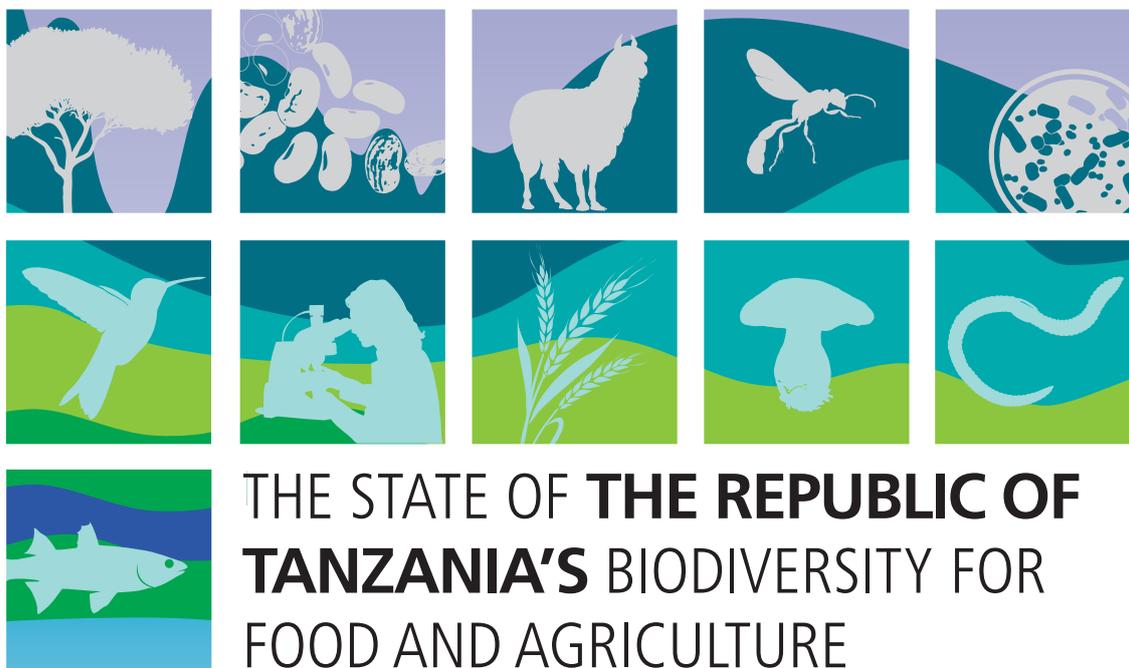


COUNTRY REPORTS



THE STATE OF **THE REPUBLIC OF TANZANIA'S** BIODIVERSITY FOR FOOD AND AGRICULTURE

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Guidelines for countries to provide a brief report on the state of their biodiversity for food and agriculture

Prepared by the Secretariat of the FAO Commission on Genetic Resources for Food and Agriculture

Introduction

The present guidelines are intended to assist countries that have not submitted a Country Report for *The State of the World's Biodiversity for Food and Agriculture* to prepare a brief report, capturing the major issues and findings on the state of their biodiversity for food and agriculture. The brief reports will be used at the informal regional consultations where countries will come together to discuss and define the regional needs and priorities for the conservation and sustainable use of biodiversity for food and agriculture.

The brief report is not meant to replace the Country Report which should follow the guidelines for the preparation of Country Reports (country report guidelines¹). It should, however, provide a solid basis for the preparation of such a Country Report. Countries that have not yet prepared a Country Report are requested to prepare the brief report for the informal regional consultations, and to make use of its information in the preparation of their Country Report.

Context

Conservation and sustainable management of biodiversity for food and agriculture require a comprehensive understanding of the state and use of its components. 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 structure, functions and processes of agricultural, pastoral, forest and aquatic production systems. This diversity has been managed or influenced by farmers, livestock keepers, forest dwellers and fisher folk for hundreds of generations and reflects the diversity of both human activities and natural processes.

In 2007, the Commission on Genetic Resources for Food and Agriculture (the Commission)² requested FAO to prepare the first report on *The State of the World's Biodiversity for Food and Agriculture* (Report). The presentation of a draft of the Report is foreseen for the Commission's Sixteenth Regular Session in the beginning of 2017.³

At its Fourteenth Regular Session, the Commission invited countries to participate in the process by preparing Country Reports on the state of their national biodiversity for food and agriculture.⁴ To assist countries in this task, FAO developed guidelines for the preparation of Country Reports (country report guidelines).⁵ Building on previous global assessments prepared under the aegis of the Commission, the

¹See <http://www.fao.org/nr/cgrfa/biodiversity/guidelines/en/>.

²The FAO Commission on Genetic Resources for Food and Agriculture is the only intergovernmental forum that specifically develops policies for the sustainable use and conservation of genetic resources for food and agriculture and the fair and equitable sharing of benefits derived from their use. As of 1 December 2015, 178 countries are member of the Commission.

³CGRFA-11/07/Report, Appendix E.

⁴CGRFA-14/13/Report, paragraph 14.

⁵See <http://www.fao.org/nr/cgrfa/biodiversity/guidelines/en/>.

Report will focus on the interactions between sectors (plant, animal, forest and aquatic genetic resources) and on cross-sectoral matters. It will also provide baseline information on the state of associated biodiversity⁶ and the ecosystem services they provide (please consult Appendix 1 for the scope of the Report).

Informal regional consultations

In accordance with a request of the Commission,⁷ a series of informal regional consultations will be held in 2016 as part of the preparation of the Report with National Focal Points appointed by countries. The objective of the informal consultations is to discuss needs and priorities for the conservation and sustainable use of biodiversity for food and agriculture in the region. To support discussions at the regional consultations, countries that have not submitted a Country Report are invited to use the present guidelines to prepare a brief report on the state of their biodiversity for food and agriculture.

Recommended approach for preparing a brief report on the state of the country's biodiversity for food and agriculture

Given the cross-sectoral nature of the brief report, National Focal Points are encouraged to involve as many representative stakeholders as practical, including government, research and civil society representatives from different sectors (fisheries and aquaculture, forest, livestock and plants) and those able to support analysis of associated biodiversity.

The National Focal Point is invited to submit the brief report to the Secretariat of the Commission by email at: SOW-BFA@fao.org in English, French or Spanish. To ensure the brief reports are taken into consideration during the discussions at the respective informal regional consultations, countries are requested to submit them no later than **8 April 2016**.

To assist countries with the preparation of the brief report, the guidance presented below is organized around the following four priority areas of biodiversity for food and agriculture:

- I. Assessment and monitoring
- II. Conservation and sustainable use
- III. Policies, institutions and capacity
- IV. Regional and international cooperation

Countries are invited to provide information on the above mentioned priority areas, to identify areas where information is missing and to focus on their needs and priorities.⁸

⁶Associated biodiversity includes a range of organisms that are found in and around production systems, above and below ground, and that have a functional role in the ecosystem, for example through pollination, soil formation, water provision, etc. For a more detailed definition, see Annex 1 of the country report guidelines.

⁷CGRFA-15/15/Report, paragraph 13.

⁸The 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 (CGRFA-14/13/Report, paragraph 15).

Proposed contents of the brief report

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STATE OF KNOWLEDGE OF BIODIVERSITY FOR FOOD AND AGRICULTURE

Please consult referenced sections of the country report guidelines⁹ for additional information, descriptions and definitions.

I. Assessment and monitoring of biodiversity for food and agriculture

1.1 General context¹⁰

a) Provide a brief account on the role of biodiversity for food and agriculture in your country.¹¹

1. A number of approaches have already been developed that use biodiversity for food and agriculture to achieve sustainable increases in productivity and provide a sounder ecological basis for agriculture.
 - i) The use of multi-species and multi-breed herds and flocks is one strategy that many traditional livestock farmers use to maintain high diversity in on-farm niches and to buffer against climatic and economic adversities.
 - ii) Species combinations also enhance productivity and yields in aquatic systems.
 - iii) Crop rotations, intercropping and growing different varieties of a single crop have all been shown to have beneficial effects on crop performance, nutrient availability, pest and disease control and water management.

Indicate which of the production systems listed in Table 1 below are found in your country¹² and briefly describe each of them (e.g. area under production, share of smallholders, importance of the production system to the incomes, livelihoods and well-being of rural communities, etc.).¹³

Table 1. Production systems present in the country.

Production system	Indicate if present in the country (Y/N)	Description ¹³
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⁹See <http://www.fao.org/nr/cgrfa/biodiversity/guidelines/en/>.

¹⁰Reference: questions 2, 3, 4, 5, 6 and 7 of country report guidelines.

¹¹Reference: question 3 of country report guidelines.

¹²Reference: questions 4 and 5 of country report guidelines. For the purpose of this table, aggregated production systems are used (disregarding climatic zones).

