COUNTRY REPORTS

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

EXECUTIVE SUMMARY

Egyptian regions are rich in wild plants and landraces which survived for hundreds of years. These landraces and wild relatives are widely adapted to the biotic and abiotic stresses and harsh conditions prevailing in these areas and could be exploited in crop improvement programs to address the challenges of climate change and to adapt to the new reclaimed lands. The ecosystems found in Egypt as well as their associated flora and fauna reflect the influence of these distinct biotic regions due to the highly variable geographical and bio-climatic variability in the country in addition to ancient civilizations. The biotic regions in the North are related to those of the Mediterranean Basin. The Eastern part of the country reflects influences from the Levant and the Arabian Peninsula . The biotic regions found in the South are influenced by Sudanian and Tropical Africa, and to the West, areas are related to the Saharan biotic regions found elsewhere in North Africa. Many of the biotic regions found in Egypt represent the extreme limits of their respective ranges, which makes the biological diversity found in these areas of special scientific importance. Egypt is situated in the south east of the Mediterranean Sea; her coast includes the delta of the River Nile which bifurcates north of Cairo into two branches that enter the Mediterranean at Rosetta and Damietta promontories. Egypt's diverse flora contains over 2300 vascular plant species and subspecies, and approximately 190 species and subspecies of mosses and hepatics. This reflects the long Mediterranean and Red Sea coasts combined with Egypt's position between Africa and Asia.

Egypt has been a signatory to the Convention on Biological Diversity (CBD) on June 1992 and ratified it on June 1994 and to the International Treaty on Plant Genetic Resources for Food and Agriculture since August 2002 which was ratified in 2004. Treaty sets guidelines for the process of collecting, identifying, evaluating, maintaining and documenting the plant genetic resources. It also defines national obligations for the sustainable use of those resources by each contracting party. In Egypt as a top priority, Ministry of Agriculture and Land Reclamation (MALR) focuses on preserving the national genetic resources and making them available for sustainable agricultural development without compromising biodiversity and biosafety requirements. The MALR activated the already existed Plant Genetic Resources Programme since 1994 by issuing the Ministerial Decree No. 1920 of 2003, establishing the National Gene Bank to be responsible for the conservation and maintenance of plant, animal as well as micro-organisms genetic resources in the Agricultural Sector in Egypt. MALR has appointed the NGB to be the Focal Point to represent the Ministry in the International Organizations related to the genetic resources for Food and Agriculture (FAO).Activities regarding biodiversity for genetic resources for food and agriculture have been carried out in cooperation with International Organizations and Institutes such as FAO, ACSAD, CGIAR centers , BIOVERSITY, USDA and others) .The successful implementation of conservation and use of genetic resources involves working more directly with farmers and gender and eco-system services. Strengthening these sectors and their communities is essential to the

success of biodiversity conservation and use and this would be essential for global food security and agriculture.

However, despite the many efforts taken around the world to conserve biodiversity and use it sustainably, responses so far have not been adequate to address the scale of biodiversity loss or reduce the pressures, the efforts by Egyptian scientists and in general the government to conserve and utilize the country's genetic resources are still modest or in need to be improved in various disciplines, and this is considered as a major challenge to meet the extreme events that are currently occurring in the country, especially adverse climatic changes (heat stress, drought and salinity), desertification and limited water resources. Strengthening ties with farmer communities while taking inconsideration gender issues and ecosystem services will ultimately benefit the conservation and use of genetic resources biodiversity which will reflect on agriculture and hence global food security.

The Ministry of Agriculture and Land Reclamation has launched the Agricultural Development Strategy 2030, which aims to increase the capacity of the agricultural sector to harmonize with internal and external variables and modernize agricultural systems for food security as well as improving the living standard of farmers by using agricultural resources efficiently and sustainably.

A draft law for the regulation of access and benefit sharing according to the Nagoya Protocol which the government of Egypt has ratified has been formulated in harmony with ITPGRFA and is ready for submission to the Parlaiment.

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 process for preparing this report for all production system was done for the year 2015-2016 through the literature review of all documentation and reports of:

- Egypt State of Environment 2102 (issued 2015).

- Country Pasture/Forage Resource profiles-Egypt/ FAO, 2013

-World Network of Microbiological Resources Centers(MIRCEN),Ain- Shams University Faculty Agriculture, Shobra-Khaima, Cairo, Egypt,2015

-Agricultural Sustainable Development Strategy 2030.

- Compilation and writing of the report was carried out by Dr. Neveen Abd El -Fattah Hassan - **National Gene Bank.**

2. General overview of the country

Egyptian regions are rich in wild plants and landraces which survived for hundreds of years. These landraces and wild relatives are widely adapted to the biotic and abiotic stresses and harsh conditions prevailing in these areas and could be the new reclaimed lands.

- The ecosystems found in Egypt as well as their associated flora and fauna reflect the influence of these distinct biotic regions. The biotic regions in the North are related to those of the Mediterranean Basin. The Eastern part of the country reflects influences from the Levant and the Arabian Peninsula . The biotic regions found in the South are influenced by Sudanian and Tropical Africa, and to the West, areas are related to the Saharan biotic regions found elsewhere in North Africa. Many of the biotic regions found in Egypt represent the extreme limits of their respective ranges, which makes the biological diversity found in these areas of special scientific importance

- Egypt lies between latitudes 22° and 32° to the North of the equator and between longitudes 24° and 37° to the East of Greenwich line. Egypt has a total area of about 1,002,000 sq.km of which only 4% of the total area is populated with population size 90 of million (2015). It consists of three main parts; Sinai (61,000 km, the Eastern desert extending between the River Valley and Red Sea Coast (223,000 km) and the Western desert extending between the Nile River Valley until the Libyan border (681,000 km), with a coastal belt that extends along the Mediterranean Sea from Rafah to El Salloum (850 km).

-The main objectives for the agricultural sector are: optimizing the utilization of land and water resources to expand agricultural areas, increasing yields in the old lands through the wide adoption of improved technologies, agricultural and other practices including the use of high yield varieties and good quality seeds, reclaiming more land and improving its production level, intensive research and extension efforts, and measures relating to better land and soil management, development of crop varieties tolerant to biotic stresses to expand agriculture horizontally in the new reclaimed land.

-Egyptian farmers have used genetic variation to select and develop new types and forms from the cultivated plant species since thousands of years. Many plant species and types were known and have been utilized along this long period of time. The history of plant domestication provides ample evidence that biodiversity is the humanity's best defense against poverty, food insecurity and threats to natural resources. The utilization of biological diversity remains the best way to secure the future food needs and to drive the economic and social development of the world's rapidly growing human population.

