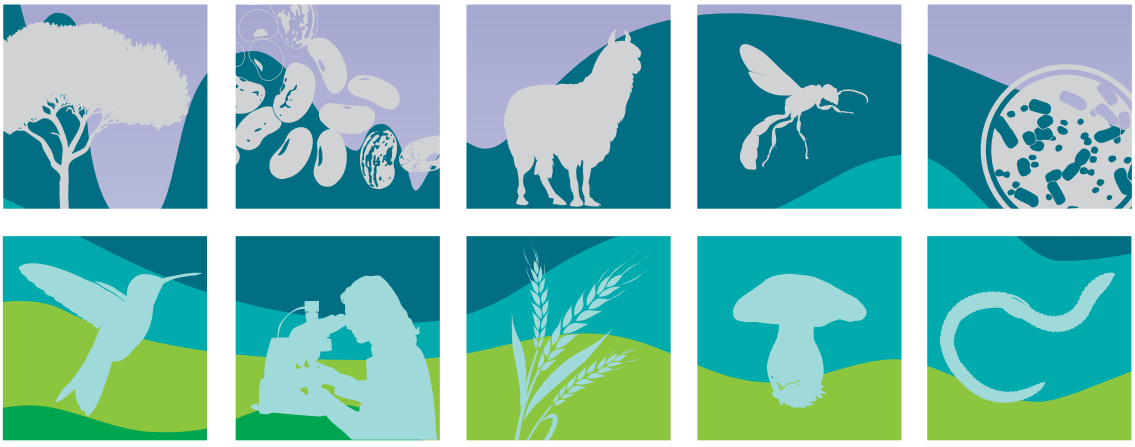
COUNTRY REPORTS



THE STATE OF **JAMAICA'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: Jamaica

National Focal Point: Carla Douglas

INSTRUCTIONS FOR DYNAMIC GUIDELINES

How do I complete the dynamic guidelines?

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

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

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

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

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

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

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

Where can I get further assistance?

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

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

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

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THE ESSENTIAL ROLE OF COUNTRY REPORTS

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

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

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

I. INTRODUCTION

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

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

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

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

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

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

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

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

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

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

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

II. OBJECTIVES OF THE GUIDELINES

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

III. SCOPE, STRUCTURE AND CONTENT

Scope of the Country Report

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

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

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

Structure of the Country Report

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

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

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

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

IV. TIMELINE AND PROCESS

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

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

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

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.

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.

The recommendations provided by the Secretariat in the Guidelines for the preparation of Country Reports were followed as best as possible in the preparation of this national report.

A National Committee was formed under the auspices of the Office of the Chief Technical Director of the then Ministry of Agriculture & Fisheries. The Ministry has since been renamed - the Ministry of Industry, Commerce, Agriculture and Fisheries. A participatory approach was utilized in which representative stakeholders from key institutions representing government, research and civil society were invited to be a part of this National Committee.

A stakeholder scoping exercise was then held to ensure that there was adequate representation for the completion of this report from representative stakeholders as well as from the relevant sectors namely fisheries, aquaculture, forest, livestock, plants and gender and minority groups.

Stakeholder groups were formed for each sector. These sector groups were encouraged to meet and complete the sections of the Country Report relevant to their discipline. This stage proved to be the most challenging due to various commitments by stakeholders as well as the detailed process involved. As a result minimal responses were initially received.

Another approach was then utilized in which key individuals from the relevant sectors were invited to stakeholder workshops and portions of the report completed by the participants. Sections of the report were also sent via email and the stakeholders asked to complete the sections relevant to their discipline as well as provide direction as to where the information could be found.

The responses received were then compiled and input made into the document. The draft document was then sent to the Chief Technical Director for official endorsement and onward submission to the Secretariat of the Commission on Genetic Resources for Food and Agriculture.

Below is a list of the names of the participants and stakeholders consulted in the preparation of this report:

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Institute of Jamaica (IOJ)

Sashalee Cross
Assistant Botanist
Institute of Jamaica (IOJ)

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National Environmental and Planning Agency (NEPA)

Andrea Donaldson
Manager
Ecosystems Management Branch
National Environmental and Planning Agency (NEPA)

Ian Jones
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Fisheries Division – Ministry of Industry Commerce Agriculture and Fisheries (MICAF)

Maxine Brown
Livestock Specialist

Rural Agriculture Development Authority (RADA)

Elreta Thompson
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Mildred Crawford
The Jamaica Network of Rural Women Producers

Rochelle Graham
Research Officer Policy & Research Unit
Bureau of Women's Affairs

Sharon Robinson
Director
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Michael Pryce
Senior Director
Agriculture Marketing Information Division
Ministry of Industry Commerce Agriculture and Fisheries (MICAF)

Kevin Condappa
Director
Agribusiness & Market Distribution
Agricultural Services Unit
Ministry of Industry Commerce Agriculture and Fisheries (MICAF)

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.

Jamaica is a part of the Greater Antilles and is the third largest island in the Caribbean. The first occupants of the country, the Tainos, called the island " Xaymaca" which means 'Land of Wood and Water' , a mere indicator of the rich, verdant foliage, flowing rivers and streams that marked the island's landscape.

Jamaica experiences variable annual rainfall, land and sea breezes which influence its tropical maritime climate. The country is noted for its karst topography of which the most developed and most popular is called the Cockpit Country. Limestone, igneous and metamorphic rocks, shale and alluvial deposits cover the island's surface comprising various land formations that give rise to surface drainage.

The country has a wide variety of forest types which are the main repositories of biodiversity, especially endemic flora and fauna. In fact Jamaica is rated fifth in the islands of the world in terms of endemic plants. There are also high levels of endemism for many species of animals including terrestrial Grapsid crabs, reptiles, snails, land birds and amphibians.

There is some documentation of the species diversity that exist in the island in Jamaica's Conservation Data Centre Database (CDC). Information can be found on the terrestrial, marine and freshwater animal and plant species in the island. The status of the species of fungi, bacteria, viruses and some invertebrates is however relatively unknown.

Jamaica's biodiversity plays an important role in food and agriculture for the nation. Along with tourism and mining, agriculture contributes significantly to the country's economy and the livelihood of its people. The Jamaican diet is comprised of local foods as well as of imported food items. Terrestrial plant species are cultivated and consumed locally as well as exported. Improved plant varieties are imported and cultivated.