¹³Reference: questions 5 and 7 (Table 3) of country report guidelines and FAOSTAT: <http://faostat3.fao.org/home/E>

<p>Livestock grassland-based systems</p>	<p>Y</p>	<p>The livestock sector also renders consumptive and productive use, value of biodiversity contributing 4.6% in 2012 and 4.4% in 2013 to the national GDP. Tanzania has the third largest livestock population on the African continent comprising 25 million cattle, 98% of which are indigenous breeds, complemented by 16.7 million goats, 8 million sheep, 2.4 million pigs, and 36 million chickens. Livestock occupies about 26 million ha of Tanzanian land, out of the 50 million ha of land classified as suitable for production.</p> <p>Livestock production can be classified into three main systems based on the spatial characteristics (area requirement) and the economic objective (commercial or subsistence) of livestock keeping. These systems are extensive, semi-intensive and intensive. Extensive system are grassland based and require a large area (more than 5ha) of range land to sustain a livestock unit of 1year. In this system, livestock are usually sustained by the free grazing of natural pastures whose quality varies with the season.</p> <p>.Like other developing countries, livestock production systems in Tanzania vary widely and fall into four broad categories, pastoralist, agro-pastoralist, smallholder traditional subsistence and market oriented smallholder dairy producers (Moyo et al 2007; Freeman et al 2007; World Bank 2007).</p> <p>Variation is also influenced by breeds of animals used, intensity of land and labor use and feeding systems (Wakhungu 2001; Muriuki et al 2003). The suitability of different production systems to the existing environment, socio-economic profiles, the preferences by farmers and other inherent factors such as farm size, distance to the market need to be understood to attain the overall development in livestock sector (Swai and Karimuribo 2011). Similarly, lack of understanding of cattle production systems makes it difficult to design and implement livestock-based development programmes that benefit livestock keepers (Delgado 2005; World Bank 2009). Constraints to cattle production are complex and vary among households due to the different biological, social and economic factors that influence production methods and, consequently, productivity levels (Steinfeld et al 2006; Thornton 2010).</p> <p>Grass species commonly found in include <i>Panicum</i> spp., <i>Pennisetum purpureum</i>, and <i>Chloris gayana</i>. <i>Neonotonia wightii</i> and <i>Centrosema pubescens</i> are the major legumes.</p> <p>Three main grazing systems can be identified namely:</p> <ol style="list-style-type: none"> a. Nomadism in semi-arid areas where stock owners move with their animals in search of forage (as is still the case of Maasailand, to a significant extent). b. Semi-nomadism, with cattle owners permanently settled, but trekking their animals to distant grazing and watering areas. c. Ranching and dairying by land-owning associations, villages, corporations or private individuals. Under this system pasture innovations can be (or have been) successfully introduced (Kidunda <i>et al.</i>, 1990).
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<p>Livestock grassland-based systems</p>	<p>Y</p>	<p>Livestock grazing is considered to be of great ecological importance in terrestrial ecosystems if sustained at acceptable levels. Overgrazing has ecological ramifications which lead to degradation of the ecosystem. This has become a problem in many parts of Tanzania (Kikoti <i>et al.</i> 2015).</p> <p>The natural grassland responds to intensive management and can support one stock unit on less than one hectare. Grasses found in the zone are <i>Cenchrus ciliaris</i>, <i>Setaria sphacelata</i> var. <i>splendida</i>, <i>Panicum</i> spp., and <i>Pennisetum purpureum</i>, and legumes <i>Centrosema pubescens</i>, <i>Desmodium intortum</i>, <i>Neonotonia wightii</i> and <i>Medicago sativa</i>. Three main grazing systems can be identified namely</p> <ol style="list-style-type: none"> a) Nomadism in semi-arid areas where stock owners move with their animals in search of forage (as is still the case of Maasailand, to a significant extent). b) Semi-nomadism, with cattle owners permanently settled, but trekking their animals to distant grazing and watering areas. c) Ranching and dairying by land-owning associations, villages, corporations or private individuals. innovations can be (or have been) successfully introduced (Kidunda <i>et al.</i>,1990) <p>Five main pasture types have been identified by ecological zone (TSAP 1978.)</p> <ol style="list-style-type: none"> a) Semi arid to sub humid grazing land: covers nearly 30% of the grazing area and is mainly found in the central plains including the pastoral systems of Arusha, Dodoma, Shinyanga and Singida. About 40% of the national cattle herd are found here at density of less than three ha/ head. Seasonality of production, drought and overgrazing are major problems. The trees mostly are <i>Brachystegia</i> or <i>Combretum</i> spp. The commonest grasses include <i>Chloris gayana</i>, <i>Cenchrus ciliaris</i>, <i>Brachiaria brizantha</i>, <i>Cynodon</i> spp. and <i>Andropogon gayanus</i>. <i>Sporobolus</i> spp. dominate in overgrazed areas. b) Humid plateau lands: these represent another 30% of the grazing area and support nearly 50% of the cattle. They are typified by the agropastoral zones of Mwanza, Mara and Mbeya. These two types, represent 60% of the area and carry 90% of the stock. The most common species of legumes found in this zone are <i>Desmodium</i> spp., <i>Clitoria ternatea</i>, <i>Macroptilium atropurpureum</i>., <i>Neonotonia wightii</i> and <i>Stylosanthes guianensis</i>. Dominant grasses are <i>Chloris gayana</i>, <i>Pennisetum purpureum</i> and <i>Setaria sphacelata</i>. The three remaining types are:- c) Humid lowland: represents 20% of the grazing, but only about two% of the livestock are here. The regions with the most potential are Mtwara and Lindi. Species commonly found include <i>Hyparrhenia</i> spp. and <i>Cynodon</i> spp. d) Very humid highlands: cover nine % of the area and support five% of the cattle. They are in parts of Kilimanjaro, Mbeya, Ruvuma and Kagera; most of the exotic and crossbred cattle are here. The potential of the area is for forestry or intensive agriculture including pyrethrum, coffee and tea e) Very humid lowlands: This is a limited area, restricted to Tanga region, but, livestock, especially crossbred dairy stock is increasing.
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<p>Livestock landless systems</p>		<p>In semi intensive systems, livestock are allowed to graze during the day and supplemented with feed upon their return from grazing. A good example of this is a small holder dairy production system. Intensive systems are high in put –high output with animal spending their life time in stalls (landless system), and animal receiving improved feed or animals spend time partly in their pastures and finish their eating via stall feeding (feedlot system). Livestock production systems used in any particular area are determined by social economic environment, tradition and available resources.</p> <p>Apart from supplying food products, livestock play a major role as an engine for rural livelihoods and development. Livestock provide draught power, transport and manure as fertilizer for crop farming activities and potential energy sources through biogas technologies for rural electrification and/or cooking fuel.</p> <p>The 2012/13 National Panel survey revealed 50% of all households keep livestock (4.6 million households), 62% of which are rural and 23% urban, with ownership patterns dominated by chickens (86% households), goats (48%), cattle (35%), pigs (9%) and other livestock (10%). Traditional breeds and processes dominate the Tanzania livestock sector. Tanzania Short Horn Zebu is the most widespread cattle breed in the nation. Agro-pastoralists households account for 80% of livestock production, pastoral communities 14% and remainig 6% comes from the commercial ranches and dairy sector. Sheep and goats are widely distributed and adapted to many agro-ecological zones. Domestic livestock populations have been increasing by 5% per annum over the past 15 years.</p> <p>In some urban areas of Tanzania, these systems have grown at an average rate of 6% per year over the last 13 years (Bahari et al 2000).The expanding urban and peri-urban livestock production sector has been described for cities like Dar es Salaam (Smith and Olaloku 1998; Sumberg 1997, 1999) but also for smaller cities such as Mwanza and Shinyanga (Nyamrunda and Sumberg 1998) and Tanga (Mulangila et al 1995). In most cities, urban farming is the second largest employer after petty trade and labour, and 74% of urban farmers keep livestock (Kristjanson et al 2004).</p> <p>Livestock that are kept are usually the conventional animals like cattle for milk, small ruminants and pigs for meat, and poultry for eggs and meat (Otte and Upton 2005). However, it is projected that rapid population growth will continue to be an important challenge to the goal of achieving sustainable improvements in food security</p>
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<p>Naturally regenerated forests</p>	<p>Y</p>	<p>Forests and woodlands in Tanzania cover 38.8 million ha representing about 40.4 per cent of the total land area. Out of this area, 13 million ha have been gazetted as forest reserves while about 1.6 million ha of the gazetted forest reserves are under water catchment management. Woodland is the dominant forest type covering large areas in the western and southern parts of the country.</p> <p>The forestry sector has a very important role to play in Tanzania's economy covering more than half of the total land mass, the country's forests contain such a high level of biologically diverse resources that makes Tanzania one of the richest countries in terms of biodiversity in the world. Forestry renders consumptive, productive and non-consumptive values of biodiversity. It contributes 4.6% of the nation's GDP (NBS, 2014), employing about 800,000 people. It is a source of fodder for livestock and supports the development of other sectors such as agriculture and tourism. The country is yet to benefit from the consumptive use of non-wood forest products (NWFPs) such as medicinal plants and animals that host genetic information with the potential to transform livelihoods of communities, and contribute to a green economy. Forests alone contribute over 90% of energy (both firewood and charcoal) consumption (URT, 2014a), with the highest percentage of charcoal being consumed in the urban centers such as the city of Dar Es Salaam. Furthermore, forests also offer ecosystem services as water catchment areas, carbon sinks, and biodiversity protection (URT, 2014a). Tanzania hosts significant forest cover that is productively exploited for direct use in furniture, energy, textile and leather industries</p>
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Mangrove forests	Y	<p>Mangrove forests are the dominant coastal ecosystem in Tanzania where approximately 150,000 people earn their livings from mangrove resources. Mangroves provide ecological services such as nursery areas for fish and prawns, roosting areas for birds and coastal protection. Mangrove forest also protect sea pollution by absorbing heavy metals that could affect human health through consumption of sea foods. Mangroves are a traded commodity and its poles are exported and used locally as a building material and are also used to make fish traps. Boat-making is a common use, in particular for the construction of dhow (traditional wooden boat) ribs and rails, and to a lesser extent keels. Mangrove wood is used for fuel to commercially produce salt and lime and process fish. Charcoal making is widely practiced through the Ruvu and Wami Deltas. Through utilization of these forests communities around them are benefiting in sustaining their livelihoods and hence contributing to improved life standards and poverty reduction.</p> <p>Mangrove forests are usually restored through natural regeneration, or via artificial restoration using planted seedlings. Through natural re-colonisation most of the local species occupy the shoreline and natural succession can take place (Macintosh, 2002). The major advantage of natural regeneration is that the resulting forest is expected to be more similar to the local mangrove species. In addition, natural regeneration is relatively easy and more vigorously establish, less labour is required and result <i>Journal of Global Biosciences</i> Vol. 3(1), 2014 pp. 334-344 ISSN 2320-1355 http://mutagens.co.in 335 in minimum soil disturbance However, it may hampered by lack of seeds and propagules, weed competition, pollution, poor soil conditions or disturbed hydrodynamics of the site (Field, 1996).</p>
Self-recruiting capture	N	
Culture-based fisheries	Y	<p>Tanzania is endowed with marine and inland aquatic resources including a coastline of 1,424 km stretching from Tanga in the north to Mtwara on the south side including islands, 64,000 km² of territorial waters, 223,000 km² of Exclusive Economic Zone (EEZ), 54,277 km² of large freshwater lakes (Victoria, Tanganyika and Nyasa), medium and small lakes, various rivers and wetlands that is considerably rich in fisheries resources. The sector employs more than 4 million people and its contribution to the GDP in 2012 and 2013 was 1.4%. Fisheries provide 30% of the national total animal protein intake (URT, 2010a), and is a source of foreign exchange and supports recreation as well as the tourism industry.</p>

