important measures to regulate fishing in the Croatian part of Adriatic Sea are temporal and spatial fishing restrictions, control of catch and fishing effort, defining the technical construction characteristics of fishing tools, prescribing temporary or permanent closed fishing season, prescribing minimum fishing length. Spatial fishing restrictions include protection of special habitats of fish and other marine organisms regulated by the Ordinance of Ministry of Agriculture. Starting from 2014, Croatia plans to introduce incentives for the temporary cessation of fishing activities, supporting in this way recovery of fish stocks.
Croatia has established permanent monitoring of commercial fishery. Since 1996, the Republic of Croatia has established monitoring of bottom settlement within the EU MEDITS programme, and monitoring of the commercial fishery was established

as of 2002/03 through the DemMon project. From 2012/2013, in the Republic of Croatia, the monitoring of demersal resources (as well as other segments of fishing) has been established.
The Nature Protection Law aims to ensure the conservation and sustainable use of associated biodiversity components.

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.**

''National programme for the protection of autochthonous - native and protected breeds of domestic animals in the Republic of Croatia'' give support for improvement of a programme for economic utilization and rise in competitiveness of native breeds is one of basic postulates for a long term sustainability of native and protected breeds of domestic animals in the Republic of Croatia, endangered breeds, in particular. Primary goals of the development of supporting measures for the protection of native and protected breeds are: promotion and affirmation of native and protected breeds through programmes of protection via sustainable management; support of marketing activities with a goal of promoting products of native and protected breeds; encouraging inclusion of native and protected breeds into folklore, tourist, hobbyist and other programmes; encouraging inclusion of native and protected breeds into management of protected areas; finding material funds for the support of breeding organisations and other non-profitable participants of programmes for the preservation of native and protected breeds.

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.

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.).

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)?**

Within the existing legal framework, the tasks concerning the conservation of biodiversity are placed under the jurisdiction of the Ministry of Agriculture, while the preservation of the critically endangered wild species and their habitats as well as of the endangered and rare natural habitats are under the jurisdiction of the Ministry of Environmental and Nature Protection.

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

Add row

Delete row

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 Ministry of Environment and Nature Protection has issued a Draft Regulation on the requirements for gene banking of the critically endangered indigenous wildlife species. However, before such a regulation may be implemented it is necessary that the current provisions of the Nature Protection Act concerning gene bank licensing be amended.

The Regulation would prescribe the requirements for the operation of gene banks that stored biological and genetic material of the critically endangered wildlife species, and set down the rules for issuing permits with regard to the activities that the bank performed. Additionally, it would institute general and specific principles and standards that the gene banks conducting the respective activities would be obliged to abide (concerning its facilities and equipment, safety, working conditions, personnel, record keeping and the proper usage of biological and genetic material 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)

Add row

Delete row

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.**

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.

Phytosanitary Information System ("FIS")

In the sector of animal genetic resources is established system to monitor the status of animal genetic resources, including in situ and ex situ programs.

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
Phytosanitary Information System	Plant pests (organisms harmful to plants)	Integrated system of records, registers, applications and databases in plant health sector
Nature Protection Information System	Habitats data, floristic data; faunistic data	Integrated system of various thematic databases, applications and web services intended for storage, maintenance and exchange of data related to biodiversity and nature protection in Croatia

Add row

Delete row

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.

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.**

Breeding organisations as NGOs actively partake in the conservation of biodiversity by representing breeders' interests. They cooperate with the bodies of public administration and public institutions, promote breeds, develop programme for the economic utilization and cooperate with similar breeding organisations on a national and international level.

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.**

Ministry of Agriculture Republic of Croatia has a national rural development measures such as:
• Organic and Integrated production,
• Support of endangered autochthonous and protected breeds of domestic animals,
• Suport of endangered autochthonous and traditional varieties of agricultural plants.

The aim of those measures is to encourage agricultural practices that are beneficial to the environment and mitigate the negative impacts of agriculture. In new programming period part of the Rural Development Programme 2014-2020. are Agri-

environment-climate measure – M10 and Organic farming – M11. Those measures are created as response to the growing need for sustainable rural development and the desire to encourage farmers to voluntarily use production methods that are consistent with the requirements of the wider community for the preservation and improvement of environmental conditions. At the same time it achieves the protection of the characteristic landscape, natural resources, soil and genetic diversity from further deterioration or loss and biodiversity preservation.

From 2015 onwards, EU Common Agricultural Policy introduced a new policy instrument of the first pillar, direct payments - greening (greeening). Within this, farmers will receive payment if you follow three compulsory agricultural practices beneficial for the climate and environment, and the maintenance of permanent grassland, if you have ecological focus area on the agricultural area and crop diversification. Respect for agricultural practices beneficial for the climate and the environment is mandatory for farms with arable land. Greening aims to strengthen the environmental sustainability of agriculture, such as crop diversification, maintenance of grasslands, climate change mitigation and biodiversity conservation.

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.