- Despite of the fact that the Egyptian agriculture is a very intensive system and uses more than 450 thousand tons of true seeds from different field crops and more than 5000 tons of vegetables seeds excluding the seed of vegetatively propagated crops, some Egyptian farmers still use the seeds of old local varieties in many places in Egypt which are considered a very rich biodiversity source.

-It is worthy to note here that Egypt has been a signatory to the Convention on Biological Diversity CBD on June 1992 and ratified it on June 1994 and to the International Treaty on Plant Genetic Resources for Food and Agriculture since August 2002 which was ratified in 2004. Treaty sets guidelines for the process of collecting, identifying, evaluating, maintaining and documenting the plant genetic resources. It also defines national obligations for the sustainable use of those resources by each contracting party.

-As a top priority, Ministry of agriculture and Land Reclamation (MALR) focuses on preserving the national genetic resources and making them available for sustainable agricultural development without compromising biodiversity and biosafety requirements.

-MALR activated the already existed Plant Genetic Resources Programme since 1994. According to the Ministerial Decree No. 1920 of 2003, the National Gene Bank was established to be responsible for the conservation and maintenance of plant, animal as well as micro-organisms genetic resources in the Agricultural Sector in Egypt. The NGB was inaugurated on the 6th of October 2004. It has short, medium and long range cold storage facilities.

-MALR has appointed the NGB to be the Focal Point and to represent the Ministry in the International Organizations related to genetic resources.

- MALR has also made further changes in the cropping patterns and the provision of the required incentives to increase production of competitive products and realizing an export

surplus. the complete liberalization of the production, marketing and export of all crops. preparation of a comprehensive national agricultural research policy, with a view to enhancing the planning and coordination of research activities at the national level.

Role of biodiversity for food and agriculture

1-The biodiversity of Egypt reflects its position, habitats and climate. Egypt is the meeting point of biotic elements belonging to four bio-geographical regions: Sahara-Sindian which is represented in the vast deserts; Iran-Turanian which occupies a small area in the Sinai highlands; Mediterranean which occupies a small area along the Mediterranean coast; and Afrotropical. The country possesses a wide range of habitats (e.g. mangroves, coral reefs, mountains, wades) and species (dugong), representing both tropical and Mediterranean environments. Agricultural Biodiversity refers to the diversity of all living organisms in the agricultural landscape used directly or indirectly in food and agriculture production

2- Biodiversity comprises much of the renewable natural capital on which livelihoods and development are based. All Policies relating to issues such as land degradation and desertification, trade, transport, development, climate change, security, health care and education have impacts on biodiversity. Despite the critical need for more effective conservation and sustainable use, the trends from available indicators suggest that the state of biodiversity is declining, the pressures upon it are increasing, and the benefits derived by humans from biodiversity are diminishing. The losses are due to a range of pressures driven by a range of socio-economic drivers. Climate change will act synergistically with other threats with serious consequences on biodiversity..

3- As Egypt is Party in the Convention on Biological Diversity (CBD) since June 1992 and ratified it on June 1994 and International Treaty on Plant Genetic Resources for Food and Agriculture since August 2002 which was ratified in 2004, Egypt is committed to conserve and sustainably use biological diversity for the benefit of present and future generations by addressing the main drivers of biodiversity loss.

4- The principal pressures on biodiversity were identified as habitat loss and degradation, overexploitation and unsustainable use, climate change, pollution and the spread of invasive alien species. These pressures are increasing continuously and are themselves driven by a range of socio-economic drivers, mainly the increased human population and associated increases in global consumption of natural resources and energy.

-The Ministry of Agriculture and Land Reclamation has released the Agricultural Development Strategy 2030, which aims to increase the capacity of the agricultural sector to harmonize with internal and external variables and modernize agricultural systems for food security as well as improving the living standards of farmers by using agricultural resources efficiently and sustainably.

5- Ministry of Agriculture and the Agricultural Researches Center developed adaptation measures to cope with these negative impacts, such as:

- Changing sowing dates for each crop.

- Developing crops tolerant to high temperature and water shortage

- Develop monitoring systems for current and recent pests.

- Improve the productivity of livestock breeds and the development of the nutrition program to cope with warmer climatic conditions.

- Enhance programs of producing plants varieties and programs of animal sector improvement: add new plant and animal species together with programs to preserve biodiversity systems.

- Strengthen the capacity of the National Gene Bank and other Biological Diversity Banks at the most fragile areas especially desert areas.

6- Wild life plays an important role in agricultural habitats in pollination and keeping ecological balance. Almost all of the cultivated land in Egypt is in the Nile valley and delta (80 % of total cultivated land). There are also small areas of cultivation in Northern Sinai and Western Desert oases which are irrigated with underground water. Urban centers are mostly concentrated around the Nile valley and in the delta, with smaller settlements in coastal areas. Egyptian economy's losses were estimated by about 13.5 billion pounds/year due to usage of pesticides which contributes to the loss of pollinators. The excessive use of fertilizers and pesticides had also led to the disappearance of important agricultural biodiversity such as owl, kite, and pollinators. Fertilizer use increased from 707,400 tons in 2001 to 996,000 tons in 2003 and 4000,000 tons in 2005. Agricultural land is being lost to human settlements. About 286,000 feddans were lost from 1990 to 1996; 47,700 feddans every year. In addition, the introduction of high yielding varieties and their wide use led to the neglect and disappearance of traditional varieties and the erosion of crop plant genetic diversity. Currently, Egypt depends on 4 crops (wheat, corn, rice and potato) for 50% of its vegetarian food and 14 mammal and bird species for 90% of animal proteins. Invasive alien species such as palm weevil and invasive weeds are also of great concern.

7- Egypt's biodiversity has 143 unique species with global significance, in addition to species with limited geographical distribution to certain areas "Oasis, Elba Mountain and Sinai Mountains", as well as endemic species. Egypt is inhabited with more than 22000 faunal and floral species, many of which is of high resistance to drought and diseases, including 3302 flowering plants (62 endemic and 2 threatened with extinction), 800 nonflowering plants, 111 mammals (40 threatened with extinction), 480 birds (26 threatened with extinction), 109 reptiles (27 threatened with extinction), more than 1000 fish species, 800 Mollusca, 1000 Crustacean, more than 325 types of coral reefs, 10000 – 15000 insects (including 63 butterflies) in addition to thousands of algae, fungi, bacteria and viruses. A significant part of these species are found in nationally designated protected areas.