Fed aquaculture	Y	<p>Aquaculture in the United Republic of Tanzania has a vast but as yet untapped potential. The industry is dominated by freshwater fish farming in which small-scale farmers practice both extensive and semi-intensive fish farming. Small fish ponds of an average size of 10 m x 15 m (150 m²) are integrated with other agricultural activities such as gardening and animal and bird production on small pieces of land. The United Republic of Tanzania is currently estimated to have a total of 14 100 freshwater fishponds scattered across the mainland. In addition, there is a large rainbow trout (<i>Oncorhynchus mykiss</i>) farm with an area of 25 m x 25 m situated in Arusha.</p> <p>The distribution of fishponds in the country is determined by several factors such as availability of water, suitable land for fish farming, awareness and motivation within the community on the economic potential in fish farming. Although very profitable internationally, shrimp farming is still in the experimental phase in The United Republic of Tanzania, a number of private companies have acquired plots and permits for the culture of shrimp. Shrimp farming has the potential to be a profitable activity in The United Republic of Tanzania but there are widespread concerns about its potential environmental and socio-economic impacts based on observation of the global industry.</p> <p>In recent years seaweed farming has become popular in some coastal areas as a means of income generation. Small-scale seaweed farms on suitably selected sites, some of which are run by groups of women and youth, are scattered along the entire coastline of the country, from Tanga in the north to Mtwara in the south, and in the islands of Mafia and Zanzibar. Seaweed cultivation has rapidly emerged as one of the major cash crops in Tanga and Zanzibar, producing enough income to cover household costs. The species farmed are <i>Kappaphycus cottonii</i> and <i>Eucheuma spinosum</i>. <i>Kappaphycus cottonii</i> is believed to be indigenous while <i>Eucheuma spinosum</i> and <i>E. striatum</i> were originally imported from the Philippines. There is also potential for the farming of other seaweed species such as <i>Glacilaria</i>.</p>
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Fed aquaculture	Y	<p>Available records suggest that aquaculture was first introduced in Tanzania in late 1940s. It is being estimated that the industry produces about 9500 tons of fish annually, from more than 14,740 ponds scattered all over the country.</p> <p>The aquaculture sub-sector has a great potential for expansion, especially due to the fact that demand for fish is increasing as a result of population growth and stagnant production from capture fisheries, both at global and domestic levels. The export drives for fish and fish products would most likely lead to aquaculture development in the country. It is being estimated that more than 50 percent of land in the country is suitable for fish farming. Effective aquaculture industry development requires adequate and reliable resources such as land, water and quality seeds of various aquatic species. Furthermore, appropriate environmental, social, and cultural conditions are essential in order to have sustainable aquaculture development. Development of aquaculture is constrained, inter alia, by adoption of appropriate technologies including biotechnology and bio-safety; adequate aquaculture extension services, capacity in fish disease diagnosis, adequate expertise, sufficient infrastructure, culture management and availability of quality fish seeds and feeds. Other constraints include appreciation of the opportunities in aquaculture development, accessibility to capital and markets and adequate incentives to aqua-farmer investors.</p>
Non-fed aquaculture	Y	<p>The country has substantial potential for aquaculture development both fresh and marine water. These include, diversified species in the wild suitable for culture, interested farmers; availability of human resource; raw material for fish feed production. Organisms in marine culture include; finfish, lobster, crabs, bivalve, holothoridae, gastropods and seaweeds. Suitable fish species from fresh water for aquaculture include; Tilapia mossambicus, Nile tilapia, African cat fish, trout, Nile perch and fresh water prawns.</p>

Irrigated crops (Other)	Y	<p>Development of Irrigation schemes throughout Tanzania is one of the initiatives that have enabled the agricultural sector to contribute more in the socio-economic development and the attainment of food security in the country villages have increased yields and significantly improved the lives of farmers and their families. The 2010 National Irrigation Policy which provides the direction for irrigation intervention contributed effectively into this.</p> <p>Examples have been reported in some areas/villages such as; The southern highland village of Magozi where rainfall is scarce, 3,723 farmers are now cultivating land that once seemed like a barren wilderness just a few years ago. During the 2008 harvest season, only 650 ha of land could be cultivated, yielding 2,600 tons of rice. But by 2011 season, the cultivated area had more than doubled to 1,500 ha and yielding 8,250 tons of rice and establishing food self-sufficiency for the first time since 2007. In the village of Uturo, farmer's yields have increased to an average of five tons per ha of land, up from 1.5 tons in 2008. In 2006, Iganjo farmers harvested 15 tons of round potatoes per ha twice a year. Today, the farmers are getting 30 tons per season.</p> <p>This recent agricultural success is the result of irrigation development in Tanzanian villages through various projects financed by the International Development Association (IDA) in collaboration with other development partners throughout the past decade. These include the Agriculture Sector Development Program, Participatory Agricultural Development and Empowerment Project(PADEP) the River basin management and Smallholder Improvement Project (RBM SSIP); and the Tanzania Social Action Fund (TASAF). As a result of the investments made through these projects and programs, the total area of land under improved irrigation infrastructure has increased by 51%, from 264,388 ha in 2006 to 399,775 ha in 2012. In year 2014/15 it increased to 461,326 hectares (<i>Annual Report 2012/2013; Ministry of Agriculture Food Security and Cooperatives</i>).</p> <p>The 2010 policy was implemented under the National Irrigation Commission. The National irrigation Master Plan (NIMP) 2002 prepared by the Ministry of Agriculture, Food, Security and Co-Operatives in collaboration with the government of Japan through its International Cooperative Agency (JICA) has indicated that the total irrigation development potential in Tanzania Mainland is 29.4 million hectares.</p> <p>The main crops grown under irrigation include paddy, maize, onions, bananas, beans, vegetables, sugarcane and flowers among others.</p>
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Irrigated crops (rice)	Y	Rice is the third most important food crop in Tanzania after maize and cassava. According to official data, annual rice production doubled between 2001 and 2012 (as a result of expanded cultivation areas rather than increased unit yields) and now averages about 1.35 million tonnes. Smallholders currently grow the majority of rice (74 percent of the planted area) under rainfed conditions; irrigated rice (20 percent) and large-scale production (6 percent) are currently less important. The Government of Tanzania has prioritized rice through its National Rice Development Strategy (NRDS): this aims to double rice production again by 2018 in order to improve food security and provide the possibility of export to neighboring countries.
Mixed systems (livestock, crop, forest and/or aquatic and fisheries)	Y	The use of multi-species and multi-breed herds and flocks is one strategy that many traditional livestock farmers use to maintain high diversity in on-farm niches and to buffer against climatic and economic adversities. Species combinations also enhance productivity and yields in aquatic systems. Crop rotations, intercropping and growing different varieties of a single crop have all been shown to have beneficial effects on crop performance, nutrient availability, pest and disease control and water management. Multi-cropping, intercropping, alley farming, rotations and cover cropping are all ways of combining crop species that have positive effects on productivity and yield stability
Rain fed crops		<p>Rain-fed crop production is one of the dominant farming practices in developing countries and plays a major role in providing food and livelihoods for an increasing world population.</p> <p>Most Tanzanians still depend on rainfed agriculture for their livelihood: some 68% of employed adults are in agriculture, hunting, and forest industry.</p> <p>Tanzania is well endowed with a variety of farming systems with climatic variations and agro-ecological conditions of which crops can be grown. The major 1 staples include: maize, sorghum, millet, rice, wheat, pulses (mainly beans), cassava, potatoes, bananas and plantains Whereas export crops are coffee, cotton, cashew nut, tobacco, sisal, pyrethrum, tea, cloves, horticultural crops, flowers, oil seeds and spices</p> <p>Tanzania is divided into seven development zones– Central (Dodoma and Singida regions), Eastern (Tanga, Pwani, Dar es Salaam, Morogoro), Lake (Kagera, Mara, Mwanza, Shinyanga), Northern (Arusha, Kilimanjaro, Manyara, Lushoto district of Tanga), Southern (Lindi, Mtwara, Tunduru district of Ruvuma), Southern Highlands (Iringa, Mbeya, Rukwa and Ruvuma), and Western (Kigoma and Tabora).Maize is accorded highest priority among major crops in five of the zones, and second priority in NorthernZone (after common bean) and Southern Zone (after sesame)</p>
Others (please specify)		

[Insert rows as needed]

1.2. State, trends and drivers of change of biodiversity for food and agriculture

1. Describe the main features of the state and trends¹⁴of and the main drivers of change¹⁵ affecting plant, animal, forest and aquatic genetic resources in the country's production systems as identified in Table 1.