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)

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.**

One of the examples of multisectoral collaboration was the making of National Strategy and Action Plan for the Protection of Biological and Landscape Diversity of the Republic of Croatia in 1999. This Strategy is the major nature conservation document in Croatia, made to promote nature protection as an integrated activity based on species, habitats and protected areas conservation. It aims to ensure sustainable use of natural resources. Considering the comprehensiveness of the problem area and aiming at the achievement of a participatory approach to the making of the Strategy, representatives of individual government bodies (relevant ministries), scientific institutions, non-governmental organizations and public enterprises were included in the process and the Strategy was endorsed by the Croatian National Parliament (OG 81/99). First revision of the strategy was done in 2008 and the second one is being made in 2014, and these are also being done in collaboration with other sectors.

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 relevant Ministries collaborate to achieve the Aichi targets (especially no. 6, 7, 9, 13 and 16) within their jurisdictions and cooperate actively in situations of joint jurisdiction. These Aichi targets may also be applied to the preservation and the sustainable use of biodiversity for food and agriculture. The new Strategy and Action Plan for the Protection of Biological and Landscape Diversity of Croatia, which is currently in the process of being passed, will conform to the Aichi targets with respect to domestic needs and priorities. Although the implementation of the Strategy is a responsibility of the Ministry of Environment and Nature Protection, the opinions from other relevant Ministries be taken into account

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?**

Croatia is raising awareness about biodiversity conservation and nature protection, both on local and regional level, as well as educating general public about sustainable use of natural resources through the national legislation...(see Annex)

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
Sustainable use of pesticides	I – EU	Framework to achieve the sustainable use of pesticides	Directive 2009/128/EC
Plant quarantine	I - EU	Protective measures against the introduction and spread of plant pests	Directive 2000/29/EC
NATURA 2000 ecological network	I -EU	Conservation of natural habitats and of wild fauna and flora	Directive 92/43/EEC Directive 2009/147/EC

Add row

Delete row

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?**

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)
University of Zagreb, Faculty of Forestry	Subject: Conservation of Forest Genetic Resources	Graduate Study: Urban Forestry, Nature Conservation and Environmental Protection	60	20	40
University of Zagreb, Faculty of Agriculture	Subject: Utilization and conservation of Animal/ plant genetic resources	Graduate Study: Animal production, Plant production	300	100	200

Add row

Delete row

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.

University of Zagreb, Faculty of Agriculture
University of Zagreb, Faculty of Veterinary
University of Zagreb, Faculty of Forestry
University "Josip Juraj Strossmayer" Osijek, Faculty of Agriculture
Croatian Forest Research Institute
University of Zagreb, Faculty of Science, Department of Biology
University of Zagreb, Faculty of Veterinary Medicine
Croatian Natural History Museum
Institute of Oceanography and Fisheries
State Institute for Nature Protection

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?**

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?**

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?**

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?**

The Republic of Croatia during the last two decades throughout public animating tries to preserve traditional knowledge and to introduce the latest scientific achievements and methodologies into in situ and ex situ protection programs (see Annex)

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.

Croatia is planning to implement two Agri-environment-climate sub-measures under the Rural development programme 2014.-2020. The aim of the measure is to encourage farming practices that are beneficial to the environment and mitigate the negative effects of agriculture. Furthermore, this measure encourages biodiversity and genetic resources related to agriculture. First sub-measure relates to the payment for agri-environment- climate commitments with operations which support overall bio-diversity.
Second sub-measure supports conservation of genetic resources in agriculture with following operations:
• Preservation of endangered autochthonous and protected breeds of domestic animals;
• Preservation of endangered autochthonous and traditional varieties of agricultural plants;
• Preservation, sustainable use and development of genetic resources in agriculture.

Aquaculture continues to be the fastest growing animal production industry in Croatia and this rate of expansion must continue if aquaculture is to satisfy demand for fish products in the face of dwindling capture fisheries. The relationship between aquaculture and biodiversity is complex, with examples of positive and negative impacts having been reported. To enable this expansion while avoiding negative impacts from introductions of exotic species, the investigation of indigenous species.
To enable the sustainable development of fisheries sector different models of support are designed, both through national funding, and through EU funds. Financing measures and achieving the targets set by Member States of EU funds is done through a model of structural aid, or specially created funds for specific periods of time. For the fisheries sector are the European Fisheries Fund in the period 2007 -2013., and the European Fund for Maritime Affairs and Fisheries, which will relate to the period of 2014th-2020th.
Unlike structural support, where the state budget is participating in a certain percentage of the total amount of public aid, state aid to fisheries includes those support mechanisms when the state itself, without subsidies from the EU funds, co-financing of certain measures carried out for the development of the fisheries sector. Such state aid has stipulated strict conditions, criteria, method of allocation and reporting obligation.

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.**

For wild food in the Adriatic Sea, main conservation objects are to establish long-term sustainable exploitation and ensure the protection of marine biological resources (pelagic, demersal and commercial fish species) through:

- Draft Management plan for surrounding purse seine nets (defines minimum mesh size, minimum catch size, permanent suspension of fishing etc.)
- Draft Management plan for bottom trawl fisheries (defines reducing fishing effort, use of more selective fishing techniques etc.)