The maintenance, conservation and management of biodiversity are critical to the sustainable development of our natural resources. Such management systems should ensure that factors affecting threatened species are actively monitored and controlled. The maintenance of the complex food web in an ecosystem is a difficult task and is most susceptible to environmental factors such as habitat degradation due to storms and hurricanes, pollution as well as man made influences as a result of for example overfishing and Illegal, Unreported and Unregulated (IUU) fishing. The most effective ways to reverse this downward trend and restore natural resources or biodiversity is to promote conservation, establish protected areas, adopt ecosystem-based management, and implement a "precautionary principle."

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.

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: Tropics	A combination of Ranching and Pastoralist systems exist for the livestock grassland-based system. In one scenario some livestock owners keep animals on privately owned pastures or rangeland. The case also exists where farmers move with their herds in an opportunistic way on communal and private lands to find feed and water for their animals.
Livestock landless systems: Tropics	This is an intensive and semi-intensive farming system where feed is grown, chopped then fed to the animals.
Naturally regenerated forests: Tropics	Regenerating of tropical secondary forest on abandoned agricultural and mined out lands.
Planted forests: Tropics	Close gaps in forest cover and establish plantations for socioeconomic benefits. Planting is done on public and private lands actively engaging local community members in the establishments and maintenance phases. Employment gender ratio 70:30 males to females with the females completing the less physically demanding activities. Creates employment and provide alternative livelihoods to these communities in proximity to plantations.
Self-recruiting capture fisheries: Tropics	Most of Jamaica Fishery resources are not scientifically studied apart from conch and to a lesser extent lobster resources. There is a critical need for estimating sustainable yields for the various multi-species fisheries that exist in Jamaica.
Culture-based fisheries: Tropics	Oyster culture of the mangrove oyster Crassostrea rhizophorae is actively done in the small community of Bowden St. Thomas and represents a niche market that is received well at agricultural trade Expos locally. The main challenge is to develop the marketing aspect as culture systems are already well known and studied.
Fed aquaculture: Tropics	Tilapia is grown for local consumption by several small farmers island-wide. It is well developed for the Red Tilapia hybrid by cluster farmers
Non-fed aquaculture: Tropics	
Irrigated crops (other) : Tropics	Crops are cultivated in large acreages and supplied with irrigation water through an irrigation scheme managed by the National Irrigation Commission. This occurs on privately owned lands and in the national Agro Parks.
Rainfed crops : Tropics	Crops are cultivated on privately owned lands. Crops are established during the rainy season since rainfall is the exclusive source of water.
Mixed systems (livestock, crop, forest and /or aquatic and fisheries): Tropics	More than one system exists that resembles both the 'Crop-livestock' system and the Agro-pastoralist system. The Crop-livestock system is a mixed system where livestock production is integrated with crop production. The agro-pastoralist system is livestock focused with some crop production that is basically used for animal feed.

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

Add

Delete

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

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

Production systems	**Area**		**Production - quantity**		**Contribution to the agricultural sector economy**	**Reference year**
	Value	**Unit (enter)**	**Value**	**Unit (enter)**	**%**	**year**

Livestock grassland-based systems: Tropics			186,998	heads	0.924	2015 (preliminary)
Livestock landless systems: Tropics						
Naturally regenerated forests: Tropics					NK	
Planted forests: Tropics						
Self-recruiting capture fisheries: Tropics			12,961	Tonnes	0.42	2015 (preliminary)
Culture-based fisheries: Tropics						
Fed aquaculture: Tropics			646	Tonnes	NK	2015 (preliminary)
Non-fed aquaculture: Tropics						
Irrigated crops (other) : Tropics			571,441	Tonnes	5.02	2015
Rainfed crops : Tropics						
Mixed systems (livestock, crop, forest and /or aquatic and fisheries): Tropics					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.

Most of the livestock production is destined for local consumption. The impact in biodiversity is mostly seen in the pig and poultry industry where the traditional livestock are being substituted for imported animals due to consumer demand, food security and exportability. For pigs there is improved genetics using modern reproductive techniques including as well as for poultry housing and nutrition.

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.

Changes in land and water use and management- lands previously used for grazing and farming being converted to housing; changing economic, socio-political and cultural factors, limited finances, larceny of crops and livestock are all drives of change that have resulted in reduced populations of animals and plants.

The main drivers of change for forest genetic resources are droughts, fires, spread of invasive species and population dynamics. These pressures resulted in the near total loss of swamp and short open dry forest. (Source: Land Use assessment Change for Jamaica 2013).

The main drivers of change on biodiversity in fisheries resources are Illegal, Unreported and Unregulated (IUU) fishing and habitat degradation due to storms and hurricanes. While Data collection systems exist there is insufficient or non-existent data analysis. Anecdotal information however from fishers and stakeholders in the marine industry has seen changes in the diversities in catch composition. That is, fish species that were once regarded as “quality” fish are no longer being caught and the “common” and “trash” fish are now collectively called common with dwindling supplies of quality fish such as groupers and deep water snappers. Common fish include parrot fishes, grunts, while trash fish include squirrel fishes, cow fish, etc.

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.

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

	Changing economic, socio-political, and cultural factors			1	
	Advancements and innovations in science and technology			1	
	Other [*please specify*]:			NA	
Naturally regenerated forests: Tropics	Changes in land and water use and management		+2		
	Pollution and external inputs		NK		
	Over-exploitation and overharvesting		-1		
	Climate change		-1		
	Natural disasters		-2		
	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		+1		
	Other [*please specify*]:		NK		
Planted forests: Tropics	Changes in land and water use and management		-1		
	Pollution and external inputs		NK		
	Over-exploitation and overharvesting		-1		
	Climate change		-1		
	Natural disasters		-2		
	Pests, diseases, alien invasive species		-2		
	Markets, trade and the private sector		NK		
	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*]:		NK		
Self-recruiting capture fisheries: Tropics	Changes in land and water use and management				-1
	Pollution and external inputs				-2
	Over-exploitation and overharvesting				-2
	Climate change				-2
	Natural disasters				-2

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

	Advancements and innovations in science and technology	1			
	Other [*please specify*]:	NA			
Mixed systems (livestock, crop, forest and /or aquatic and fisheries): Tropics	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*]:				

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: Tropics	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*]:									
Livestock landless systems: Tropics	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*]:									
Naturally regenerated forests: Tropics	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*]:									
Planted forests: Tropics	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*]:									
Self-recruiting capture fisheries: Tropics	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*]:									
Culture-based fisheries: Tropics	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*]:									
Fed aquaculture: Tropics	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*]:									
Non-fed aquaculture: Tropics	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) : Tropics	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*]:									
Rainfed crops : Tropics	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*]:									
Mixed systems (livestock, crop, forest and /or aquatic and fisheries): Tropics	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*]:									

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.