Ecosystems provide different types of life supporting services that are vital for livelihoods and economic development and provide resilience to natural disasters and climate change. A rich biodiversity underpin ecosystem services. However, Biodiversity is threatened by a number of issues including: overexploitation; pollution; invasive alien species; exploration and extraction of oil and gas; climate change; genetic erosion; poverty; the need for economic growth; political and social instability in neighboring countries; culture and beliefs; inadequate awareness and knowledge; and inadequate policy, legal and institutional response. The escalating population (projected to increase from 44.9 million people (2012) to 59.8 million by 2025), which will increase the demand for food resulting in more habitat loss and pressure on biodiversity in natural ecosystems.

Loss of biodiversity and ecosystem services:

Tanzania has a very rich biodiversity and is host to one of the world's biodiversity hotspots. This biodiversity has important economic, technological and social implications. The terrestrial biodiversity is threatened by *inter alia* demographic changes (e.g. population growth and influx of refugees), land-use changes (e.g.expanding economic activities mainly agriculture), and land degradation.

Aquatic resources are threatened by pollution, destructive fishing (e.g. dynamite, poisoning, beach-seining), unregulated coastal tourism, trophy collection (coral and shell), over-exploitation of aquatic resources, erosion and silting due to deforestation and over grazing, and loss of habitat due to development activities (e.g. construction of dams, mining, irrigation).

Wetlands (over 7% of the land area) provide important ecosystem services. Mangrove ecosystems, for instance, provide feeding, breeding, and nursery areas for fish, prawns and shellfish. Furthermore, mangroves have many direct and indirect uses to the communities, for house building, fuel wood, boat building and poles. Yields are higher from the fisheries in the mangrove-fringed coastal waters than in areas where there are no mangroves. The wetlands are threatened by increasing population, land clearance and deforestation of swamp forest and surrounding woodlands, poaching, pollution and eutrophication, and modification of natural flow regimes. The ecosystem services are impaired by infestation of alien species, declining fish populations, habitat destruction, and loss of biodiversity.

Deforestation: Forests provide valuable ecosystem services, such as purification and regulation of water, climate regulation, and carbon sequestration; it also provides food, building material and wood fuel. According to the World Bank, close to 40% of Tanzania's

¹⁴Reference: (i) the First and Second Reports on the *State of the World's Plant Genetic Resources for Food and Agriculture*; the First and Second Reports on the *State of the World's Animal Genetic Resources for Food and Agriculture*; and *The State of the World's Forest Genetic Resources*; and (ii) questions 3, 11, and 20 of country report guidelines.

¹⁵Reference: (i) the First and Second Reports on the *State of the World's Plant Genetic Resources for Food and Agriculture*; the First and Second Reports on the *State of the World's Animal Genetic Resources for Food and Agriculture*; and *The State of the World's Forest Genetic Resources*; (ii) Annex 3 of the country report guidelines includes a list of drivers of change and descriptions; and (iii) questions 44, 45 and 55 of country report guidelines.

land area consists of forests, and the average annual deforestation rate is very high: around 1.1%¹¹ (which is more than twice the global average of 0.5%). Deforestation and forest degradation are contributing to global climate change, through emissions of greenhouse gases. On the local level, it causes land degradation and erosion, siltation, affects water run-off and loss of ecosystem services. Almost half of the forested area are reserved forests or national parks, while the other half is ‘general land’, which in practice is the same as open-access areas, which implies insecure land tenure where nobody has the power or legitimacy to enforce rules of law. The result of open access is in general depletion of resources. Causes of deforestation are uncontrolled economic activities such as unplanned agricultural expansion illegal logging, mining, and fuel wood extraction.

a) Indicate whether the country has any national information system in place on associated biodiversity and identify the most frequently monitored components of associated biodiversity.¹⁶

1. Tanzania has undertaken various measures to ensure sustainable conservation demonstrated by the signing Convention of Biological Diversity (CBD) on 12th June 1992 and ratifying of the same on 1st March 1996; Development and implementation of the 2001 National Biodiversity Strategy and Action Plan (NBSAP) (URT, 2001); Development and implementation of National strategies such as:- Climate Change (2012); Strategy on Urgent Actions on Land degradation and Water Catchments (2006); Strategy on Urgent Actions for the Conservation of Marine and Coastal Environment, Lakes, Rivers and Dams (2008); and Development of National Environmental and Action Plan (2013-2018) and other Strategies aimed at pollution control. In addition to that, formulation of different Acts, Regulations and Policies has led to among other things, development and implementation of Programmes and Projects, strengthening and establishment of Institutions and Agencies to manage biodiversity such as the Tanzania Forest Services Agency (TFS); Institutions to conduct research which include, Tanzania Fisheries Research Institute (TAFIRI), Tanzania Wildlife Research Institute (TAWIRI), Tanzania Forestry Research Institute (TAFORI) and several Agricultural Research Institutes (ARIs); Long term monitoring initiatives such as the National Forest Resources Monitoring and Assessment (NAFORMA) Programme; educational programmes like the “Malihai clubs”(1,687) in primary and secondary schools as well as Beach Management Units (BMUs).

National level interventions are carried out in tandem with and or complement to regional and international obligations as Tanzania implements several multilateral agreements for the protection of biodiversity.

a) List associated biodiversity species that are actively managed in production systems for the provision of ecosystem services in Table 2.

Table 2. List of associated biodiversity species that are actively managed in production systems for the provision of ecosystem services.¹⁷

Associated biodiversity species	Ecosystem functions and services provided by the species in the production system
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¹⁶Reference: questions 28 and 75 of country report guidelines.

¹⁷Reference: question 27 of country report guidelines.

Species 1	Wild plant biodiversity are important culturally and nutritionally. They form an integral part of daily diets of many poor people especially during famine. Some species also possess medicinal properties, dyes & flavorings.
Species2	Forests and savannahs provide critical inputs for farming in the form of fodder, soil nutrients, fencing, etc. Forests provide valuable ecosystem services, such as purification and regulation of water, climate regulation, and carbon sequestration; it also provides food, building material and wood fuel. Almost half of the forested area are reserved forests or national parks. About 38 percent of Tanzania's total land area is covered by forests and woodlands that provide for wildlife habitat, unique natural ecosystems and biological diversity, and water catchments.
Species 3	Wild fruit trees and shrubs used as a source of fruits and herbs (medicinal purposes)
Species 4	Mangroves provide ecological services such as nursery areas for fish and prawns, roosting areas for birds and coastal protection. Mangrove forest also protect sea pollution by absorbing heavy metals that could affect human health through consumption of sea foods. Mangroves are a traded commodity and its poles are exported and used locally as a building material and are also used to make fish traps. Boat-making is a common use, in particular for the construction of dhow (traditional wooden boat) ribs and rails, and to a lesser extent keels. Mangrove wood is used for fuel to commercially produce salt and lime and process fish. Charcoal making is widely practiced through the Ruvu and Wami Deltas. Through utilization of these forests communities around them are benefiting in sustaining their livelihoods and hence contributing to improved life standards and poverty reduction.
Species 5	Bee keeping- helps in the pollination

[Insert rows as needed]

- b) Provide in Table 3 a list of wild food species known to be harvested, hunted, captured or gathered for food in your country. Indicate 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)).

Table 3. Wild food species used for food in the country.¹⁸

Wild food species	Change in state (2,1,0,-1,-2, NK)
Species 1	Amaranth 1
Species2	Bitter lettuce (NK)
Species 3	Black jack -1 and many other wild vegetables. Change of state indicates 2
Species 4	Guava/ strawberry guava 1
Species 5	Wild passion fruit 0

¹⁸Reference: question 34 of country report guidelines.

