




THE SECOND REPORT
ON THE STATE
OF THE WORLD'S

FOREST GENETIC RESOURCES

COUNTRY REPORT

MALTA



This country report was prepared as a contribution to the FAO publication, *The Second Report on the State of the World's Forest Genetic Resources*.

The country reports had two elements: (1) an online questionnaire to gather data and information on forest genetic resources; and (2) a complementary written report. For the written reports, countries were invited to follow the structure of the global report and reporting guidelines adopted by the Commission on Genetic Resources for Food and Agriculture at its Seventeenth Regular Session in 2019.

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ANNEX 2

PROPOSED OUTLINE OF THE COMPLEMENTARY REPORT
**THE SECOND REPORT ON
THE STATE OF THE WORLD'S FOREST GENETIC RESOURCES**
**MALTA
NOVEMBER, 2020**

Preface

Acknowledgements

Abbreviations and Acronyms

Executive summary

Part 1: The contributions of forest genetic resources to sustainable development

Chapter 1. Value and importance of forest genetic resources

The objective of this chapter is to present a narrative of your country and its economic, environmental, social and cultural conditions as they relate to forests and the forest sector. This chapter should also describe briefly the current and potential contributions of forest genetic resources to sustainable development, and in particular to sustainable forest management, adaptation and mitigation of climate change, food security, nutrition and poverty alleviation in your country, as appropriate. Information on the following topics or issues should be presented:

- The role of forests and the forest sector in the national economy
- Economic, environmental, social and cultural values of forest genetic resources
- The contributions of forest genetic resources towards relevant Sustainable Development Goals

The National Focal Points may consider the following guiding questions in preparing the content of this chapter:

- ✓ What are the main roles of forests in your country (supply of wood and non-wood products, provisioning of ecosystem services, etc)

Forests are normally managed for conservation objectives and to provide ecosystem services in accordance with national policies and action plans and international commitments. These include but are not limited to:

- i. Biodiversity conservation
- ii. Climate regulation
- iii. Soil conservation and prevention of land degradation
- iv. Recreation
- v. Research

- ✓ What are the specific economic, environmental, social and cultural values of forest genetic resources in your country?

The value of forest genetic resources has been explored by various researchers throughout the years; despite these resources have ecological, ornamental, medicinal, nutritional, cultural, and social values, much of their potential uses lack detailed research and remain largely untapped.

- ✓ How do forest genetic resources contribute to sustainable development in your country?

Wooded areas contribute to sustainable development by improving air quality, preserving water courses as these are very scarce in Malta, therefore preserving local habitats mitigating the effects of climate change on biodiversity and the built environment. It is understood that tree cover would directly contribute to improve groundwater resources. In general, forest genetic resources are not used directly, such as for the production of timber, to establish sustainable development feedback loops for production. Benefits of the natural environment on social health are also acknowledged as contributors to sustainable development and tourism. Research interest from external research institutions is another contributor to sustainable development.

- ✓ What are the priorities and needs of your country to enhance these contributions?

Malta is in the process of establishing a national genebank which will serve to store seeds of local plant biodiversity, as well as establish partnerships and cooperation for their study, valorization and potential utilization in breeding programmes or other such outlets.

- ✓ What are the constraints in your country to increasing awareness on the value and importance of forest genetic resources?

Many of the species identified as priorities, especially for local use, have received little or no research attention. Genetic knowledge for the conservation, utilization and improvement is scarce but has been on the increase in the last decade. Genetic characterization is still lagging behind for most species. Lack of land availability, of land preservation of business interest, and of adequate financial investment are limiting factors to provide backing for the development of knowledge on these genetic resources, and transfer this into potential value and public awareness.

Part 2: State of diversity in forests and woodlands

Chapter 2. State of forests

The objective of this chapter is to present a narrative of the state of forests in your country and explain briefly the trends that are shaping them. It is recommended to focus on the overall situation and its implications on forest genetic resources. There is no need to present extensively the data your country provided to FAO for the 2020 Global Forest Resources Assessment. The chapter should also identify

the main drivers of change, and analyse their consequences specifically for forest genetic resources. Information on the following topics or issues should be presented:

- State of forests and trends in their management
- Drivers of change in the forest sector, and their consequences for forest genetic resources
- Challenges and opportunities for forest genetic resources

The National Focal Points may consider the following guiding questions in preparing the content of this chapter:

- ✓ What is the state of forests in your country?