Effects of drivers of change on wild foods

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

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

Drivers	**Effect of drivers** (2, 1, 0,-1, -2, NK, NA)		
(Place pointer on the driver name for a detailed description)	Availability of wild foods	Knowledge of wild foods	Diversity of wild food
Changes in land and water use and management			-1
Pollution and external inputs			-1
Over-exploitation and overharvesting			-2
Climate change			-1
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			1
Other [*please specify*]:			NK

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.

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?

Driver - Changes in land and water use and management; Rating: 1
Improved water supply in selected rural areas with women being key beneficiaries in agriculture; the distribution and use of crown lands for agro-park development; there has been conversion of agricultural lands for roads, manufacturing, housing etc.

Driver – Pollution and external inputs; Rating: -2
Insufficient knowledge regarding the use of external inputs in agriculture; Pollution and improper use of external inputs are destroying biodiversity.

Driver - Over-exploitation and overharvesting; Rating: -1
Exploitation such as overfishing of specific species which leads to displacement (habitation and livelihood) of fisher folks which are mostly women

Deforestation/soil erosion and the impact on rural women for rebuilding and replanting purposes*

Driver - Climate change; Rating: -2
Women and children are the most vulnerable to the impacts on climate change-loss of agricultural goods, income, displacement, sanitation, access to potable water.

Driver – Natural Disasters; Rating: -2
Similar to the response above, women and children are considered to most vulnerable in the event of natural disasters. Due to their unequal economic, social, political, and cultural positions, climate change and environmental degradation have disproportionate impacts on women's livelihoods, health, food and nutrition security, access to water and energy, as well as coping capabilities. Women, especially in rural communities, have to deal with environmental stresses and shocks and their aftermath, significantly increasing their burden of unpaid care work

Driver – Pests, Diseases, Alien invasive species; Rating: -1
Wildlife infestation in coastal areas which are affected by storm surges; affects the safety and security of women and children

Driver - Changing markets; Rating: -2

Driver – Policies; Rating: 1

Driver - Population growth and urbanization; Rating: -2
Increase in gender based violence, destruction of natural resources for housing and road infrastructure, outbreak of diseases which impact women and other vulnerable groups

Driver - Changing economic, socio-political, and cultural factors; Rating: -1
Cultural agricultural practices of women can impact biodiversity, particularly if females are not armed with the knowledge and resources on how to properly manage land. Changes in how the land is managed – particularly what crop is grown and the time of year it is sown – make a difference to the biodiversity year by year. Changing the way crops are managed, including for example the use of GM herbicide-tolerant and insect-resistant plant varieties, can also influence this.

Driver - Advancements and innovations in science and technology; Rating: 1
The development and diffusion of scientific knowledge and technologies can allow for increased efficiency in resource use. The exposure and interaction of women to said innovation can have a positive impact on bio-diversity.

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

Driver - Changes in land and water use and management; Rating: 1

Women as head of households have been utilizing indigenous knowledge to enhance healthy lifestyle

Driver – Pollution and external inputs; Rating: -2
Pollution destroys the natural environmental utilized in traditional practices; Interrupts human practices and the results thereof.

Driver - Over-exploitation and overharvesting; Rating: -1
Reduction in resilience: loss of resources and storage of inputs as well as the insufficient time to rebound. (Indigenous knowledge as social capital)

Driver - Climate change; Rating: 1
Impact of climate change may be negative but adaptation strategies through the use of social capital have reduced the impacts.

Driver – Natural Disasters; Rating: 0

Driver – Pests, Diseases, Alien invasive species; Rating: -1

Driver - Changing markets: -1

Driver – Policies; Rating: 1

Driver - Population growth and urbanization; Rating: -1
Loss due to migration. Change in education trends- No emphasis on image/knowledge of agriculture

Driver - Changing economic, socio-political, and cultural factors; Rating: -1
Rural women participate at the community levels, but impact on decision making is limited

Driver - Advancements and innovations in science and technology; Rating: 1
Helps in the preservation of traditional knowledge

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

Driver - Changes in land and water use and management; Rating: 1
Promotion and expansion of backyard farming have led to improving food security and sustainability if rural households

Driver – Pollution and external inputs; Rating: -2
Pollution causes food insecurity (food production lessens) and sustainability. Food becomes unsafe for human consumption

Driver - Over-exploitation and overharvesting; Rating: -1
Over exploitation reduces easy access to and availability of food.

Driver - Climate change; Rating: -2
Climate change has increased food insecurity, due to dependence on imports for basic food items

Driver – Natural Disasters; Rating: -2
There are more female headed households than male headed households in Jamaica and as result women are more responsible for providing food for the family. Natural disasters can affect women's economic and physical access to food which will inevitable impact the poverty levels of the household. Areas affected include availability and stability of supplies and nutritional status.

Driver – Pests, Diseases, Alien invasive species; Rating: -1
Invasive species have the potential to affect food availability and safety

Driver – Changing markets; Rating: -2

Driver – Policies; Rating: 1

Driver - Population growth and urbanization; Rating: -2
Lack of access to farms/means of production- no feeder roads

Driver - Changing economic, socio-political, and cultural factors; Rating: -1

Driver - Advancements and innovations in science and technology; Rating: 2
Advancement in science and technology has the ability to improve food security though new innovations in agriculture and farming practices

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

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

Countermeasures

Driver - Changes in land and water use and management;
“Eat what you grow. Grow what you eat” National campaign; Provision of inputs for backyard farming by the government; National School Feeding Programme

Driver – Pollution and external inputs;
The National Environmental and Planning Agency (NEPA) has Standards and Policies implemented by the Ministry Of Water Land Environment and Climate Change (MOWLECC).
Capacity building and training in the proper use of chemicals by the Rural Agriculture Development Authority (RADA) but limited access by rural women
Livestock development by the Veterinary Services Division (VSD) and the Research & Development Division (R&D); both are Divisions within the Ministry of Industry Commerce Agriculture and Fisheries

Driver - Over-exploitation and overharvesting;
There are Conservation areas such as fish sanctuaries; Forestry reserves.