Species 6	Marula tree 1
Species 7	Giant pouch rat 0
Species 8	Collobus monkey 0
Species 9	Termites 1
Species 10	Ants (NK)
Species 11	(senene in Swahili) 1

[Insert rows as needed]

- c) If available, provide information on the proportion of the population in your country that uses wild food on a regular basis for food and nutrition.¹⁹

“Wild” foods (defined here as any uncultivated species, plant, or animal) are an important part of many local and traditional food systems (Kuhnlein and Receveur 1996), food systems that, for many rural people in developing countries, have formed the foundation of food and nutrition security for generations. Such food systems include culturally-important and locally-available foods from hunting, gathering, and small-scale agriculture; the technologies needed to obtain, process and prepare them; and, associated social and cultural characteristics, beliefs, and practices (including traditional knowledge;

- The proportion of the population using wild food on a regular basis for food and nutrition is very small.

d) Briefly summarize the state and trends²⁰of and the drivers of change²¹affecting:

- o **Associated biodiversity²²: micro-organisms, invertebrates, vertebrates, plants**
- o **Ecosystem services²³: regulating, supporting**
- o **Wild food resources²⁴**

1. Habitat conversion, loss, degradation and fragmentation in terrestrial, freshwater and marine environments;
2. Over-exploitation of particular species of wildlife, tree species and aquatic Biodiversity due to human economic activities
3. Invasive alien species in terrestrial, freshwater and marine environments;
4. Environmental pollution or contamination; and
5. Climate change
6. Introduction of exotic plant material
7. Change of culture and human behaviour

BOX 1. Describe one or two examples of countermeasures that have been taken in the country to reduce adverse effects of drivers on associated biodiversity, ecosystem services and/or wild foods.²⁵

¹⁹Reference: question 59 of country report guidelines.

²⁰Reference: questions 21, 22, 23, 24, 29, 34 and 35 of country report guidelines.

²¹Reference: Annex 3 and questions 9, 10, 12, 14, 44, 45 and 55 of country report guidelines.

²²Annex 1 of the country report guidelines provides a definition of associated biodiversity.

²³Annex 4 of the country report guidelines provides a definition of ecosystem services.

²⁴Reference: question 34 of country report guidelines.

²⁵Reference: question 19 of country report guidelines.

1. Tanzania has made considerable efforts towards conservation of forest, wildlife habitat and marine environment; combating land degradation; and protection and conservation of water catchments which contribute towards achieving MDGs particularly Goal 7 on environmental sustainability. The Government has implemented various policies, legislation, programs, plans and strategies related to environmental conservation and sustainable development which have contributed in improving state of environment as well as biodiversity.
2. Other initiatives include mainstreaming of environment into national development frameworks as well as national policies, strategies and plans; and promoting participatory resource management in forest, wildlife and marine area.
3. Establishment of the National Plant genetic Resources Centre which has a mandate of collecting and conserving the Plant Genetic Resources giving priority to landraces and wild crop species

1.3 Needs and priorities

Identify the country's main needs and priorities in terms of the state of biodiversity for food and agriculture, and in particular of associated biodiversity, wild foods and ecosystem services.²⁶

While there has been some progress in protecting globally threatened and commercial species in development activities (eg. through EIA studies), much less progress has been made in protecting biodiversity of value to local livelihoods and its role in provision of ecosystem services (eg. clean water and soil). Tools for assessing the value of ecosystem services and bringing them into the market-place are only just emerging. A much better understanding of the range of goods and services that biodiversity provides, and their spatial distribution, is required in order to assess the true costs and benefits of development options. Criteria and principles are needed to weigh up long term biodiversity loss against short term economic gain. Tanzania also need to establish an understanding of how much biodiversity is desirable. This way ,informed decisions can be made. There are many economic and social benefits to be gained from sustainable management of biological resources, which are often under-exploited or overlooked. For example:

- New business and trade opportunities from growing markets for organic and sustainable products, including agricultural produce, timber, fish, and 'wild crafted' products (eg. herbs and spices), for which there are international certification or labelling schemes. Demand for such products is largely in distant. Northern markets, but is also a growing in many urban centres in the South.
- Safeguarding the long-term viability of natural resource based industries such as forestry and fisheries.
- Protecting commercially valuable and rare species for trade and tourism.
- Safeguarding the contribution of biodiversity to local livelihoods. Biodiversity provides food, medicines, livestock fodder, building materials and other goods for subsistence and trade amongst poor rural communities. It is estimated that over 80% of the world's population depends on

²⁶Reference: questions 28, 48 and 49 of country report guidelines.

traditional medicines for healthcare. Wild foods can be critical in times of stress, eg. war and famine; and biodiverse areas can have important cultural and spiritual value.

- Using traditional plant-based medicines to provide cheap alternatives to supplement under- resourced healthcare systems.
- Maintaining essential ecosystem services, such as provision of freshwater, soil conservation and climate stability. Loss of diversity can lead to land degradation and reduced resilience to stress eg. drought.

Also an effective set of responses to ensure the sustainable management of ecosystems requires substantial changes in institutions and governance, economic policies and incentives, social and behavior factors, technology, and knowledge. Actions such as the integration of ecosystem management goals in various sectors (such as agriculture, forestry, finance, trade, and health), increased transparency and accountability of government and private-sector performance in ecosystem management, elimination of perverse subsidies, greater use of economic instruments and market-based approaches, empowerment of groups dependent on ecosystem services or affected by their degradation, promotion of technologies enabling increased crop yields without harmful environmental impacts, ecosystem restoration, and the incorporation of nonmarket values of ecosystems and their services in management decisions all could substantially lessen the severity of these problems in the next several decades. The remainder of this Summary for Decision-makers presents the four major findings of the Millennium Ecosystem Assessment on the problems to be addressed and the actions needed to enhance the conservation and sustainable use of ecosystems.

Mainstreaming should not only be about integrating biodiversity and economic objectives in different sectors, but should also address the social dimension of sustainable development, particularly in the South where rural poverty is widespread. Poverty reduction is one of the cross-sectoral priorities of sustainable development, which were developed precisely because environmental objectives are unachievable in their absence. Thus, the possible negative impacts of integrated approaches on the poor need to be identified and addressed, while options which maximise beneficial outcomes should be prioritised. Improved natural resource management in different sectors is likely to benefit rural communities, but mainstreaming could impose costs on the poor if, for example, access to essential resources is restricted. Although the links between biodiversity and poverty reduction are increasingly recognised, in practice, both the conservation and development communities tend not to pay adequate attention to these links. Much of the literature and guidance on NBSAPs and biodiversity mainstreaming focuses on linking biodiversity with economics, and preserving threatened species, placing much less emphasis on biodiversity of importance to local livelihoods. Furthermore, communities are rarely consulted or able to influence decision-making, and the influence of organizations representing them tends to be relatively weak compared to those concerned with global biodiversity conservation. While the last decade has seen the emergence of integrated conservation and development initiatives at community level, their success and wider adoption has often been restricted by unsupportive policy and institutional frameworks (eg. insecure land and resource tenure, and unfavourable markets).

II. Sustainable use and conservation of biodiversity for food and agriculture

2.1 Sustainable use

- a) List in Table 4 management and diversity based practices that support the maintenance and use of biodiversity for food and agriculture in production systems.

Table 4. Management²⁷ and diversity based²⁸ practices that support the maintenance and use of biodiversity for food and agriculture in production systems.

Production system	Management/ diversity based practice ²⁹	Trends in the application of the practice over the past ten years
Agriculture	Rain fed and irrigation	Irrigation area is increasing while rain fed area is decreasing
Forestry	Naturally regenerating and planted forests	Naturally regenerating forests are decreasing
Fisheries	Natural fishing and aquaculture	Natural fishing is stable but aquaculture pace is slow

[Insert rows as needed]

BOX 2. Describe a successful programme or project that has been undertaken in the country to support one of the practices listed in Table 4.³⁰

- b) Provide examples whereby the diversity *per se*,³¹ or its lack,³² had a direct effect on productivity; food security and nutrition; rural livelihoods; ecosystem services; sustainability; resilience; or sustainable intensification.
- c) List in Table 5 examples whereby the use of biodiversity for food and agriculture contributed to cope with climate change, invasive alien species, and natural or human-made disasters

Table 5. Examples whereby the use of biodiversity for food and agriculture (BFA) contributed to cope with climate change, invasive alien species, and natural or human-made disasters

Objective	Description
Use of BFA to adapt to and mitigate climate change ³³	Open seed source project sponsored by FAOs BSF through Bioversity international. It is implemented among three East African countries i.e Kenya, Uganda and Tanzania.

²⁷ Annex 5 of the country report guidelines describes a list of management practices supporting the use and conservation of biodiversity for food and agriculture.

²⁸ Annex 6 of the country report guidelines describes a list of diversity based interventions supporting the use and conservation of biodiversity for food and agriculture.

²⁹ Reference: questions 52, 53 and 56 of country report guidelines.

³⁰ Reference: question 54 of country report guidelines.

³¹ Reference: question 58 of country report guidelines.

³² Reference: question 57 of country report guidelines.

³³ Reference: question 69 of country report guidelines.