- Marine Fishery Act (temporal and spatial fishing restrictions, control of catch and fishing effort, defining the technical construction characteristics of fishing tools, prescribing temporary or permanent closed fishing season, prescribing minimum fishing length)
- Introduction of incentives for the temporary cessation of fishing activities supporting in this way recovery of fish stocks.

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

Croatia is ensuring sustainable exploitation of natural resources through national legislation (sustainable forest management, sustainable agricultural development and sustainable exploitation of marine resources).

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.**

The Ministry of Agriculture recognizes the importance of proper education on agri-environmental issues, including the issue of conservation and sustainable use of biodiversity for food and agriculture. (see Annex)

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.**

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.**

Submit by email

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.

ANNEX

Additional answers to the questions that were not possible to insert in the appropriate boxes due to the document restriction

Question 53. after Table 21

Widely used practice of management of microorganisms in crop production is inoculation of soybean seed with root nodulating bacterium Bradyrhizobium japonicum. Out of 54 109 ha of soybean in 2012, about 70% were sown using inoculated seed (2.8% of total utilised agricultural area, Statistical Yearbook 2013). Inoculation significantly increases natural nitrogen fixation and decreases the need for application of artificial fertilizers, both for soybean and for subsequent crops.

There are now fish species in marine aquaculture.

Meagre (*Argyrosomus regius*) is a fish of the Sciaenidae family (lat. Sciaenidae), the fish living in dark places at depths greater than 30m. Meagre is a genuine, almost forgotten Adriatic white fish which was abundant in the Adriatic Sea hundred years ago. This top-class whitefish has been placed on the market in 2011 under the brand name "Kornatska hama" (Kornati Meagre). The taste is most similar to sea bass and it is farmed alongside the islet of Košara near Kornati National Park.

Dentex (*Dentex dentex*) belongs to Sparidae family (Sparidae). With sea bream and sea bass it is the most desired Adriatic fish. It grows up to 1 meter in length and achieves weight up to 16 kg. It is solidly build, and owes its name to large fangs. In the Adriatic Sea, Dentex can be found on the territory of islands around Šibenik and Zadar, populated habitats are also located near Pula and Rovinj and around the islands of Vis, Lastovo, Mljet and Palagruža. Apart from the Adriatic it is widespread in the whole Mediterranean and Eastern Atlantic.

Question 62.

Information about management practices that favor the maintenance and use of biodiversity for food and agriculture largely depend on policies and legislation regulating use of such practices and support given by the state.
Practices such as organic agriculture in crop production, integrated pest management in crop production and forestry, as well as sustainable soil management practices and reduced-impact logging in forestry are regulated by Law on Agriculture and Forest Law. Those practices are well implemented in Croatia and reliable data on trends and percentage of area under the practice exist. Organic agriculture and integrated production are supported by the state, and Paying agency for agriculture, fisheries and rural development keeps records on the production. Maintenance of home gardens is not supported by the state, but area under the practice is recorded in annual reports on the state of agriculture.

Pollination and landscape management practices are already partially implemented and further actions are planned, mostly within the framework of rural development measures. Although the use of the practices is increased, exact percentage of area involved is not known yet.

Some other practices or measures that favor the maintenance and use of biodiversity are to some degree prescribed by different laws and regulations (Marine Fishery Law, Freshwater Fishery Law, Water Law etc.), but due to capacity limitations no monitoring activities are established. Therefore the extent to which such practices have been adopted is not known.

Use of biodiversity-friendly practices should not depend only on law enforcement and state support, but public awareness regarding importance of implementation of such practices has to be risen. Some of this work is already done by NGOs and farmers associations and should be encouraged further. In addition, specific training relevant to better understanding of biodiversity is planned for beneficiaries and advisors through rural development measures.

Question 83.

Croatia is raising awareness about biodiversity conservation and nature protection, both on local and regional level, as well as educating general public about sustainable use of natural resources through the national legislation, participation in different events, lectures and printed material. Also, subsidies for nature friendly agricultural practices are being proposed through Rural Development Programme 2014-2020, which should minimize some of the negative impacts.

Question 91.

The Republic of Croatia during the last two decades throughout public animating tries to preserve traditional knowledge and to introduce the latest scientific achievements and methodologies into *in situ* and *ex situ* protection programs in terms of preserving biodiversity as valuable resources. In Croatia, there is enough knowledge and information how to conserve and use biodiversity in order to improve the safety of food production, to improve production systems security and protection of existing ecosystems. Available financial resources represent a limit for implementation of new researches within the target range. The priorities are focused on maintaining the existing level of biodiversity, promotion of traditional knowledge and experience, and introduction of new research methods.

Question 95.

The Ministry of Agriculture recognizes the importance of proper education on agri-environmental issues, including the issue of conservation and sustainable use of biodiversity for food and agriculture. Beneficiaries of the measure Agri-environment-climate have obligation to attend and finish training related to the measure.