Definitions of Forests are not appropriate for the Maltese context. Hence, the answers for this section should be for the subsequent Section (Chapter 3).

- ✓ What are the trends affecting forests and their management in your country?
- ✓ What are the drivers of change in the forest sector in your country, and what are their consequences for forest genetic resources?
- ✓ What challenges and opportunities these trends and drivers create for the conservation, use and development of forest genetic resources?

Chapter 3. State of other wooded lands

The objective of this chapter is to present a narrative of the state of other wooded lands and trees outside of forests in your country and explain briefly the trends that are shaping them. The chapter should also identify the main drivers of change, and analyse their consequences specifically for forest genetic resources. Information on the following topics or issues should be presented:

- State of other wooded lands and trends in their management
- Drivers of change in other wooded lands, and their consequences for forest genetic resources
- Challenges and opportunities for forest genetic resources in other wooded lands

The National Focal Points may consider the following guiding questions in preparing the content of this chapter:

- ✓ What is the state of other wooded lands?

All native woodlands are protected by S.L. 549.44 and S.L. 549.123, whereby their status is regularly assessed and reported by habitat. Such habitat relevant to woodlands include the following habitats listed under Annex I of the Habitats Directive:

- Arborescent matorral with *Laurus nobilis* (5230);
- *Salix alba* and *Populus alba* galleries (92A0);
- Southern riparian galleries and thickets (92D0);
- *Olea* and *Ceratonia* forests (9320);
- *Quercus ilex* forests (9340);
- Mediterranean pine forests with endemic Mesogean pines (9540);

Tetraclinis articulata forests (9570);

In terms of FGRs, the Authority considers the certain species as native or archeophytic to Malta. Most of these species are addressed in the aforementioned regulations.

In terms of in situ conservation, Malta has a national ecological network as set up by the Flora, Fauna and Natural Habitats Protection Regulations (S.L. 549.44), under the Environment Protection Act (CAP 549), as indicated in question 3 further above. The EU's Natura 2000 (N2K) network and Tree Protected Areas

(TPAs) form part of this ecological network. Various protected areas have management plans (or conservation orders in some cases) that have been set up as legal requirements to prepare conservation measures.

There are 60 Tree Protection Areas (TPAs) in total in the Maltese archipelago, of which 48 in Malta, 10 in Gozo and 2 in Comino. Of these TPAs, 30 were designated in 2011 through Government Notice, G.N. 473 of 2011 and a further 30 were designated in 2017 through G.N. 316 of 2017. A total of 60 native tree species, of which 66% rare and endangered species are protected through the declaration of these TPAs.

In terms of ex situ conservation, Environment and Resources Authority acts on the basis of the Flora, Fauna and Natural Habitats Protection Regulations (S.L. 549.44) and the Convention on Biological Diversity (Incorporation) Regulations (S.L. 549.27).

- ✓ What are the trends affecting other wooded lands and their management in your country?

All woodland habitats in the Maltese Islands have shown a stable trend over the past 16 years. This information can be accessed from the Habitats Directive Article 17 report for Malta: <http://cdr.eionet.europa.eu/mt/eu/art17/>.

Environment and Resources Authority

- ✓ What are the drivers of change in other wooded lands in your country, and what are their consequences for forest genetic resources? Environment and Resources Authority

Each woodland habitat has its own pressures and threats, as per table below. The information on the pressures and threats are collected from the Habitats Directive Article 17 report for Malta, which can be accessed from here: <http://cdr.eionet.europa.eu/mt/eu/art17/>.

Habitats	Pressures & Threats
Arborescent matorral with <i>Laurus nobilis</i> (5230)	Active abstractions from groundwater, surface water or mixed water for agriculture. Modification of hydrological flow or physical alteration of water bodies for agriculture (excluding development and operation of dams). Interspecific relations (competition, predation, parasitism, pathogens).
<i>Salix alba</i> and <i>Populus alba</i> galleries (92A0)	Active abstractions from groundwater, surface water or mixed water for agriculture. Modification of hydrological flow or physical alteration of water bodies for agriculture (excluding development and operation of dams). Interspecific relations (competition, predation, parasitism, pathogens).
Southern riparian galleries and thickets (92D0)	Active abstractions from groundwater, surface water or mixed water for agriculture. Other invasive alien species (other than species of Union concern). Modification of hydrological flow.
<i>Olea</i> and <i>Ceratonia</i> forests (9320)	Other invasive alien species (other than species of Union concern).
<i>Quercus ilex</i> forests (9340)	Sports, tourism and leisure activities. Other invasive alien species (other than species of Union concern).
Mediterranean pine forests with endemic Mesogean pines (9540)	Other invasive alien species (other than species of Union concern).