Use of BFA to manage the spread of/control invasive alien species ³⁴	
Use of BFA to prevent natural or human-made disasters and/or reduce their effects on livelihoods, food security and nutrition ³⁵	

d) List and briefly describe ecosystem/landscape/seascape approaches³⁶ that have improved the management and use of BFA in the country.³⁷

1. In recognition of the potential for indigenous plants and animals that can widen the food base and provide opportunities for other uses in agriculture, forestry, medicine, recreation, industry, etc. Tanzania has mandated organisations such as the National Plant Genetic Resources (NPGRC) and selected livestock research institutions to ensure protection of the genetic resources.
2. Tanzania has registered significant progress in protecting some ecosystems and biodiversity at levels that surpass the 2020 Aichi Targets. This is demonstrated by the size of land under protection, which is about 40% of the total land area (6.5% of marine and 33.5% of terrestrial). This progress is due to direct interventions by the URT under relevant Ministries to set up policies, legislations, Strategies and guidelines for protection of biodiversity in the country. These interventions have been supported by research and development programmes from the academia and public sector institutions working in the area of conservation and sustainable development.
3. The HASHI project was intended to improve rural livelihoods by reviving *ngitili* (Barrow and Mlengi 2004). *Ngitili* were traditionally used to provide forage for livestock-especially oxen- the end of the dry season when villagers plow their land. Vegetation and trees are nurtured on fallow lands during the wet season so that fodder supplies are available for livestock during dry seasons. Two types of *ngitili* exist: enclosures owned by individuals or families, and communal enclosures owned and managed in common. Both were originally developed by the Sukuma people, responding to acute animal feed shortages caused by droughts, loss of grazing land to crops, and declining land productivity (Barrow and Mlengi 2003). The HASHI project’s approach to *ngitili* revival was to work with local people, first to identify areas requiring urgent land restoration, and second, to restore these areas according to customary practice. In many villages, HASHI field officers used residual natural seed and root stock to restore *ngitili* enclosures. Some of the restored *ngitili* dated back to the days before

³⁴Reference: question 46 of country report guidelines.

³⁵Reference: question 43 of country report guidelines.

³⁶The ecosystem approach concept is generally understood to encompass the management of human activities, based on the best understanding of the ecological interactions and processes, so as to ensure that ecosystems structure and functions are sustained for the benefit of present and future generations. Ecosystem approaches include the Convention on Biological Diversity’s Ecosystem Approach, Integrated Land Use Planning, Integrated Water Resource Management, Sustainable Forest Management, Code of Conduct for Responsible Fisheries, Ecosystem approach to fisheries management, etc.

- A “landscape approach” means taking both a geographical and socio-economic approach to managing the land, water and forest resources that form the foundation – the natural capital – for meeting our goals of food security and inclusive green growth. By taking into account the inter-actions between these core elements of natural capital and the ecosystem services they produce, rather than considering them in isolation from one another, we are better able to maximize productivity, improve livelihoods, and reduce negative environmental impacts.

³⁷Reference: questions 60, 61 and 80 of country report guidelines.

villagization, and others were newly created by farmers and villages. In addition to restoring *ngitili*, villagers were encouraged to plant trees around homesteads (particularly fruit and shade trees), field boundaries, and farm perimeters. This restoration and tree planting helped improve soil fertility and provide fuel wood, with the side benefit of helping farmers to stake out and formalize their land rights within villages. Together with the World Agroforestry Centre, the staff of HASHI, carried out much research to assess the potential for agroforestry and find out more about *ngitili* (Barrow and others 1988).

e) Provide examples of activities undertaken to maintain and use traditional knowledge of associated biodiversity and wild foods.³⁸

1. During collection missions of crop landraces for conservation purposes, traditional knowledge information is collected and Documented.
2. A number of research work on traditional knowledge is undergoing within the country such as; Promotion of use of traditional knowledge in biodiversity conservation. Traditional forest management locally known as *ngitiri* in Shinyanga; *alalili* in Masai land; and *milaga* in Dodoma, are now recognized and it plays an important role in the management of forests and woodlands across many parts of Tanzania. These traditional practices involve fallowing the land for a period of time to enable regeneration of vegetation and trees and then being used later for grazing and firewood collection.
3. Ethno medicinal study are conducted to document medicinal plants used in the treatment of ailments in some villages e.g Kimboza forest reserve in Morogoro, a low and catchment forest with high number of endemic plant species.
3. Ethno botany surveys and research done by scientists and indigenous people on the identification of useful plants as alternative medicine for both people and livestock and other uses.

f. Identify possible needs and priorities in terms of the sustainable use of biodiversity for food and agriculture, and in particular of associated biodiversity and wild foods.

Wild or uncultivated foods have long been important in the diets of the Wasambaa People in the area use a high diversity of traditional vegetables and a higher ratio of wild to cultivated vegetables compared to other parts of Tanzania (including Arumeru, Singida and Kongwa) (Keding *et al.* 2007, Weinberger and Swai 2006). Malnutrition, especially vitamin A and iron deficiencies, have been found to be a problem in the area (Mulokozi *et al.* 2003).

2.2. Conservation

a) Describe the status of *in situ* conservation of associated biodiversity and wild food species in your country³⁹:

³⁸Reference: questions 32, 33, 38 and 39 of country report guidelines.

³⁹Reference: questions 31 (Table 13) and 37 (Table 17) of country report guidelines.

1. **List and describe any existing national *in situ* conservation initiative(s).**
 - On farm conservation activities has been initiated at the NPGRC in some areas of the country.
 - Forest reserves
 - Protected animals like rhinos etc.
 - Ngorongoro conservation initiatives

2. **Indicate which species/groups of species are being conserved and with what objective(s).**
 - Yams, Finger millet, sorghum, forest plants, endangered and endemic animals and plants

3. **Describe any existing sub regional/regional *in situ* conservation initiative(s) the country is involved in.**

-NK

b) Describe the status of *ex situ* conservation⁴⁰ of associated biodiversity and wild food species in your country:

1. **List and describe any existing national *ex situ* conservation initiative(s).**

- There is a well established National Plant Genetic Resources Centre responsible for the collection and *ex situ* conservation
- There are two Botanical gardens earlier established of which the NPGRC has been given the mandate to take care of.

2. **Indicate which species/groups of species are being conserved and with what objective(s).**

- Different fruit trees
- Spices
- Medicinal plants
- Ornamental plants etc.
- Forest plants
- Animals (wild)
- Food crops and their wild relativesNIL

3. **Describe any existing sub regional/regional *in situ* conservation initiative(s) the country is involved in.**

NIL

c) Identify possible needs and priorities in terms of the conservation of biodiversity for food and agriculture, and in particular of associated biodiversity and wild food species.

i)Regulation:

Robust regulatory frameworks and enforcement mechanisms, including standards, codes, compliance and liability regimes, that can help reduce The Economics of Climate Change in Tanzania - Ecosystems Page 29 of 45 threats to biodiversity and ecosystems, while enhancing ecological services for climate adaptation. For example, the National Environmental Policy, Forestry Policy, Wildlife Policy, National Forest Programme, Integrated Coastal Zone Management Strategy, Agricultural Sector Development Strategy, Forestry Management Act (2002), and the Environmental Management

⁴⁰Reference: questions 30 (Table 12) and 36 (Table 16) of country report guidelines.

Act (2004) are regulatory mechanisms that aim at conserving natural resources in the country. These mechanisms need to be flexible to accommodate new available information, and moving targets based on better understanding of the dynamics between biophysical and social systems.

ii). Knowledge

To transfer knowledge and action between partners, sectors and countries: successful adaptation requires ecosystem and biodiversity conservation to be integrated with other sectoral and local government management activities (e.g. mainstreaming community-based natural resources management – CBNRM – in all sectors as indicated by the Environment Management Act introduced in 2004).

iii).Enhanced traditional knowledge

Giving value to traditional cultural practices could serve to protect components of biodiversity important for utilitarian or spiritual reasons. This will reduce negative impacts on biodiversity, protect threatened biodiversity, and use biodiversity sustainably.

iv).To cover a broader range of genetic diversity, Integration of *ex situ* and *in situ* conservation strategies, particularly for species that are difficult to maintain in *ex situ* facilities should be a priority.

v). Ecosystem restoration activities are now common in many countries and include actions to restore almost all types of ecosystems, including wetlands, forests, grasslands, estuaries, coral reefs, and mangroves.

2.3 Access and exchange⁴¹

a) Describe in Table 6 the main measures in the country (i) regulating access to; and (ii) ensuring the fair and equitable sharing of benefits arising from the utilization of biodiversity for food and agriculture (BFA).

Table 6. Description of the main measures in the country (i) regulating access to; and (ii) ensuring the fair and equitable sharing of benefits arising from the utilization of biodiversity for food and agriculture (BFA).⁴²

Components of BFA	Description of measures governing access to BFA	Description of measures regulating the fair and equitable sharing of benefits arising from the utilization of BFA
<i>Genetic</i>		

⁴¹Reference: questions 72 and 73 of country report guidelines.

⁴²Measures facilitating access to the different components of biodiversity for food and agriculture usually vary according to the intended use of the resource (e.g. any use, research and development, commercial use). Examples of possible measures consist of the need to obtain prior informed consent (PIC), sharing benefits based on mutually agreed terms (MAT), having special considerations in place for access to resources held by indigenous peoples and local communities, etc.