The wild flora of Egypt is well documented in many reference books. It comprises some 2121 species and 153 infra-specific epithets (subspecies, variety and forma) of native and naturalized vascular plants, in addition to 158 species of mosses and hepatics. Substantial part of this diversity is confined to wettest regions: Mediterranean, Sinai Peninsula and Gebel Elba, a mountain range that supports Acacia woodland. While not counting its northern Mediterranean fringe, Western Desert is the poorest regions in the country in terms of plant diversity (El Hadidi and Hosni, 1996 and Boulos, 1999-2005).

8. Comment on the effects on biodiversity for food and agriculture of production destined for exportation versus production for local and/or national consumption.

1-A number of factors threaten country's diversity for all production system, among these; are the loss and degradation of habitats, over-exploitation and over harvesting of plant species, extensive agricultural and unplanned developmental activities, pollution, introduced species, overgrazing, water extraction, intensive use of chemical fertilizers, population pressure, land use legislations, climatic conditions, development and urbanization. Many of them have concurred to habitat fragmentation and ecosystem degradation. Financial constraints have impeded to take appropriate and effective measures to counter-balance these negative factors, which are seriously threatening populations of genetic resources. All production systems (crops , forestry, livestock production systems were highly affected due to changes in land and water use, over exploitation, Climate change vulnerability of diseases.

2- Wild life plays an important role in agricultural habitats in pollination and keeping ecological balance. Almost all of the cultivated land in Egypt is in the Nile valley and delta (80 % of total cultivated land). There are also small areas of cultivation in Northern Sinai and Western Desert oases which are irrigated with underground water. Urban centers are mostly concentrated around the Nile valley and in the delta, with smaller settlements in coastal areas. Egyptian economy's losses were estimated by about 13.5 billion pounds/year due to usage of pesticides which contributes to the loss of pollinators. The excessive use of fertilizers and pesticides had also led to the disappearance of important agricultural biodiversity such as owl, kite, and pollinators. Fertilizer use increased from 707,400 tons in 2001 to 996,000 tons in 2003 and 4000,000 tons in 2005. Agricultural land is being lost to human settlements. About 286,000 feddans were lost from 1990 to 1996; 47,700 feddans every year. In addition, the introduction of high yielding varieties and their wide use led to the neglect and disappearance of traditional varieties and the erosion of crop plant genetic diversity. Currently, Egypt depends on 4 crops (wheat, corn, rice and potato) for 50% of its vegetarian food and 14 mammal and bird species for 90% of animal proteins. Invasive alien species such as palm weevil and invasive weeds are also of great concern.

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CHAPTER 2: DRIVERS OF CHANGE

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?

A number of factors affect country's diversity, which are : the pollution, introduced of invasion species, loss and degradation of habitats, over-exploitation and over harvesting of plant species, extensive agricultural and unplanned developmental activities, overgrazing, , increase use of fertilizers and pesticides , increase population , climatic conditions, development and urbanization. A major problem facing the current plant genetic diversity is climate change, Genetic diversity for some underutilized species was not studied properly including Sumac, Pomegranate, Pistachio and Fig local grab and many others. the over expanding of population due to migration from Syria and Iraq and land fragmentation and miss management of range land.

All production systems (crops , livestock , etc..) were highly affected due to changes in land and water use, over exploitation, Climate change vulnerability of diseases the Tomato diseases under rainfed agriculture is an example local policies are not effective and in need to be reviewed to control loss of biodiversity for food and agriculture

The main drivers of change are:

- Intensive agriculture in all arable lands..

- Population growth and urbanization, in all governorates.

- Over use of natural plant by grazing resources and harvesting for fuel and medicinal remedies.

10. Where associated biodiversity is believed to be affected by climate change.

Agriculture plays an important role in the Egyptian macro economy; it has about 55% of Egypt's man power, also it consumes about 80% of total water resources and contributes about 14% of the Gross Domestic Product (GDP). More than 70% of agricultural land depends on low efficient irrigation systems that caused loss of large quantities of water, degradation of land productivity, and the problems of salinization.

Several studies were conducted on the impact of climate change and the increase in high temperature on the agriculture sector as follows:

- Increase in water consumption of crops

- Decrease in crop productivity of the most important crops like wheat, rice, potatoes and soybean while it is projected that cotton productivity will increase.

- Spread of agriculture pests that would affect productivity reduction.

- Indirect climate change impacts on the agriculture sector will be attributed to the decrease of the natural water resource of the Nile River, salinization increase, availability of the genetic resources, vapor rates and lightening.

- Deterioration of agricultural activity has social and economic effects on labor migration from degraded agricultural areas.

Also, high temperatures will affect livestock health and its productivity of milk and meat as well as reduction in cows and poultry growth rate with the probability of diseases spread related to water quality and livestock including foot and mouth disease.

Moreover, Fishery will face high temperature effects leading to fish migration to the North towards a more deep area. Fisheries production will be negatively affected by high water temperature and fresh water supplies decrease. Also, fish quality existed in Northern lakes will change due to salinization increase.

13. Briefly describe the main driver(s) affecting ecosystem services in each production system, as identified in Table5.

Climate change has an impact on biodiversity, and is projected to become a progressively more significant threat in the coming decades, especially terrestrial ecosystems with limited carrying capacity and sensitive ecosystems such as desert ecosystems and coral reefs, respectively. Already, changes to the timing of flowering and migration patterns as well as to the population density and distribution of species have been observed worldwide

(Rosenzweig et al. 2007). There is widespread evidence that climate change will also act synergistically with other threats, such as the spread of diseases and invasive alien species.

Studies had shown that Egypt's climate had changed greatly over the last 10000 years (Bubenger et al. 2008), as it turned gradually from wet climate (rainfall was more than 300 mm/year) to arid climate (less than 50 mm/year) which is prevailing till now. Human relationship with his surrounding environment was intimate where many animals like giraffes and elephants were living at that time, and then disappeared later on due to the arid climate.

Seasonal temperature distribution in Egypt in the year 2005 and the projected years 2025, 2075 and 2100 has been studied (Hegazy et al., 2009). It is anticipated that there will be increased air temperature throughout the four seasons in the coming 100 years, from the southern towards the northern parts of Egypt. This change will require the management of the local agro ecosystems in order to adapt planting or sowing practices for the projected climate change scenarios. Climate change has an impact on biodiversity, and is projected to become a progressively more significant threat in the coming decades, especially terrestrial ecosystems with limited carrying capacity and sensitive ecosystems such as desert ecosystems and coral reefs, respectively. Already, changes to the timing of flowering and migration patterns as well as to the population density and distribution of species have been observed worldwide (Rosenzweig et al. 2007). There is widespread evidence that climate change will also act synergistically with other threats, such as the spread of diseases and invasive alien species.