<i>Tetraclinis articulata</i> forests (9570)	Other invasive alien species (other than species of Union concern). Abiotic natural processes (e.g. erosion, silting up, drying out, submersion, salinization). Interspecific relations (competition, predation, parasitism, pathogens).
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- ✓ What challenges and opportunities do these trends and drivers create for the conservation, use and development of forest genetic resources?

Environment and Resources Authority Challenges:

- Land use change and land degradation
- Habitat fragmentation and modification
- Limited scientific information and uncertainty surrounding the genetic variation distribution within *in situ* conservation area
- Climate change
- Introduction of invasive alien species, including pests and diseases
- Suspected intraspecies or hybridization with introduced related species (e.g. *Ulmus* spp., *Pinus* spp.)

Opportunities:

- The conservation of FGR can contribute to the safeguarding of biodiversity and the maintenance of ecosystem services.

Chapter 4. State of diversity between trees and other woody plant species

The objective of this chapter is to provide information on the diversity of tree and other wooded plant species that are considered as “forest genetic resources” and managed or utilized in the forestry context (including agroforestry) in your country. The chapter should also describe trends in the number of these species in your country and identify the drivers of change in species diversity, including threats (e.g. pests and diseases) to species. Information on the following topics or issues should be presented:

- Number of tree and other woody plant species (shrubs, palms and bamboo) that are considered as “forest genetic resources” and managed or utilized in the forestry context (including agroforestry) in your country
- Number of native and introduced species managed or utilized in the forestry context (including agroforestry) in your country
- Trends in the number of species in your country
- Drivers of change in the number of species and threats to species

The National Focal Points may consider the following guiding questions in preparing the content of this chapter:

- ✓ How many tree and other woody plants species are considered as “forest genetic resources” in your country?

An inventory defining forest genetic resources has not yet been established in Malta.

- ✓ How many of these species are native (including naturalized species) and introduced?

An inventory defining forest genetic resources has not yet been established in Malta. It is estimated that at least 1186 species of plants are either endemic, sub-endemic, indigenous, archaeophytes, or naturalized aliens; a further 182 species of plants are of uncertain origin. On the basis that an inventory defining forest genetic resources has not yet been established in Malta, what proportion from these species are forest genetic resources is unknown.

- ✓ Is the number of species decreasing, stable or increasing in your country?

A detailed ecological survey on the trends of forest genetic resources is unavailable; independent unpublished research (E. Lanfranco, 2013) indicates that a large portion of plant biodiversity is either stable or on the decrease.

- ✓ What are the drivers of change in the number of species and threats to species?

Each woodland and forest habitat has its own pressures and threats, as per table below. The information on the pressures and threats are collected from the Habitats Directive Article 17 report for Malta, which can be accessed from here: <http://cdr.eionet.europa.eu/mt/eu/art17/>.

Habitats	Pressures & Threats
Arborescent matorral with <i>Laurus nobilis</i> (5230)	Active abstractions from groundwater, surface water or mixed water for agriculture. Modification of hydrological flow or physical alteration of water bodies for agriculture (excluding development and operation of dams). Interspecific relations (competition, predation, parasitism, pathogens).
<i>Salix alba</i> and <i>Populus alba</i> galleries (92A0)	Active abstractions from groundwater, surface water or mixed water for agriculture. Modification of hydrological flow or physical alteration of water bodies for agriculture (excluding development and operation of dams). Interspecific relations (competition, predation, parasitism, pathogens).
Southern riparian galleries and thickets (92D0)	Active abstractions from groundwater, surface water or mixed water for agriculture. Other invasive alien species (other than species of Union concern). Modification of hydrological flow.
<i>Olea</i> and <i>Ceratonia</i> forests (9320)	Other invasive alien species (other than species of Union concern).
<i>Quercus ilex</i> forests (9340)	Sports, tourism and leisure activities. Other invasive alien species (other than species of Union concern).
Mediterranean pine	Other invasive alien species (other than species of Union concern).

forests with endemic Mesogean pines (9540)	
<i>Tetraclinis articulata</i> forests (9570)	Other invasive alien species (other than species of Union concern). Abiotic natural processes (e.g. erosion, silting up, drying out, submersion, salinization). Interspecific relations (competition, predation, parasitism, pathogens).