Driver - Climate change;
Import substitution programme for competitive agricultural produce

Currently the PIOJ is the implementing entity for a project funded by the Adaptation Fund. The project is Enhancing the Resilience of the Agricultural Sector and Coastal Areas to Protect Livelihoods and Improve Food Security. One of the components looks at enhancing the climate resilience of the agricultural sector by improving water and land management practices through water storage, soil conservation, micro dams, small-scale irrigation, and other initiatives.

Driver – Natural Disasters;
Strengthening women’s access to and control over productive assets, such as land, and their participation in natural resource management and decision-making in the household and the community helps to mitigate such impacts on their lives and livelihoods. Expanding women’s capabilities and their environmental and social roles is indispensable for sustainable development

National Food and Security Policy is also a counter measure for combating food insecurity issues especially as they relate to women and the most vulnerable

National Policy on Gender Equality speaks to women’s’ empowerment in all areas of development

The Adaptation Fund project is also a countermeasure in that other components look at protecting Negril’s beaches from coastal erosion caused by intense storms and sea-level rise by building breakwater structures and improving institutional and local level capacity for coastal and agricultural adaptation and awareness raising for behavior modification through training, the design of replicable technical standards, and spreading information on effective adaptation measures

Driver – Pests, Diseases, Alien invasive species;
There is awareness about the importance of stemming the tide of invasive alien species

Driver – Changing markets;

Driver – Policies;

Driver - Population growth and urbanization;

There is a National Policy on Gender Equality

Driver - Changing economic, socio-political, and cultural factors;

Driver - Advancements and innovations in science and technology
Science and Technology Policy; Push In schools to look at STEM and its ability to advance development
MMarine Protected Areas
The designation of twelve (12) additional marine protected areas (MPAs) in the form of fish Sanctuaries or Special Fishery Conservation Areas since 2009 has been pivotal and has been a flagship programme for the Fisheries Division of the Ministry of Agriculture in recent times. With associated management regimes through co-management approaches, these MPAs are managed to ensure no fishing in designated boundaries which has seen some auxiliary increases in biodiversity and size of catches in documented cases in some of these sanctuaries. Similarly, the use of Fish Aggregating Devices (FADs) and artificial reefs (ECOREEF) has seen positive results where active enforcement and management are sustained.

Sea turtle Management
NEPA conducts monitoring at two sites; reconfirmation of historical nesting beaches; work with persons interested in sea turtle monitoring; develop material to aid in conservation and information gathering.

Bat Species Assessment

NEPA personnel visit a number of caves to confirm that they still act as cave roost and then assessments to determine species composition is conducted.

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.

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.

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.

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: Tropics	0	1	1	1
Livestock landless systems: Tropics	1	1	0	0
Naturally regenerated forests: Tropics	NK	1	0	1
Planted forests: Tropics	NK	1	NK	1
Self-recruiting capture fisheries: Tropics	1	1 - Invasive specie	1 - Lion Fish	1-Sea weed
Culture-based fisheries: Tropics	NK	NK	NK	NK
Fed aquaculture: Tropics	NK	NK	NK	NK
Non-fed aquaculture: Tropics	NK	NK	NK	NK

Irrigated crops (other) : Tropics	1	1	0	0
Rainfed crops : Tropics	1	1	0	1
Mixed systems (livestock, crop, forest and /or aquatic and fisheries): Tropics	1	1	0	1

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.

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: Tropics	0	0	0	0	0	0	0	0	0
Livestock landless systems: Tropics	NA	0	0	0	0	0	0	0	0
Naturally regenerated forests: Tropics	0	1	1	0	0	0	0	0	0
Planted forests: Tropics	NK								
Self-recruiting capture fisheries: Tropics	NA								
Culture-based fisheries: Tropics	NA								
Fed aquaculture: Tropics	NA								
Non-fed aquaculture: Tropics	NA								
Irrigated crops (other) : Tropics	0	-1	-1	-1	-1	-1	1	0	-1
Rainfed crops : Tropics	0	-1	NK	0	0	0	0	0	0
Mixed systems (livestock, crop, forest and /or aquatic and fisheries): Tropics	0	0	0	0	0	0	0	0	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.

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: Tropics	Changes in animal genetic resources	0	0	0	NA	0	0	0	0	0
	Changes in crop genetic resources	0	NA	0	NA	NA	NA	NA	NA	NA
	Changes in forest genetic resources	NA	NA	0	NA	NA	NA	0	0	0
	Changes in aquatic genetic resources	NA	0	0	NA	0	NA	0	0	0
	Changes in micro-organism genetic resources (associated biodiversity)	0	0	0	NA	0	0	0	NA	NA
	Changes in invertebrates genetic resources (associated biodiversity)	0	0	0	NA	0	0	0	NA	NA
	Changes in vertebrates genetic resources (associated biodiversity)	0	0	0	NA	0	0	0	NA	NA
	Changes in plants genetic resources (associated biodiversity)	1	0	0	1	1	1	1	1	1
Livestock landless systems: Tropics	Changes in animal genetic resources	NA	0	0	NA	0	0	0	0	0
	Changes in crop genetic resources	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Changes in forest genetic resources	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Changes in aquatic genetic resources	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Changes in micro-organism genetic resources (associated biodiversity)	NA	0	0	NA	0	0	NA	NA	0
	Changes in invertebrates genetic resources (associated biodiversity)	NA	0	0	NA	0	0	0	NA	0