<i>resources</i>		
PGRFA	<p>i. National Focal Points are responsible for providing information on how to access the PGRFA</p> <p>ii. SMTA- Competent National Authorities such as the NPGRC is responsible for granting access to users of their genetic resources</p> <p>iii. Principles of CBD to be followed</p> <p>iv Access to “Plant Genetic Resources for Food and Agriculture (PGRFA)” is based on the provisions of the International Treaty on Plant Genetic Resources for Food and Agriculture (IT).</p>	<p>i.Principles of CBD</p> <p>ii. Crops listed in Annex I of this treaty are subject to a specific access system, the “Multilateral System of Access and Benefit Sharing”, established under ITPGRFA as Tanzania is signatory.</p>
AnGR	i.Principles of CBD	i.Principles of CBD
FGR	Principles of CBD	Principles of CBD
AqGR	Principles of CBD	Principles of CBD
<i>Associated biodiversity</i>		Principles of CBD
Micro-organisms	CBD	CBD
Invertebrates	CBD	CBD
Vertebrates	CBD	CBD
Plants	CBD	CBD
<i>Wild foods</i>	CBD	CBD

[Insert rows as needed]

- b) **Identify possible needs and priorities in terms of the policies and regulations governing the access to and ensuring the fair and equitable sharing of benefits arising from the utilization of biodiversity for food and agriculture, and in particular of associated biodiversity.**

III. Policies, institutions and capacity

3.1 Policies, programs, institutions and other stakeholders

- a) **Describe relevant policies and programs the country has adopted and is implementing to support the conservation and sustainable use of biodiversity for food and agriculture, and specify to which those that aim at:**
- **the coordinated use and conservation of sectoral genetic resources**
 - **addressing food security and nutrition⁴³**
 - **the sustainable use and conservation of associated biodiversity**
 - **the maintenance of ecosystem services**
 - **improving resilience and sustainability of production systems**
 - **supporting farmers, livestock keepers, forest dwellers and fisher folk to adopt and maintain**

⁴³The relevant policies and programmes should have an explicit reference to associated biodiversity and/or wild foods.

- **practices that strengthen the conservation and use of biodiversity for food and agriculture**
- **the application of an ecosystem/landscape/seascape approach⁴⁴**

Tanzania is committed to and has taken a number of measures towards conservation of biological diversity. These measures are guided by the National Environmental Policy (1997) and the Environmental Management Act (2004) complemented by sectoral policies and legislation as well as Multilateral Environmental Agreements (MEAs). These policies, legal and institutional frameworks provide for various development opportunities and challenges to the rural and urban local government authorities. Prior to the preparation of the Fourth Report on the Implementation of CBD (2009), there have been several policies, legislation, strategies and action plans that have been supporting implementation of the Convention in particular conservation of biodiversity. However, there has been new development or progress in further developing policies, legislation and strategies since then. These new initiatives include development and implementation of Agricultural and Livestock Policy, 2013; National Biotechnology Policy, 2010; National Irrigation Policy, 2010; Mineral Policy of Tanzania, 2009; Water Resource Management Act of 2009; Water Supply and Sanitation Act of 2009; Mining Act of 2010; Grazing Land and Animal Feed Resources Act of 2010; Public Health Act of 2009; Wildlife Conservation Act No. 5 of 2009, and Tanzania Development Vision, 2025.

1. The Convention on Biological Diversity was signed by Tanzania on 12 June 1992, and ratified on 1 March 1996. The Convention on Biological Diversity gives an opportunity for Tanzania to contribute to the global initiatives for the conservation of biological resources and makes it eligible to benefit from technology transfer, financial assistance, scientific and research cooperation, and capacity building. In addition, Tanzania stands to benefit from other provisions of the Convention relating to: research and training; public education and awareness; the need for impact assessments with respect to projects that may threaten genetic resources, species, or habitat; exchange of information; and technical cooperation. These provisions provide avenues or the development of a technical, social and management infrastructure that is conducive to better protect Tanzanian biological diversity. It also creates a basis for exchange and cooperation among country parties.
2. The National Agriculture Policy, 2012 emphasizes that the natural resources (land, soil, water and forests) must be managed so that agriculture is sustained. It also advocates for measures that will minimize encroachment in public lands including forests, woodlands, wetlands and pasture; promote agro-forestry and organic farming; and intensify plant genetic conservation programs.
3. The National Fisheries Sector Policy and Strategy Statement, 1997 focuses on the promotion of sustainable exploitation, utilization and marketing of fish resources to provide food, income, employment and foreign exchange earnings and effective protection of the aquatic environment. The Government is also implementing Fisheries Sector Development Programme (FSDP) to ensure sustainable fisheries resources

⁴⁴Reference: question 67 of country report guidelines.

management and conservation of biodiversity.

4. The Forest Ordinance is the major legal instrument of the Tanzania forest policy. It covers the creation and declaration of forest resources. The requirements necessary for declaring an area as a forest reserve are spelled out. The Forest Ordinance is not meant as a policy instrument for the attainment of certain objectives. It is rather an administrative instrument which enables the establishment of reserves. The Ministry responsible for forests has suggested the following amendments to the Forest Ordinance. The Ordinance will be extended to cover the establishment of institutions other than state forest reserves, such as village forest reserves, controlled areas, silvi-pastoral areas for pastoralists, etc.

5. The Convention for the Protection, Management and Development of the Marine and Coastal Environment of the Eastern African Region (the Nairobi Convention), was adopted on 21 June 1985 and acceded to by Tanzania on 1 March 1996. This regional Convention includes two Protocols and an Action Plan. The objective of the Convention is to ensure sound environmental management of the maritime and coastal areas of the East African region. It provides a framework for the protection and development of marine and coastal resources. The protocols focus on the conservation of flora and fauna and on measures for combating marine and coastal pollution.

(i) Provide a short analysis of the strengths and weaknesses of the policies and programs mentioned above and indicate their level of implementation.⁴⁵

a). Strength is covered above

b). Weaknesses:

i. Lack of integration of sector policies: for example integrating environmental objectives into non- environmental policy areas, such as energy, agriculture and transport, rather than leaving them to be pursued solely through purely environmental policy practices.

ii. Overlapping policies result in unnecessary administrative costs, increasing the cost of implementation.

BOX 3. Provide up to three examples to highlight how stakeholder groups in the country, such as groups or associations of farmers, forest dwellers, fisher folk and livestock keepers, NGOs or other civil society organizations, have actively contributed to the improved sustainable use and/or conservation of biodiversity for food and agriculture and the maintenance of ecosystem services.⁴⁶

(ii) Provide examples of successful inter ministerial cooperation in the area of conservation and sustainable use of biodiversity for food and agriculture and describe the relevant

⁴⁵Reference: questions 66 and 67 of country report guidelines.

⁴⁶Reference: question 77 of country report guidelines.

collaboration mechanisms.⁴⁷

- (iii) **Identify possible needs and priorities in terms of policies, programs and institutions governing biodiversity for food and agriculture, and in particular associated biodiversity and wild food species.**⁴⁸

3.2 Capacity

- a) **Identify and prioritize training and education needs that target the conservation and sustainable use of associated biodiversity and describe possible constraints.**⁴⁹

Due to increased population coupled with widespread poverty and ignorance, human pressure on biodiversity continues to increase over the years, thus the need to conserve, manage and utilize biodiversity resources on a sustainable basis cannot be over-emphasized. Conservation of the country's unique ecosystems and biodiversity requires not only good understanding and knowledge of the resource base but also the relevant capacity to do so. Thus capacity should be developed and continuously improved to meet various development challenges.

Training should be done starting at;

- (i). Education at Grass-root level on the importance and values of the existing associated biodiversity
- (ii). Harvesting methods should be taught to users to not over exploit the existing resources after knowing its importance
- (iii) Promoting the conservation of the biodiversity *in situ* and *ex situ* together with the associated traditional /indigenous knowledge
- (iv). Curricula on Biodiversity conservation to be introduced in schools/colleges at all levels
- (v). Awareness creation to Policy makers on the existing biodiversity and its importance

- b) **Identify and prioritize research needs to strengthen the conservation and sustainable use of associated biodiversity, wild foods and ecosystem services and describe possible constraints.**⁵⁰

IV. Regional cooperation

4.1 Regional initiatives the country is involved in to conserve and use biodiversity for food and agriculture

- a) **Describe in Table 7 relevant regional policies and programmes embedding the conservation and/or use of biodiversity for food and agriculture, and in particular associated biodiversity, wild food species and ecosystem services.**

Table 7. Description of relevant regional policies and programs that embed the conservation and/or use of biodiversity for food and agriculture, and in particular associated biodiversity, wild food species

⁴⁷Reference: questions 81 and 82 of country report guidelines.

⁴⁸Reference: question 88 of country report guidelines.

⁴⁹ Reference: questions 85, 86 and 90 of country report guidelines.