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The influence of the increased air temperature on the spatial and temporal distribution of four of the major economic crops in Egypt was also studied (Hegazy et al., 2008). The study concentrated on cotton (Gossypium barbadense L., cv. Giza 89), wheat (Triticum aestivum L., cv. Gemiza 9), rice (Oryza stiva L., cv. Sakha 101) and maize (Zea mays L., cv. Hybrid 10). Optimum air temperature allowing maximum growth for each of the study crop cultivars and the current and projected air temperature patterns in the future years were used for projection of the seasonal and crop distribution maps in the years 2005, 2025, 2050, 2075 and 2100.

Results showed that sowing dates of a target crop may be managed in order to allow maximum predicted planting area in the same region. The current maximum area suitable for planting cotton and wheat will be greatly affected by the projected increase in air temperature.

- Bubenger O., A. Bolten, F.Darius (2007). Atlas of Culture and Environmental Change in Arid Africa. Heinrich- Barth- Institut, Koln, Germany 239 pp.
- Hegazy et al. (2009). State of the Environment: Egypt, GEO South-Eastern Europe and Eastern Mediterranean Symposium On Earth Observation Services for Monitoring the Environment and Protecting the General Public, 8-10 June 2009, Athens, Greece.
- Rosenzweig et al. (2007). Assessment of observed changes and responses in natural and managed systems. In Climate Change 2007: Impacts, Adaptation and Vulnerability, Fourth Assessment Report of the Intergovernmental Panel on Climate Change (eds. Parry, M.L., Canziani, O.F.,

15. Briefly describe the main driver(s) affecting the availability, diversity and knowledge of wild foods in your country, as identified in Table 6.

Egypt has a rich and diverse biota: its unique geographical position at the juncture of several biogeographic regions, as well as the great variety of landscapes and habitat types support a correspondingly diverse species. Habitats with the greatest floral and faunal species diversity, or informally "the biodiversity hot spots" of Egypt, are roughly the mountains of South Sinai, the Gebel Elba region, and the Mediterranean littoral and coastal desert west of Alexandria. The Nile River itself and the Delta lakes support a considerable number of species. However, the species richness of the Red Sea's coral reefs is unrivaled in Egypt.

Despite being dominated by desert and drought, Egypt's biodiversity has 143 unique species with global significance, in addition to species with limited geographical distribution to certain areas "Oasis, Elba Mountain and Sinai Mountains", as well as endemic species. Egypt is inhabited with more than 22000 faunal and floral species, many of which is of high resistance to drought and diseases, including 3302 flowering plants (62 endemic and 2 threatened with extinction), 800 nonflowering plants, 111 mammals (40 threatened with extinction), 480 birds (26 threatened with extinction), 109 reptiles (27 threatened with extinction), more than 1000 fish species, 800 Mollusca, 1000 Crustacean, more than 325 types of coral reefs, 10000 - 15000 insects (including 63 butterflies) in addition to thousands of algae, fungi, bacteria and viruses. A significant part of these species are found in nationally designated protected areas.

Some animal and plant species represent relicts of a once flourishing growth in ancient periods when the environment was less severe. As conditions became decidedly arid, limited population's numbers of these species remained in the natural refugee sites. For example, small populations of gymnosperms trees of Juniperus phoenicea still exist in a few hilly sites in North Sinai (e.g. Gebel El-Maghara, Yelleg, Labni and El-Halal). Similarly, a few individual cheetahs can be found in the Qattara Depression of the Western Desert, but they are on the brink of extinction.

The wild flora of Egypt is well documented in many reference books. It comprises some 2121 species and 153 infra-specific epithets (subspecies, variety and forma) of native and naturalized vascular plants, in addition to 158 species of mosses and hepatics. Substantial part

of this diversity is confined to wettest regions: Mediterranean, Sinai Peninsula and Gebel Elba, a mountain range that supports Acacia woodland. While not counting its northern Mediterranean fringe, Western Desert is the poorest regions in the country in terms of plant diversity (El Hadidi and Hosni, 1996 and Boulos, 1999-2005). The vegetation of Egypt is also well documented in many theses, scientific papers and reports. However, there is no checklist for the algal and agricultural flora in Egypt, but as a rough estimate the algal diversity approximates 1500 species; while the agro diversity approximates 2100 species in addition to ca 1000 species of ornamental cultivated species. Thus, it must be a priority to concentrate future studies on algal and agro biodiversity in order to prepare accessible verified check lists for both groups of plants.

Few of Egypt's described taxonomic groups or species have been assessed to determine their conservation status.

In Egypt, terrestrial, inland water, coastal and marine wildlife is widely used for commercial, semi-commercial and subsistence purposes through both formal and informal markets. While some of this use is well managed and/or is at levels within the capacity of the resource for renewal, much is thought to be unsustainable. Nevertheless, there is no reliable information available on informal commercial industries based on biological resources (e.g. hunting, ecotourism and medicinal plants harvesting) because they are not appropriately regulated, or managed through permit and licensing systems.

The first wildlife protection law in Egypt was passed in 1912; it made it illegal to kill certain species of birds known to be beneficial to agriculture. Since the 1960's, a number of important steps have been taken to conserve Egypt's vulnerable wildlife populations and important habitats. Law 53/1966 prohibited hunting birds and other wild animals considered to be beneficial and in need of protection. Law 102/1983 concerning protected areas is an important legislation for nature conservation in Egypt where much of the country's nature conservation effort has focused on the establishment of a network of protected areas. Law 4/1994 for Environment addresses wildlife conservation offering protection of threatened species listed by decrees and laws. National organizations were established for the protection of nature including the Egyptian Wildlife Service established at the Giza Zoological Garden in 1979 and the Egyptian Environmental Affairs Agency (EEAA) established in 1992, now the main component of the Ministry of State for Environmental Affairs. A Game Bird Hunting Management Committee was established in 1994. With the passage of the Environment Law (law 4 for 1994) a new, more powerful and effective legislative system was established, which grants better protection to Egyptian wildlife. Law 4 for 1994 gives the Egyptian Environmental Affairs Agency (EEAA) the mandate and responsibility to protect Egypt's wildlife and their habitats, and makes the organization the focal point for all of the country's international conservation obligations (including CITES)

Intensive commercial collection and habitat destruction are the two main factors which have led to the disappearance of many wildlife species in Egypt. For instance, the Egyptian Tortoise (T. kleinmanni) is disappearing from much of its former range because of intensive collection for trade and habitat destruction despite that it was protected by the Minister of Agriculture Decree 1403 for 1990.