	Changes in vertebrates genetic resources (associated biodiversity)	NA	0	0	NA	0	NA	NA	NA	NA
	Changes in plants genetic resources (associated biodiversity)	NK	0	0	NA	0	NA	NA	NA	0
Naturally regenerated forests: Tropics	Changes in animal genetic resources	NA	NA	-1	NA	0	0	0	NA	NA
	Changes in crop genetic resources	1	-1	0	-1	0	-1	0	-1	-1
	Changes in forest genetic resources	1	1	1	1	1	1	1	1	1
	Changes in aquatic genetic resources	NA	NA	0	NA	0	NA	0	NA	NA
	Changes in micro-organism genetic resources (associated biodiversity)	0	0	0	0	0	0	0	NA	0
	Changes in invertebrates genetic resources (associated biodiversity)	1	0	0	0	0	0	0	NA	0
	Changes in vertebrates genetic resources (associated biodiversity)	0	0	0	0	0	0	0	0	0
	Changes in plants genetic resources (associated biodiversity)	1	-1	1	0	0	0	0	1	1
Planted forests: Tropics	Changes in animal genetic resources	0	NA	0	NA	0	0	NA	NA	-1
	Changes in crop genetic resources	1	0	1	1	1	1	0	0	1
	Changes in forest genetic resources	1	1	1	1	0	1	0	1	1
	Changes in aquatic genetic resources	NK	NA	NK	NA	NK	NA	NA	NA	NA
	Changes in micro-organism genetic resources (associated biodiversity)	-1	-1	NK	0	0	0	0	0	0
	Changes in invertebrates genetic resources (associated biodiversity)	0	-1	NK	NK	0	0	0	NA	0
	Changes in vertebrates genetic resources (associated biodiversity)	0	0	0	NA	0	0	0	0	0
	Changes in plants genetic resources (associated biodiversity)	1	0	0	1	0	1	0	1	1
Self-recruiting capture fisheries: Tropics	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)									
Culture-based fisheries: Tropics	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)									
Fed aquaculture: Tropics	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)									
Non-fed aquaculture: Tropics	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) : Tropics	Changes in animal genetic resources	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Changes in crop genetic resources	1	-1	0	0	1	1	1	0	1
	Changes in forest genetic resources	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Changes in aquatic genetic resources	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Changes in micro-organism genetic resources (associated biodiversity)	0	-1	0	0	0	NK	0	0	0
	Changes in invertebrates genetic resources (associated biodiversity)	1	0	NA	NA	0	0	0	0	0
	Changes in vertebrates genetic resources (associated biodiversity)	0	0	0	0	0	0	0	0	0

	Changes in plants genetic resources (associated biodiversity)	0	0	0	1	1	1	0	0	1
Rainfed crops : Tropics	Changes in animal genetic resources	0	NK	0	0	0	0	0	0	0
	Changes in crop genetic resources	1	1	0	1	1	1	1	1	1
	Changes in forest genetic resources	1	1	0	1	1	1	1	1	1
	Changes in aquatic genetic resources	0	0	0	NA	0	NA	0	0	0
	Changes in micro-organism genetic resources (associated biodiversity)	0	-1	0	0	0	0	0	0	0
	Changes in invertebrates genetic resources (associated biodiversity)	1	0	NA	NA	0	0	0	0	0
	Changes in vertebrates genetic resources (associated biodiversity)	0	0	0	0	0	0	0	0	0
	Changes in plants genetic resources (associated biodiversity)	1	0	0	1	1	1	0	0	1
Mixed systems (livestock, crop, forest and /or aquatic and fisheries): Tropics	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)									

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.

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

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

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

Ecosystem service provided (Place pointer on the ecosystem service name for a detailed description)	**Actively managed species (name) and sub-species (where available)**	**Production systems (code or name)**	**Availability of diversity information (Y/N)**	**Source of information**
Pollination	Bees (Apis mellifera) Jamaican bats Pallas Mastiff Bat (Molossus mollossus milleri) Red-billed Streamertail Black billed Streamertail Mango Hummingbirds	• Naturally regenerated forests • Planted forests • Irrigated crops • Rain fed crops	N	
Pest and disease regulation	• Parasitoid Wasp – Pink mealy bug • Anagyrus kamali • Gyranusoidea indica • Redhead ladybird beetle-PHM (Cryptolaemus montrouzieri) • Papaya mealy bug • Parasitoid Wasp – coffee berry borer • Fungus (Coffee Board) • Leaf hopper on sugar cane (SIRI) • Gambusia sp. • Common name: Tiki Tiki • Limia sp. (fish)	• Irrigated crops • • • • Irrigated crops • Irrigated crops • • • •	N	
Water purification and waste treatment	Water hyacinth Duck weed	• Fed aquaculture – ornamental fish • Fed aquaculture – ornamental fish	N	
Natural hazard regulation	Khus Khus (Vetiver zizanioides) Wind breaks (tree)	• Rainfed • Irrigated • Irrigated – bananas, papaya	Y	
Nutrient cycling	Vermiculture – red worm (Coffee Board) Guinea grass – (Panicum maximum)	• Irrigated – coffee • Rain fed - coffee • Irrigated – cash crops • Rain fed – cash crops		

Ecosystem service provided (Place pointer on the ecosystem service name for a detailed description)	**Actively managed species (name) and sub-species (where available)**	**Production systems (code or name)**	**Availability of diversity information (Y/N)**	**Source of information**
Soil formation and protection	Guinea grass – (Panicum maximum) Khus Khus (Vetiver zizanioides) Forestry – species for soil conservation Coral species Mangroves species Seagrass species	 • Self-recruiting • Self-recruiting • Self-recruiting	 Y Y Y	
Water cycling				
Habitat provisioning	Mangroves Seagrass Coral species Lignum vitae (Lignum vitae butterfly) Loggerhead Turtle (Caretta caretta) Green Turtle (Chelonian mydas) Leatherback Turtle (Dermochelys coriacea) Hawksbill Turtle (Eretmochelys imbricata)	• Self-recruiting • Self-recruiting • Self-recruiting • Naturally regenerated forests • Irrigated crops		
Production of oxygen/ Gas regulation	Silviculture (any tree except pine) Seagrass beds Mangroves	• Planted forests • Self-recruiting • Self-recruiting		
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.

Marine Protected Areas
The designation of twelve (12) additional marine protected areas (MPAs) in the form of fish Sanctuaries or Special Fishery Conservation Areas since 2009 has been pivotal and has been a flagship programme for the Fisheries Division of the Ministry of Agriculture in recent times. With associated management regimes through co-management approaches, these MPAs are managed to ensure no fishing in designated boundaries which has seen some auxiliary increases in biodiversity and size of catches in documented cases in some of these sanctuaries. Similarly, the use of Fish Aggregating Devices (FADs) and artificial reefs (ECOREEF) has seen positive results where active enforcement and management are sustained.

Sea turtle Management
NEPA conducts monitoring at two sites; reconfirmation of historical nesting beaches; work with persons interested in sea turtle monitoring; develop material to aid in conservation and information gathering.

Bat Species Assessment

NEPA personnel visit a number of caves to confirm that they still act as cave roost and then assessments to determine species

composition are conducted.