⁵⁰ Reference: questions 87 and 91 of country report guidelines.

and ecosystem services.⁵¹

Regional policies and programs	Description
East Africa Community (EAC)	The regional cooperation, based in Arusha, Tanzania, has an agenda on forest sector and issues of biodiversity, management, trade, MTAs in forestry will be addressed
Association of Forestry Research of East Africa (AFREA)	Co-operation in research in forestry focusing on priority areas and sharing of information for development in the region.
SADC Plant Genetic Resources centre	A regional Plant Genetic Resources centre based in Lusaka, Zambia responsible for the conservation of Base collections from the member states
The East African Community Climate Change	The East African Community Climate Change Policy was developed as a result of a directive by the Heads of State of the East African Community (EAC) Partner States, at their 11th Summit Meeting, which was held in Arusha, Tanzania on 20th November 2009 to address the adverse impacts of Climate Change in the region. This is in response to the growing concern about the increasing threats of the negative Climate Change impacts to the development of set targets and goals in the region. In addition, it is a fulfilment of one of the objectives of the Community; to develop policies and programmes aimed at widening and deepening cooperation among Partner States.
SADC Regional Biodiversity Strategy.	In 2007, SADC Ministers responsible for Environment approved a Regional Biodiversity Strategy
Regional Guidelines for the management of Invasive Alien Species	Realising that Invasive Alien Species also contribute to the extinction of indigenous species, the SADC Secretariat facilitated the development of Regional Guidelines for the management of Invasive Alien Species.
Transfrontier Conservation Areas (TFCA) such as the Kavango –Zambezi Transfrontier Conservation Area and other TFCAs.	A Transfrontier Conservation Area (TFCA) is defined in the SADC Protocol on Wildlife Conservation and Law Enforcement (1999) as a component of a large ecological region that straddles the boundaries of two or more countries encompassing one or more protected areas as well as multiple resource use areas. TFCAs are founded with the aim of collaboratively managing shared natural and cultural resources across international boundaries for improved biodiversity conservation and socio-economic development.

[Insert rows as needed]

4.2 Needs and priorities

- a) **Identify possible needs and priorities in terms of embedding biodiversity for food and agriculture, and in particular associated biodiversity, wild foods and ecosystem services into regional and international initiatives.**

V. Synthesis of needs and priorities and the possible way forward

Countries may wish to use Table 8 to summarize their needs and priorities, and possible actions to be undertaken, with respect to the four priority areas of the guidelines.⁵²

Table 8. List of the country's needs and priorities, and possible actions to be undertaken, to conserve

⁵¹Reference: question 84 of country report guidelines.

⁵²See sections 1.3 (a), 2.1 (f), 2.2 (c), 2.3 (b), 3.1 (d), 3.2, 4.2 (a) of the present guidelines.

and use biodiversity for food and agriculture.

Priority areas	Needs and priorities	Possible actions to be undertaken ⁵³
1. Assessment and monitoring	i. - Nodes of information such as computerized information data base systems in place ii. - Assessment of vulnerability and adaptation to climate change in various sectors	i. Establishment of data base of information on conservation and use of biodiversity for food and agriculture in organizations working in the environment and natural resources
2. Conservation and sustainable use	<p>Forest Sector</p> i. Collaborative forest management in various districts ii. Ensured ecosystem stability through conservation of forest biodiversity	a) Initiate National wide tree planting b) Develop community Forest fire prevention plans and programmes c) Strengthen community based forest management practices d) Afforestation programmes in degraded lands using more adaptive species e) Establish multiple fast growing tree species in community woodlots f) Control habitat destruction and fragmentation in high biodiversity areas g) Enhance the development of buffer zones and wildlife migratory routes h) Promotion of alternative sources of energy for both domestic and industrial use i) Promotion of appropriate and efficient technologies to reduce use of wood j) Promotion of natural forest regeneration k) Enhance participatory forest management through benefit sharing from forest resources l) Ex-situ conservation of important plant genetic resources m) Promotion of use of non-timber forest products n) Promotion of lesser unknown timber species
	<p>Livestock sector</p> i. Strengthen cross breeding for resistant breeds ii. Strengthen tick and tsetse control programmes iii. Strengthen livestock extension services iv. Improve livestock marketing infrastructure v. Enhance research and development vi. Promote zero grazing	i. Change land use patterns ii. Tsetse fly control iii. Integrated pest and disease control iv. Sustainable range management v. Infrastructure development vi. Research and development • Education of farmers/livestock keepers vii. Advocate zero grazing viii Control movement of livestock
	<p>Agricultural sector</p> i. Diversification of agriculture by growing different types of crops on different land unit ii. R&D on seed varieties tolerant to different challenges pose by climate change iii. Increase agricultural extension activities	i. Introduce Alternative farming systems ii. Promote indigenous knowledge iii. Shift crop farming to more appropriate agroecological zones

⁵³Reference: questions 92, 93, 94, 95, 96 and 97 of country report guidelines.

	<p><i>Coastal and Marine Resources</i></p> <p>i. Marine and coastal environment management programmes and projects to be initiated.</p> <hr/> <p><i>Wildlife sector</i></p> <p>i. Wildlife management policy to ensure conservation of wildlife resources ii. enhanced legal, regulatory, institutional environment for rural communities and private sector to participate in wildlife conservation through establishment of Wildlife management areas (WMA) iii. Developing appropriate regulatory mechanisms that will continue to set aside PAs where wildlife and natural areas will be conserved</p>	<p>iv. Integrated crop and pest management v. Make better use of climate and weather data, weather forecasts, and other management tools vi. Create awareness on the negative effects of climate change vii. Follow standard agronomic practices Promotion of annual and short term crops</p> <hr/> <p>i. Raise awareness on climate change ii. Restoration of degraded habitats <i>e.g.</i>, beach nourishment, <i>vertiva</i> grass planting, mangrove replanting, stimulation of coral reefs growth iii. Reduction or elimination of non-climate stress and monitoring; <i>e.g.</i>, Elimination of destructive fishing practices and over-fishing, Reduction of pollution and damaging extraction, proper management of salt production and seaweed farming, Coastal ecosystem monitoring.</p> <hr/> <p>i. Development of migratory corridors and buffer zones for wildlife species ii. Development and implementation of management plans for protected and conserved areas. iii. Support implementation of Community Based Management (CBM) programmes of wildlife management areas surrounding the national parks and game reserves iv. Combating illegal hunting and forest fires v. Developing wildlife information database vi. Enhance wildlife extension services and assistance to rural communities in managing wildlife resources • Enhance capacity building on wildlife management for sustainable development</p>
<p>3. Policies, institutions and capacity</p>	<p>i. To have policies in place that act in safeguarding and promoting the sustainable utilization of the biodiversity for food and agriculture ii. National capacities in terms of human and infrastructures to assess the implications (environmental, social and economic) in the whole area of biodiversity conservation.</p>	<p>i. Improving horizontal coordination and cooperation between policy sectors and the respective ministries by creating appropriate national level mechanisms to enhance communication between national entities on the whole issue of biodiversity conservation. ii. The understanding of the inter-linkages between the social, economic and environmental impacts of policies and economic activities should be improved iii. Involving more ministries in capacity building initiatives for sustainable development, including the Ministries of Finance and Planning who allocate and solicit funds for countries' programs. iv. Improving the policy-making process by working on all steps of the policy-making cycle. v. Creating an inventory of capacity building providers and ongoing capacity building</p>

		activities and identify gaps.
4. Regional and international cooperation	<p>i. Parties to understand the opportunities and challenges of cooperation in supporting capacity building, sharing of knowledge and technology between countries and funding for the implementation of the biodiversity conservation.</p> <p>ii. Knowing what would be the priorities for action to strengthen cooperation to achieve the goals set on all sectors of biodiversity conservation.³⁶</p> <p>iii. Determined international & regional cooperation, an enabling environment and means of implementation are needed to stimulate and contribute to developing the knowledge, capacities and motivation for biodiversity conservation</p>	<p>i. Parties to set mechanisms and roles for the conservation of Biodiversity from the perspective of international and regional cooperation.</p> <p>ii. Synergies between conventions and treaties (International & regional) through joint work plans.</p> <p>iii. The international agreements with the greatest impact on biodiversity should be linked with other agreements/ issues that are not in the environmental field such as those dealing with economics and politics and that solutions designed for one regime to not lead to problems in other regimes. For example, efforts to sequester carbon under the Kyoto Protocol should seek to enhance biodiversity, not harm it (for example, by planting multiple species of native trees rather than mono specific plantations of exotic species)</p>

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APPENDIX 1

Figure 1. Recommended scope of *The State of the World’s Biodiversity for Food and Agriculture*.

	Ecosystem services	
	Mainly provisioning	Mainly supporting and regulating
Biological resources	<p>Food and non-food products provided by cultivated and wild species and genetic resources of plants, animals (vertebrate and invertebrate), aquatic resources and micro-organisms.</p> <p>Examples include trees (timber, fuelwood), crops (food, feed, fodder and dye), livestock (meat, eggs, hides, fur skins and fibre), fish, wild plants (food, medicine), wild relatives, edible fungi, edible insects, bush meat, crustaceans and mollusks (pearls).</p>	<p>Associated biodiversity: species and genetic resources directly involved in supporting and regulating production systems.</p> <p>Examples include soil and planktonic microbes, pollinators, symbionts and kelp forests.</p>
Relevant CGRFA assessments	<p>Plant genetic resources: First and Second Reports on the <i>State of the World’s Plant Genetic Resources for Food and Agriculture</i></p> <p>Animal genetic resources: First and Second Reports on the <i>State of the World’s Animal Genetic Resources for Food and Agriculture</i></p> <p>Forest genetic resources: <i>The State of the World’s Forest Genetic Resources</i></p> <p>Aquatic genetic resources: <i>The State of the World’s Aquatic Genetic Resources for Food and Agriculture</i> (expected 2017)</p>	<p><i>The State of the World’s Biodiversity for Food and Agriculture</i> (expected 2017)</p>

Note: The scope of *The State of the World’s Biodiversity for Food and Agriculture* includes interactions between plant, animal, forest and/or aquatic genetic resources, ecosystem services (mainly supporting and regulating), associated biodiversity and wild foods.