All available data about Egypt over 30 years at CITES in terms of the quantities and the current status of international trade in endangered fauna and flora species reveal that the Egyptian list combines 355 species including (352) fauna species among which 296 in annex"2" and 3 flora species only. The list shows that registered species contain 43 mammal species only out of 120 species, 75 bird species only out of 480 migratory and endemic species, 28 reptile species only out of 112, 10 fish species only, 3 bivalves and the remaining majority belongs to sanitarians species (367) which includes most of coral reef species registered in Egypt. There is a need to implement education and public awareness campaigns at all levels.

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

The main threats to the agricultural biodiversity in Egypt are as follows:

a. Urbanization expansion on agricultural land in spite of the strict legislation, faces destruction of agricultural lands.

b. Absence of suitable successive agricultural cycles in addition to cultivation of specific crops that have a high economic values.

c. Use of surface flooding irrigation methods, which led to land degradation, reduction of soil fertility and increased soil salinity.

d. Groundwater contamination with pesticides and chemical fertilizers leading to unhealthy production of food contaminated with traces of these pesticides.

e. Excessive use of chemical fertilizers and pesticides, which led to the disappearance of most of the wildlife (pollinators, kite, owl, fox, mongoose and wild cat).

f. Invasive species, especially palm weevil, grasses and various agricultural pests, which cause significant economic losses.

g. Increased migration from countryside areas to cities with increasing burden on resources.

h. Neglecting the local breeds and varieties as a result of the introduction of high yielding crops and animal breeds so that some became badly degraded or so rare with others disappearing.

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

19. Referring to the information provided in this chapter.

National responses to the continuing loss of biodiversity are varied and threats to biodiversity are addressed through a number of activities.

1-The National Gene Bank and Genetic Resources of Egypt:

-The National Gene Bank of Egypt was opened on the sixth of October 2004 to be responsible for the ex situ conservation programme and to be the focal point regarding the coordination of breeding programmes in both public and private sectors, seed supply system, and genetic resource programme.

National Gene Bank Organization:

-There are four major departments related to the NGB activities, they are:

- Field Crops.
- Horticultural Crops.
- Animal Genetic Resources.
- Agriculture-related micro-organisms.

- **The National Gene Bank Organization also comprises the following sections, labs, and facilities:**

1- The Genetic resources conservation section
2- Seed Viability Testing and Regeneration Section.
3- Genetic Resources Evaluation Section.
4- Documentation and Information Section.
5- Taxonomy Section.
6- Chemical Analysis Lab.
7- Molecular Genetics Lab.
8- Tissue Culture Lab.
9- Cytogenetics Lab.
10- NGB Farm.
11- Green houses.
12- NGB Herbarium
13- Small Botanical Garden

-The cold storage facilities of the NGB contains more than 24 thousand accessions (end of 2015) from the different genera and species
-These accessions are collected from breeding and research institutions, seed companies, farmers, individuals, international research centers, and from collecting missions.
-During the last six years 4,662 thousand genetic resources were identified, characterized, evaluated and regenerated.
- The evaluation of these genetic resources included field, molecular, cytological, chemical, and biochemical evaluation.
-The NGB has documented 11,169 thousand genetic resources on its database.
-The design of cold storage facilities was planned to contain approximately 200 thousand accessions in short, medium (active collection), and long (base collection) storage.
-All the information obtained during field and lab evaluation are distributed among the concerned parties.
-In addition to conserving accessions of true seeds the NGB has tissue culture storage facility and Botanical Garden.
-In addition to the establishment of the NGB as the ex situ major conservation facility, there are several botanical gardens which were established during the last 120 years. These botanical gardens belong and are supervised by the Ministry of Agriculture and Land Reclamation.
-Several herbaria of dried native plants (specimen) can be found in Egypt such as the Department of Botany of the Faculty of Science, Cairo and Ain Shams Universities and in the Agriculture Museum, where MALR is maintaining a very big collection among other herbaria

in Egypt. The herbarium serves as a reference for the identification of the several groups of native germplasm.

-It is worthy to note that the property of the different accessions of genetic resources in the NGB is respected under the rules of the intellectual property rights.

The Agricultural Research Center (ARC):

-ARC has 17 research institutes, Labs and support organizations. It has the primary responsibility for crop improvement research, cultivar development, and testing throughout the country. The ARC manages through special units the production of Breeder and Basic seed classes. ARC acquired six seed conditioning lines which are intended mainly for the conditioning of basic seed, but are also used to condition certified seeds on a charge per weight basis. ARC has a network of 10 Regional Research Stations with 37 specialized Stations, and 21 experimental units for crop experimentation on the village level nationwide.

-ARC is supervising and leading 6 field crops Breeding Programmes on the national level, namely:

1 National Programme for Cereal Crops
2 National Programme for Fibre Crops
3 National Programme for Oil and Onion Crops
4 – National Programme for Legume and Fodder Crops
5 National Programme for Sugar Crops
6 National Programme for Horticultural Crops

- There are some very limited plant breeding activities in the National Research Center (NRC), agricultural colleges and on a some what larger scale in seed companies specially for hybrids since 1988.

-308 varieties from 28 field crops, and 629 varieties from 32 vegetable crops, have been registered under the supervision of the ARC. Variety registration includes the variety testing for not less than 3 years for variety identification (DUS), and variety performance (VCU) before release. The majority of field crops varieties and to a lesser extent vegetable varieties have been developed by the ARC Research Institutes.

Other National Programmes:

-The following Institutions are partially involved in plant genetic resources activities:

1. Agriculture Research Center (ARC), MALR is the main institution involved with PGR activities (collection, evaluation, conservation and improvement of crop varieties).
2. Desert Research Center (DRC) and MALR (mainly involved with desert crop plants).
3.National Research Center (NRC) and Ministry of Scientific Research (mainly involved with medicinal plants and with some of the field crops).
4.17 agricultural faculties and 15 faculties of science of different Egyptian universities.

The State of In Situ Management:

-To insure that the National Programme benefits directly from this mechanism and the widest possible participation of the National Stakeholders in Egypt, three workshops were held and

in Egypt. The herbarium serves as a reference for the identification of the several groups of native germplasm.

-It is worthy to note that the property of the different accessions of genetic resources in the NGB is respected under the rules of the intellectual property rights.