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
Micro-organisms	NK	NK	
Invertebrates	• Significant enough for them to be declared endangered	Removal of habitats • Invasive alien species • Climate Change • Poaching	
Vertebrates	• Endangered	• Removal of habitats • Invasive alien species • Climate Change • Poaching • Killed for food	
Plants	IUCN Red List		
Wild Food Species	IUCN Red List		

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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
Micro-organisms	NK	NK	NK	NK	NK

Components of associated biodiversity	Organisms, species and sub-species (where available) conserved	Size of collection	Conservation conditions	Objective(s)	Characterization and evaluation status
Invertebrates	Giant Swallow Tail Butterfly- Pterorus (Papilio) homerus	NK	• To increase the food plant – the Water mahoe • Legislation exists under the Wildlife Protection Act 1945	Conservation plan exists – to increase populations of the Swallow tail by	Taxanomic description data available
Vertebrates	• Yellow snake – Dry limestone; Cockpit Country; Nat Regen forests • Indian coney – Hellshire Hills, Blue and John Crow Mtn.; Nate Regen Forests • American Crocodile – South Coast; Self recruiting & Nat Regen Forests • Jamaican Iguana – Hellshire Hills; Nat Regen Forests • Sea turtles – South coast?; Self recruiting • Manatees – Alligator pond (South coast);Self recruiting • Black billed Parrots - Cockpit Country? • Yellow billed parrots – Cockpit Country?	NK Can estimate for Iguanas, Manatees	Permit and Licence Regulations under the NRCA Act mandate that for certain activities of development a permit or licences is required before the activity should take place. If granted there will be conditions for the development The animals which are listed under the Wild Life Protection Act (1945) for which possession is an offence punishable with either a fine or imprisonment.	Management /Recovery plans in place for: • Turtles – Monitoring programme on the beaches; legislation exists to protect them • Iguana – Head Start Programme at Hope zoo where they are grown then released into the wild; invasive species control programme for mongoose; feral cats, etc that threaten the Iguana • Manatee	
Plants	• Orchidaceae family • Lignum vitae				

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

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

Components of associated biodiversity	Organisms, species and sub-species (where available) conserved	Site name and location	Production system(s) involved (code or name)	Conservation objective(s)	Specific actions that secure associated biodiversity or ecosystem services
Invertebrates	Giant Swallow Tail Butterfly- Pterorus (Papilio) homerus	• Blue and John Crow Mountains • The Cockpit Country	• Naturally regenerated forest	Conservation plan exists – to increase populations of the Swallow tail by	• To increase the food plant – the Water mahoe • Legislation exists under the Wildlife Protection Act 1945
Vertebrates	• Yellow snake *Indian coney • American Crocodile • Jamaican Iguana • Sea turtles • Manatees • Black billed Parrots • Yellow billed parrots	• Dry limestone forests *South Coast • Cockpit Country Blue and *John Crow Mountains *Hellshire Hills *Alligator Pond (South Coast)	Naturally regenerated forest Self recruiting fisheries	Management/ Recovery plans in place for: • Turtles – Monitoring programme on the beaches; legislation exists to protect them • Iguana – Head Start Programme at Hope zoo where they are grown then released into the wild; invasive species control programme for mongoose; feral cats, etc that threaten the Iguana • Manatee	Permit and Licence Regulations under the NRCA Act mandate that for certain activities of development a permit or licences is required before the activity should take place. If granted there will be conditions for the development The animals which are listed under the Wild Life Protection Act (1945) for which possession is an offence punishable with either a fine or imprisonment.
Vertebrates	Multiple finfish species; conch, corals, sea urchins		Self recruiting fisheries	Management and recovery	a. Marine protected areas in the form of fish sanctuaries. b. Implementation of FADs and ECOREEF c. Replanting of corals d. Deter and combat alien invasive species (e.g. Lionfish)

Add row

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

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.

State and trends of wild resources used for food

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

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

Species (local name)	Species (scientific name)	Production systems or other environments in which present and harvested	Change in state (2,1,0,-1,-2, NK)	Differences within species identified and characterized (Y/N)	Source of information
Wild boar		Naturally Regenerated Forest	NK		
Deer (invasive)		Naturally Regenerated Forest	NK		
Bromeliad-Pinguin		Naturally Regenerated Forest	0		
Orchid -Vanilla orchid (green wiss)		Naturally Regenerated Forest	0		
Wild yam		Naturally Regenerated Forest	0		
Wild guava		Naturally Regenerated Forest	0		
Sea grapes		Naturally Regenerated Forest	-1		
Wild cherries		Naturally Regenerated Forest	0		
Pursley,pussley (Soups)		Naturally Regenerated Forest	0		
Sarsaparilla (Chainey root) Genus: Smilax		Naturally Regenerated Forest	0		
Irish moss (marine algae)		Self recruiting fisheries	0		

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
Ramoon (Bark and leaves)		Naturally Regenerated Forest	0		
Strong back	(Desmodium sp.)	Naturally Regenerated Forest	0		
Medina		Naturally Regenerated Forest	0		
Moringa	Moringa sp	Naturally Regenerated Forest	0		
Groupers		Self recruiting fisheries	-2		
Deep water snappers		Self recruiting fisheries	-2		
Lion fish (invasive)		Self recruiting fisheries	0		
Parrots		Self recruiting fisheries	-1		
Squirrellfishes		Self recruiting fisheries	0		
grunts		Self recruiting fisheries	-1		
butter fishes		Self recruiting fisheries	-1		
cow fish		Self recruiting fisheries	0		
triggerfishes		Self recruiting fisheries	0		
crabs		Self recruiting fisheries	0		

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Wild food resources at risk

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

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

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

Wild food species (scientific name)	Degree of threat	Main threat	References or sources of information if available

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

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

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?

This is normally achieved through active consultations and focus meetings with local fisherfolk and fishers. Public education and awareness campaigns are critical to achieving biodiversity gains. This is actively done through agricultural Trade expos where booths are set up to introduce fisheries conservation and the sustainable management and development of fisheries.

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.

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)

Add row

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

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.**

C-FISH is an innovative project devised by environmental not-for-profit The CARIBSAVE Partnership & is aimed at strengthening community based fish sanctuaries and marine protected areas (MPAs) in 5 countries across the Caribbean - Jamaica, Grenada, St Lucia, Dominica & Saint Vincent & the Grenadines.
Scientists have known for some time that successful MPAs can generate significant environmental, social & economic benefits from sustainable fisheries to tourism to natural coastal defenses. This is part of a growing international focus on Ecosystem-based Adaptation to climate change (EbA) is rapidly being recognized as one of the most realistic & cost-effective strategies for small island developing states (SIDS), where the impacts of climate change can be reduced by strengthening the resilience & productivity of coastal ecosystems.

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)

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.