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Animal Production Institute:

Livestock genetic resources

Integration of livestock into farming systems Livestock/crop production is an excellent example of an integrated production system, where fodder crops and agricultural residues provide the feed for animals. The majority of small farmers (about 90% of farmers) practice this system. Animal fertilizer makes the soil more productive than would be the case in their absence. More than 50 million m3 of animal fertilizer are produced annually. An important part of the forage is grown on the farm whereas concentrates are purchased. Egypt has little effective rainfall, at most 200 mm unequally distributed and on limited areas; therefore, Egypt has poor rangeland, although vast areas of more than 10 million ha exist.

-Moreover, the cattle population is concentrated in both Middle Delta and Middle Egypt regions with percentages 22.4 % and 26.2%, respectively. While 32.2% of the buffalo population is in the Middle Delta region and 22.4% is in the Middle Egypt region.

Nevertheless. 31% of the sheep population is concentrated in Upper Egypt, compared to 22.38% in Western Delta region. The goat population is concentrated in both Upper Egypt and Middle Egypt regions with percentages of 36 % and 23.5%, respectively. Indigenous cattle represent about 60% of the all cattle, while mixed-breed cattle represent about 37% and imported cattle about 3%. It is worth mentioning that 65% of the cattle population in the Western Delta region is mixed-breed, while in Middle Egypt the percentage of mixed-breed is 18.5% only.

-The cow population totaled 4.762 million head. while the buffalo population reached 3.949 million head in 2014. Regarding small ruminants, the sheep population reached 5.502 million head, while the goat population about 4.185 million head in 2014. The camel population was about 158269 head. while beast nearly 1.379143 million head in 2014. (Economic Affairs Sector2014)

-The sector is depending mainly on the private sector, with the majority of animal breeders being smallholder farmers and the share of the government sector is less than 2% of the total animal numbers. The ruminant

-Sector is well-integrated with cropland since Egypt has limited natural pastures. The feeding system is considered one of the key factors which play an important role in animal development and improvement (El-Nahrawy, 2008). Egypt has little effective rainfall, with the highest of 200 mm being unequally distributed and on limited areas; therefore, Egypt has poor rangeland (rangelands provide only 5% of animal feed in Egypt), although vast areas of more than 10 million ha exist. Egypt depends mainly on Egyptian clover (berseem) as the key forage crop. The cultivated area of berseem ranges from 1 050 000 ha to 1 260 000 ha in Delta and the Nile Valley annually ,. Animal production is highly dependent on cattle and buffaloes as milk-producing animals, as well as male animals and un-reproductive females are fattened for meat. In 2014 the estimated of milk quantities according to categories covered about 1083473.33 ton and number of dairy cattle concealed about 224867 (head)

Total of live stock (2014)	
Cows	4762491
Buffalo	3949262
Sheep	5502637
Goat	4185761
Camel	158269
Beast	1379143

Desert Research Center

-Mainly involved with desert crop plants and wild forage.

Forest flora resources

-In this respect, there are 2 different natural types of forests in Egypt as follows:

A. Climatic Formation

-This type of forest community is mainly confined to Gebel Elba, which represents the last North point of tropical rain forests extended into Egypt.

B. Edaphic Formation

- The mangrove forest of the Red Sea region is not to be referred to the climatic formation because it belongs to the maritime plant community which determined mainly be edaphic factors. If the sea is near, (e.g. the Red Sea region), the term maritime plant community may be used, if not the term halophytic community is more adequate, (e.g, in salt areas of the desert). Therefore, this two communities occur wherever the soil is saline

Central Laboratory of Aquaculture Reasearch

Fisheries and Aquatic genetic resources

Egypt occupies the northeast corner of the African continent. It borders the Mediterranean Sea, between Libya and the Gaza Strip, and the Red Sea, north of Sudan. Egypt includes the Sinai Peninsula, with the Suez and Aqaba Gulfs. The Nile River, with its many irrigation canals, flows through the country. It feeds the lakes of Mariut, Edku and Manzala, the northern lagoons of Port Fouad and Bardawil, the lake Timsah, the Bitter Lakes with the closed lakes (Qarun, Wadi Al Raiyan (1 and 3)) and the great reservoir behind the Aswan High Dam (Lake Nasser). Recently, some small water bodies in the western desert have been re-developed for fish production (Toshka and Natroun valley water bodies).

Capture fisheries in marine and fresh water has a long tradition in Egypt. However, during the last two decades aquaculture production has grown rapidly. In 2003 aquaculture production surpassed capture fishery production in terms of volume of fish produced

Marine, inland and aquaculture production – Egypt (2014)		
Thousand tonnes (2014)	**Contribution**	**(%)**
Marine capture fisheries	**127 821**	**11.70**
Inland capture fisheries	**259 577**	**23.75**
Aquaculture	**705 490**	**64.55**
Total	**1 092 888**	**100.00**

Marine sub-sector

Marine fisheries produce a wide variety of species. The most important are: sardine (15.0 percent of landings in 2014), shrimp (8.9 percent), anchovy (5.8 percent), brushtooth lizardfish (4.7 percent), mullets (3.1 percent), bogue (2.7 percent), and round scade (6.2 percent).

Other National Programmes:

-The following Institutions are partially involved in plant genetic resources activities:

1. Agriculture Research Center (ARC), MALR is the main institution involved with PGR activities (collection, evaluation, conservation and improvement of crop varieties).
2. Desert Research Center (DRC) and MALR (mainly involved with desert crop plants).
3.National Research Center (NRC) and Ministry of Scientific Research (mainly involved with medicinal plants and with some of the field crops).
4.17 agricultural faculties and 15 faculties of science of different Egyptian universities.

The State of In Situ Management:

-To insure that the National Programme benefits directly from this mechanism and the widest possible participation of the National Stakeholders in Egypt, three workshops were held and organized by the NGB from the stakeholders representing breeding programmes, seed supply companies and farmers, and the plant genetic resources programme, NGB.

-Under the convention of biological diversity, CBD concerning in situ conservation, a programme for in situ conservation including wild and wild relatives of plant genetic resources has been established. Under the law No. 102 of 1983 concerning the protected areas, twenty four protectorates representing about 10% of the total area of Egypt were identified. The following table shows the number of plant species in 14 protected areas which contain plant genetic resources

The Country Biodiversity Strategy and Action Plan:

-The Convention on Biological Diversity (CBD) that came into force at the end of 1993 requires all member states to develop a national biodiversity strategy and action plan (NBSAP) as the primary mechanism for the implementation of the CBD strategic plan with the aim to stimulate conservation action at the national level. A National Biodiversity Strategy and Action Plan (1997-2017) were developed by Egypt using a wide participatory approach. The strategy was adopted by the Government in 1998 as response to Egypt's obligations under the Convention on Biological Diversity (CBD).