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.

The National Lionfish Project is a Pilot Project within a larger Regional Project entitled Mitigating the Threat of Invasive Alien Species in the Insular Caribbean (MTIASIC) funded by the Global Environment Facility (GEF) and the United Nations Environment Programme (UNEP). The Lionfish Pilot Project in Jamaica is led by the University of the West Indies- Discovery Bay Marine Lab (UWI-DBML) and National Environment and Planning Agency (NEPA). Lionfish are invasive species in Jamaica, but successful population control came at the hands of a powerful predator - humans. Lionfish destroy stocks of other fish populations by eating young native fish, they also cause havoc to reefs and other local eco-systems. Fishing shops sponsored contests to see who could capture the greatest numbers of lionfish, in an effort to drive numbers down.

Markets are now regularly stocked with lionfish filets and a new-found appetite among the population for the fish is helping to drive down populations of the invasive species.
The National Environment and Planning Agency in Jamaica announced a 66 percent drop in sightings of the invasive fish once people began eating the animals in large numbers.
A campaign aimed at wiping out the species around the island nation has the motto "eat sustainable, eat lionfish!" That push was sponsored by the U.S. National Oceanic and Atmospheric Administration (NOAA).

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?

The main needs and priorities central to the maintenance of biodiversity is the promotion of sustainable management and development of plant, animal, forest and aquatic genetic resources. Data collection needs to be focused not only on information gathering as it relates to species numbers but the use of these species as food needs to be better documented.
It is essential for the science to be applied for the proper estimation of maximum sustainable yields to be used by key decision makers. Where this is not available the “precautionary principle” is actively supported.

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?

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: Tropics	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*]:			
Livestock landless systems: Tropics	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*]:			
Naturally regenerated forests: Tropics	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*]:			
Planted forests: Tropics	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*]:			
Self-recruiting capture fisheries: Tropics	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	100	2	2
	Conservation hatcheries			
	Reduced-impact logging			
	Other [*please specify*]:			
Culture-based fisheries: Tropics	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*]:			
Fed aquaculture: Tropics	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*]:			
Non-fed aquaculture: Tropics	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) : Tropics	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*]:			
Rainfed crops : Tropics	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*]:			

Mixed systems (livestock, crop, forest and /or aquatic and fisheries): Tropics	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*]:			

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.

Individual Fishing Quota system for the Queen Conch (Strombus gigas) annual fish production

Jamaica is recognized internationally for its active management of its queen conch resources over this period and beyond. This species is an endangered species listed under Appendix II of CITES and therefore there is strict regulation of trade. Stock assessment through abundance surveys are done every 3-5 years with significant investment by the country (approx. US300,000.00). Jamaica has managed to estimate a safe and stable empirical yield that has led to sustainable fishery over these years.

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: Tropics	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*]:			
Livestock landless systems: Tropics	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*]:			
Naturally regenerated forests: Tropics	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*]:			
Planted forests: Tropics	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*]:			
Self-recruiting capture fisheries: Tropics	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*]:			
Culture-based fisheries: Tropics	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*]:			
Fed aquaculture: Tropics	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*]:			
Non-fed aquaculture: Tropics	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) : Tropics	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*]:			
Rainfed crops : Tropics	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*]:			
Mixed systems (livestock, crop, forest and /or aquatic and fisheries): Tropics	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*]:			

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.

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.**

The Conch Abundance Survey Programme that is implemented every 3-5 years on the Pedro Bank. In this programme scientific transacts are laid at the bottom of the seafloor at specific depths over 60-80 sites by scientific divers across the 8,000Sq. Km Pedro Bank, the main fishing ground of the queen conch. Counts are made within these transects along with the collection of other critical ecosystem parameters to determine the biomass and stock size. It is this scientific data that is used to come up with a National Quota for the 2016 fishing season. In between surveys, catch and effort data based on landings are used to determine annual quotas.

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			
Over-use of chemical control mechanisms (e.g. disease control agents, pesticides, herbicides, veterinary drugs, etc.)			
Inappropriate water management			
Practices leading to soil and water degradation			
Over-grazing			
Uncontrolled forest clearing			
Fishing in protected areas			
Overharvesting			
Other [*please specify*):			

Add row

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

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

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.

The implementation of no fishing regulations in fish sanctuaries have promoted increased biodiversity. Since launching the Boscobel Sanctuary in 2009, several recent surveys (2011) have shown signs of new coral growth and an increase in fish population. The Boscobel Sanctuary is a protected area off the north coast of Jamaica and a part of the Sandals Foundation's Marine Plan, which includes a commitment to the management of marine sanctuaries, marker buoys in designated areas, reef and fish population monitoring; and working alongside the Jamaican Government, fisher folk and community members to ensure Jamaicans are aware of the benefits of marine protected areas.

Some of the benefits of marine sanctuaries include fish moving from these areas into unprotected areas, improving fish population there; coral growth, which has a very positive impact on marine biodiversity and a greater interest in Dive Tourism (Clarke. H., 2011)

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.

The exact proportion of the population in the Jamaica that consume these wild foods on a regular basis is not known. There are however Maroons (indigenous groups) in the local Maroon villages, medicinal and ethno-botanical practitioners (bush doctors) and their clients that tend to consume some of the wild plant species as 'roots drinks' and tonics hence the inclusion of these in the listing as 'foods'.

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)	Extent of adoption (2,1,0,NA)	Importance assigned to the ecosystem approach (2,1,0,NA)
Self recruiting capture fisheries	Fisheries management	1	

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.**

The Inter-America Institute for Cooperation on Agriculture (IICA) engaged EcoReefs to create reef fish habitat in the Bluefields Bay and Montego Bay fish sanctuaries. 350 EcoReefs modules were installed on the seascape at each site, and staghorn corals (A. cervicornis) were transplanted at the Montego Bay site. The project was sponsored through the CIDA/Jamaican Ministry of Agriculture & Fisheries/IICA "Improving Jamaica's Agricultural Productivity Project" (IJAP), and was completed in August 2011.

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?**

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?**

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?**

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.**

The National Fisheries and Aquaculture Policy (to be presented in Parliament as a Green Paper)
The Fishing Bill (to be taken to Legislative Committee of Parliament. This covers the management and regulation of aquaculture, which was previously absent. Also the support of international management and conservation measures, High Seas fisheries among other critical areas. The Formulation of Fishery Management Plans is critical here.

The Plant Genetic Resources Act which mandated the formation of a Management Authority to oversee the management and sustainable utilization of plant genetic resources.

The National Food and Nutrition Policy

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.**

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.).

C-FISH is an innovative project devised by environmental not-for-profit The CARIBSAVE Partnership & is aimed at strengthening community based fish sanctuaries and marine protected areas (MPAs) in 5 countries across the Caribbean - Jamaica, Grenada, St Lucia, Dominica & Saint Vincent & the Grenadines.
Scientists have known for some time that successful MPAs can generate significant environmental, social & economic benefits from sustainable fisheries to tourism to natural coastal defenses. This is part of a growing international focus on Ecosystem-based Adaptation to climate change (EbA) is rapidly being recognized as one of the most realistic & cost-effective strategies for small island developing states (SIDS), where the impacts of climate change can be reduced by strengthening the resilience & productivity of coastal ecosystems.

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)?**

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.

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.

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
Clearing House Mechanism	Species lists are available as it relates to terrestrial animals, marine animals, freshwater animals, terrestrial plants, marine/ wetland plants and freshwater plants. 'The status of species of fungi, bacteria, viruses and some invertebrates is not well known' NBSAP 2003.	'The Clearing-House Mechanism (CHM) is an international network that gathers and distributes information on biological diversity in support of the United Nations Convention on Biological Diversity (CBD).The network comprises national information sharing and exchange programmes established in CBD member-countries. The Jamaica CHM, a department of the Natural History Museum of Jamaica at the Institute of Jamaica, serves as Jamaica's biodiversity information network.' http://jamaicachm.org.jm/ioj_wp/

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.

Management Authority established under a Plant Genetic Resources Act that was enacted on 2014. The role of this authority is to manage plant genetic resources.

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.**

Organized Fisher groups are central to the successful operation, management and conservation of Fish Aggregating Devices (FADs). Fishers are a part of the daily monitoring, control and surveillance of the FADs where they actively protect the assets and utilize mechanisms for equitable and sustainable harvesting of large pelagic species (Kingfish, dolphinfish, mackerels, etc.)

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.**

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.

The Conch Abundance Survey Programme that is implemented every 3-5 years on the Pedro Bank. In this programme scientific transacts are laid at the bottom of the seafloor at specific depths over 60-80 sites by scientific divers across the 8,000Sq. Km Pedro Bank, the main fishing ground of the queen conch. Counts are made within these transects along with the collection of other critical ecosystem parameters to determine the biomass and stock size. It is this scientific data that is used to come up with a National Quota for the 2016 fishing season. In between surveys, catch and effort data based on landings are used to determine annual quotas.

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.**

The Prime Minister implemented an inter-Ministerial Committee in 2014 to address health and sanitation issues impacting the Pedro Cays, the major offshore fishing ground . This addressed the proliferation of garbage and its active removal; it utilized existing or previous work/research done to improve the sanitation aspects on the cays. The agencies involved are the National Solid Waste and Management Authority (The Ministry of Local Government and Community Development), the Ministry of Health, The Ministry of Agriculture and Fisheries, Ministry of Water, Land, Environment and Climate Change, and the Office of the Prime Minister.

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?**

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?**

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
C-FISH Project	R	C-FISH is an innovative project devised by environmental not-for-profit The CARIBSAVE Partnership & is aimed at strengthening community based fish sanctuaries and marine protected areas (MPAs) in 5 countries across the Caribbean - Jamaica, Grenada, St Lucia, Dominica & Saint Vincent & the Grenadines. Scientists have known for some time that successful MPAs can generate significant environmental, social & economic benefits from sustainable fisheries to tourism to natural coastal defenses. This is part of a growing international focus on Ecosystem-based Adaptation to climate change (EbA) is rapidly being recognized as one of the most realistic & cost-effective strategies for small island developing states (SIDS), where the impacts of climate change can be reduced by strengthening the resilience & productivity of coastal ecosystems.	
Caribbean Regional Fisheries Mechanism (CRFM) / CLME +/ OSPESCA	R	Three Regional Fisheries Bodies (RFBs): the Caribbean Regional Fisheries Mechanism (CRFM); the Organization of the Central American Fisheries and Aquaculture Sector (OSPESCA); and the Food and Agricultural Organisation of the United Nations - Western Central Atlantic Fisheries Commission (FAO-WECAFC) on Wednesday, 27 January,2016 signed a Memorandum of Understanding (MoU) to facilitate, support and strengthen the coordination of actions among the three RFBs to increase the sustainability of fisheries.	

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)

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.

The University of the West Indies, Mona
The University of Technology
The Northern Caribbean University

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?**

• Training in Responsible fishing practices.
• Promotion of Fisher/Group associations
• Data Collection improvement
• Compliance with Licences for fishers and vessels.

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?**

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.

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.**

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

Priority area 1. Assessment and monitoring Needs and priorities • Budgetary Support/Funding • Sustainable fisher groups • Good scientific data Possible actions to be undertaken • Strengthen data collection systems • Strengthen fisher groups • Financial support • Promote compliance with licensing system Priority area 2. Conservation and sustainable use Needs and priorities • Public education, sensitization and awareness • Scientific assessments of fishery resources Possible actions to be undertaken • Improved extension services

• Development of Fishery management plans with indicators and sustainable yields

Priority area
3. Policies, institutions and capacity

Needs and priorities
• Political will
• Accession / Ratification of International/ regional Fishery Instruments
• Strengthen national fisheries policy and legislation

Possible actions to be undertaken
• Strengthen awareness at the political level
• Mainstream biodiversity for fisheries into national policies and provide legislative support
• Set up specialized institutional capacity

Priority area
4. Regional and international cooperation

Needs and priorities
• Technical Cooperation Programmes
• Good scientific data
• Accession / Ratification of International/ regional Fishery Instruments
• Sustainable fisher groups

Possible actions to be undertaken
• Regional exchange training programmes
• Attract regional support through publishing of scientific results
• Harmonize where possible fisheries biodiversity related support in legislation

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.**

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.**

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ANNEX 1: Recommended scope of the Country Report

Biodiversity for food and agriculture

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

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

Associated biodiversity

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

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

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

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

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

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

Integrated analysis of biodiversity for food and agriculture

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

ANNEX 2: Production systems

Table 1. Climatic zones definitions

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

Table 2. Production systems descriptions

Name of production system	Climatic zone	Description
Livestock grassland-based systems	Tropics Subtropics Temperate Boreal and /or highlands[1]	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)
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.