Although the NBSAP stimulated conservation action at the national level and contributed to a better understanding of biodiversity, its value and management have not been fully effective in addressing the main drivers of biodiversity loss or mainstreaming biodiversity and ecosystem services in development activities. Egypt, as a Party to the CBD, is revising its plans in line with the new CBD Strategic Plan for Biodiversity 2011–2020, which includes reference to improving mainstreaming.

- International and Regional agreements and strategies for cooperation:

Egypt is party to conventions and agreements pertaining to various aspects of biodiversity conservation, such as to the Convention Relative to the Preservation of Fauna and Flora in their Natural State, African Convention on the Conservation of Nature and Natural Resources, Convention on International Trade in Endangered Species of Wild Fauna and Flora, Convention on the Conservation of Migratory Species of Wild Animals, Convention on

Wetlands of International Importance Especially as Waterfowl Habitat (also known as the Ramsar), United Nations Convention on the Law of the Sea, Convention on Biological Diversity and its biosafety and access and benefit sharing protocols, United Nations Framework Convention on Climate Change, United Nations Convention to Combat Desertification, Convention for the Protection of the Mediterranean Sea against Pollution, Protocol for the Protection of the Mediterranean Sea against Pollution from Land-Based Sources, Protocol Concerning Mediterranean Specially Protected Areas.

National legislative, institutional support and capacity building to protect biodiversity:

Egypt established a system and legislation for the conservation of its natural heritage. Most important are Law 48 (1982) for the Protection of the River Nile and Water Channels, Law No. 124 (1983) for Fishing, Aquatics and Regulating Fish Farms, Law 102/1983 as the legal framework for the declaration and management of protected areas (followed by the declaration of Ras Mohammed in South Sinai as the first protected area in Egypt), Law 124 1983 for the regulation and management of fisheries, Law 101 / 1985 to secure a suitable source of funding for protected areas, Law 4 / 1994 on environment protection which constituted a supportive national legislation helping to fulfill Egyptian obligations under the Convention on Biological Diversity and regulating hunting of wild animals and prohibiting the destruction of their natural habitats.

Human resources in nature conservation sector reached more than 600 persons including 7 holding PhD, 33 with MSc, 31 with BSc, 127 with higher intermediate education, and the rest with basic essential education.

In order to strengthen the environmental structure and management process, the powers and duties for inspection, enforcement, and environmental assessment of the EEAA was increased and the Nature Conservation Sector (NCS) was established. NCS liaises and coordinates activities with all sectors and departments of EEAA as well as with other relevant national, regional and international institutions.

-Protected area-based conservation:

As indicated earlier, protected areas have been one of the primary responses for maintaining biodiversity in Egypt. They have expanded over the past 30 years in both number and area. By 2015, 30 protected areas were established, extending over 14.6 % of the total land and marine areas of the country. They include a representative range of national habitats and physiographic regions, along with other sites of importance. They also cover major habitat types/biomes and eco regions of global importance identified in Egypt. However, the coverage did not meet the CBD 2020 Aichi target. Outside protected areas the proportion of sustainably managed production landscapes for agriculture, fisheries and aquaculture, amongst others, is limited.

-Management effectiveness of Protected Areas:

CBD requested parties to review management effectiveness of Protected Areas, assess the status (or "health") of Egypt's system of protected areas (PAs) by determining the extent to which PAs are achieving their objectives, identifying relative management strengths and weaknesses, and focusing attention for action and policy intervention.

In 2009, assessment of management effectiveness of protected areas was carried according to international standards using the Management Effectiveness Tracking Tool (METT) for 7 PAs (Wadi Degla, St. Catherine , Nabq , Ras Mohammed, Northern Islands of the Red Sea, Wadi El-Gemal and White Desert) which was later increased to 11 PAs (39% of its current protected areas) thus exceeding the target adopted by the CBD, which requires Parties to conduct evaluation for at least 30 % of their protected areas by 2010.

The main findings of the assessments were: PAs generally meet their conservation objectives and the staff technical skills are generally good; the P system is a vitally important socio-economic asset to Egypt but many benefits are unrealized; PAs are all under-resourced, far below the norm for Developing Countries or even for Africa; there is a marked disparity in the allocation of staff and budgets to areas as opposed to their needs and the national priorities in regard to biodiversity value; the conversion of land use, recreational use (especially tourism) and hunting are considered as the greatest pressures operating on the PA system and coordinated national strategies are required to address these issues; while there appear to be good local relations, local people don't necessarily support the PAs and they are not involved in management decisions; the system is vulnerable as a result of poor law enforcement, overexploitation of resources, lack of resources and excessive pressure on managers to accommodate unsustainable demands; site planning is generally poor and only half of the protected areas have formal management plans or definitive work plans.

The lack of financial resources is currently one of the main limitations for the effective management of existing protected areas in Egypt. Major sources of protected areas funding in Egypt currently include national government budget, bilateral and multilateral agencies (e.g. member countries of the Organization for Economic Co-operation and Development (OECD), the Global Environment Facility (GEF) and the World Bank; and probably other sources. Generally, however, neither government budgets nor international assistance have kept pace with the expansion of Egypt's protected area network since the CBD came into force in 1993. PAs are all under-resourced, far below the norm for Developing Countries or even for Africa. In order to match the regional or developing countries norms Egypt would need to invest between $7.4 million and $15.7 million annually in its national protected area system – a 4 to 9 fold increase on current expenditure.

Although public sector funding and bilateral/multilateral assistance will certainly continue to be important funding sources, new and innovative financial mechanisms are required to fill existing and future funding gaps. Financial sustainability is a critical requirement of the effective protected area networks envisaged by Aichi Target 11.

Considering this situation and the economic value of protected areas, a number of economic instruments have been applied in Egypt to generate funds for protected areas and to make them financially self-sustaining. While several of these mechanisms have been around for some years, their successful implementation may also require new approaches to ensure protected areas indeed retain critical funds for effective performance and future growth.

-Ex situ based conservation (breeding, propagation and rehabilitation):

Outside protected areas, complementary ex-situ conservation measures were undertaken for 17 animal and plant species. They resulted in the success of captive breeding for several

endangered species for the first time in Egypt. These included Oryx dammah and Arabian Oryx, Caracal and porcupine. Cheetah was introduced for the first time since 40 years, in addition to breeding the fourth generation of Egyptian Gazelle. African turtles became also available in large numbers.

Efforts have also been undertaken to rehabilitate some endemic flora and fauna species to increase their numbers in their natural habitats to protect them from extinction. These included: cultivation of some plant species in St. Katherine PA, including Arfeja (Annarhinum pubscens), Zayteia (Septemcrenata nepeta), Alloseeg (Sailne shimperiana), Alghasah (Ballota kaiseri) and St. Katherine Thyme (Origanum syriacum) with fenced areas to protect them from random grazing and other threats where the number of fenced areas reached 52 distributed in 18 sites; rehabilitation of wild turtles (Testudo kleinmanni) within Zaranik protected area after its discovery in an area outside the PA; reproduction of Acacia tree (Acacia raddiana) tree in Wadi al Gemal PA; reproduction of Haglig tree (Balanites aegyptiaca) in Elba PA; reproduction of Sarh plant (Maerua crassifolia) in Wadi al Gemal PA (wild animals like gazelle, hyrax, hares and Al teatel pastures over seed, flowers and leaves of this plant); and reproduction of Nabq plant (Zizyphus spina – Christi) known as the apple of the desert in Nabq PA.

- **Managing invasive alien species:**

Successful management of invasive species relies on preventing the introduction and spread of species to new areas, as well as controlling and eradicating established invaders in accordance with different international agreements and organizations to which Egypt is party. In this regard, ample efforts were undertaken by the Ministry of Environment in collaboration with other relevant agencies to record different taxonomic groups of invasive alien species in Egypt and to control invasive species transported by seas and ballast water, and to obtain information about current status of marine alien-invasive species. Although this signifies the national intent to manage biological invasions, there are no legislation or strategies and management plans to control and eradicate existing ones and to prevent the introduction of new ones.

Exerted efforts are still limited and the number of alien invasive species arriving in Egypt is increasing in spite of the fact that invasive species represent real threats to the Egyptian ecosystems, economy and human health. Moreover, information on existing management activities either does not exist or is not readily available. Combating Invasive species is beyond the country's current potentials in terms of human, financial and technical resources, and requires participation of all concerned agencies.

- **Managing wildlife trade and use:**

In Egypt, terrestrial, inland water, coastal and marine wildlife is widely used for commercial, semi-commercial and subsistence purposes through both formal and informal markets. While some of this use is well managed and/or is at levels within the capacity of the resource for renewal, much is thought to be unsustainable. Nevertheless, there is no reliable information available on informal commercial industries based on biological resources (e.g. hunting, ecotourism and medicinal plants harvesting) because they are not appropriately regulated, or

managed through permit and licensing systems. A draft law has been prepared for Access and Benefit Sharing for the utilization of genetic resources which will cover this gap by 2016

- **Managing agriculture and biodiversity:**

Sustainable agriculture has received increasing attention because expanding agriculture is globally the principal driver of biodiversity decline. The extension of agriculture in Egypt required more land than intensive agriculture to achieve the same production levels. Although it may have fewer impacts on wildlife and human health, it led to habitat loss and fragmentation and the erosion of genetic diversity. In response, the National Gene Bank (NGB) situated in the Agricultural Research Center (Cairo) undertakes the process of collecting, characterization, conserving, evaluating, regenerating and documenting the genetic resources of the plant, animal and microorganism genetic resources. NGB capacity is capable of 200,000 plant genetic seed samples, but the plant genetic accessions of the field and horticulture crops is estimated to be ≥ 24,000 genetic resources. In addition, there are many botanic gardens in Egypt with good management and staff facilities. Almost all the Egyptian plant collections are kept in the herbaria of the universities, research centers and botanical gardens.

Organic agriculture in Egypt dates back to the mid-1970s. Bio fertilizers and compost have been produced and applied to legume crops and cereals.to increase food production while reducing the amount of chemical fertilizers applied to crops. The Ministry of Agriculture has realized the importance of organic farming of vegetables, fruits and some crops and Egypt's first organic farm was launched in 1977 by Sekem which recognized that fertilizers and pesticides were degrading the soil and seeping into the food chain. By 2010, the total area of organic farming has reached about 82167 ha.

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

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

20. Describe the overall:

Status and Trends of Genetic diversity:

Genetic diversity is being lost in natural ecosystems and in systems of crop and livestock production due partly to the intensification of production, and partly to abandonment linked to migration from rural to urban areas. The main cause of this genetic loss was the use of uniform crop varieties to replace hundreds, if not thousands, of local varieties used over large areas. In addition, abandonment of traditional agricultural practices caused loss of cultural landscapes and associated biodiversity. The continued loss of genetic diversity of such crops may have major implications on food security.

The amount or rate of loss of genetic diversity is poorly known, but an example of the reduction in crop diversity in Egypt is cotton, where the number of local cotton varieties being cultivated in 2000s has greatly declined from those cultivated in the 1950s. It is either no longer found and the area devoted to its cultivation has been greatly reduced.

Plant genetic resources for food and agriculture:

In Egypt important progress is being made to conserve plant genetic diversity, especially using ex situ banks. A number of programmes were initiated for the collect, identify,

regenerate, evaluate, conserve and document the plant, animal and microorganism genetic resources in the Agricultural Sector in Egypt. Plant genetic resources of field and horticulture crops existing in National Gene Bank (NGB) conservation facility situated in the Agricultural Research Center (Cairo) is estimated in 2015 at more than 24,000 genetic accessions. However, the NGB capacity is estimated at 200,000 genetic resources.

22. Briefly describe the changes or trends in diversity recorded in Table7.

Scattered data is available at National Institutes and no comprehensive monitoring and periodically conducted measurements and indicators are carried out at the national level for all production systems, even though some prepared reports are developed but they are separated and not linked.

24. Briefly describe the changes or trends in diversity recorded in Table 8.

The main measurable trends for diversity are provided for botanical composition surveys.

26. Briefly describe the impacts on ecosystem services recorded in Table 9.

Almost the impact on ecosystem services were recorded based on experts personal observations but for Changes in crop genetic resources the indicators were availability for National Gene Bank' science 2004. Regarding livestock, no new breeds were introduced from these breeding programs well adapted to local community since 1980.

28. Does your country have monitoring activities related to associated biodiversity?

-Scattered monitoring activities are conducted and only botanical surveys are practiced on small scale the monitoring system for natural reserves, no referenced data is documented regarding food and agricultural components. and most conducted studies are for research purposes.