Chapter 5. State of diversity within trees and other woody plants species

The objective of this chapter is to provide information on the current state of genetic diversity in tree and other wooded plant species that are considered as “forest genetic resources” and managed or utilized in the forestry context (including agroforestry) in your country. The chapter should also describe trends in the genetic diversity of these species and in the state of their populations (in terms of health and number of populations). Furthermore, it should describe briefly efforts made to obtain information on the genetic diversity of these species. If no studies on the genetic diversity have been carried out, expert opinions on the state and the trends can be presented. Information on the following topics or issues should be presented:

- State of genetic diversity in trees and other wooded plant species in the country
- Trends in the genetic diversity of these species and in the state of their populations
- Current and emerging technologies used for assessing and/or monitoring the genetic diversity
- Capacity-building and research needs to increase the availability on information on the genetic diversity

The National Focal Points may consider the following guiding questions in preparing the content of this chapter:

- ✓ What is known about the genetic diversity of trees and other wooded plant species in your country?

Studies on the genetic diversity of trees and other wooded plant species are carried out however not based on a national plan; no substantial studies have been carried out over recent years to elucidate genetic diversity of trees and other wooded plant species.

A genebank is planned to become operational in 2022, of which task amongst others will be to document, study, assess and monitor the genetic diversity of plant genetic resources at national level, both in accordance with the recommendations emanating from the CGRFA and also with a view to valorize these genetic resources and increase awareness about their utility and importance; such research will shed light on available genetic diversity and establish a database which will be useful to draw conclusions on the trends of how genetic diversity changes over the decades.

- ✓ Is the genetic diversity of these species decreasing, stable or increasing in your country?

Information on the genetic diversity is undocumented except for independent unpublished research which indicates that interspecific plant genetic diversity is either stable or on the decrease; no extensive information on the trends of intraspecific genetic diversity is available.

- ✓ What are the trends in the state of the populations of the species?

Information on the population dynamics is occasionally produced by the University of Malta on specific communities or species; no comprehensive or near-comprehensive information on the trends of intraspecific population dynamics is available.

Furthermore, Environment and Resources Authority is currently commissioning a study about tree habitats in the Maltese Islands. From the results of this study, it is envisaged that the conservation status and trends of such habitats will be assessed on a national scale.

- ✓ What current and emerging technologies have been, or are being, used for assessing and/or monitoring the genetic diversity of these species in your country?

A limited number of studies examine genetic diversity based on state-of-the-art genetic sequencing technologies.

- ✓ What are the needs, challenges and opportunities for increasing the availability of information on the genetic diversity of these species in your country?

There is the need to further strengthen Malta's knowledgebase on such matters, by focusing on dedicated studies, building on ongoing efforts linked with commissioned studies and data management consideration.

Moreover, Malta requires the establishment of a national plan of action, which fully acknowledges the recommendation of the Global Plan of Action for the Conservation, Sustainable Use and Development of Forest Genetic Resources.

- ✓ What are the priorities for capacity building and research in this area?

Relevant measures have been outlined in Malta's NBSAP 2012-2020 and are indicated below:

- GR1: Plant and animal genetic resources for food and agriculture are conserved via the uptake of appropriate agri-environmental measures to support genetic diversity in agriculture (including tree species for food and agriculture).
- GR2: The genetic diversity of endemic species, are safeguarded through the maintenance of a gene/seed bank, and any other ex situ measures, in support of in situ conservation.
- GR3: Due consideration of the potential research stemming out of the implementation of legal provisions on Access and Benefit Sharing (ABS), based on prior informed consent (PIC) and mutually agreed terms (MAT).
- CB1: National authorities responsible for overseeing the sustainable use of resources (environment, agriculture, fisheries and water) and, for the regulation of species trade and the movement of non-native species, are well-equipped with adequate human, financial and technical means. Thus creating an enabling environment allowing effective conservation, by way of capacity building including via training, continued professional development and reviewing administrative structures.
- CB4: Gaps in taxonomic knowledge are addressed by strengthening taxonomic expertise and urging uptake of taxonomic research.
- CB5: Scientific capacity in conservation biology tools for the recovery of endangered species is strengthened.

Whilst noting that efforts have been made towards the implementation of these priorities, it is acknowledged that further work is required to ensure continuation and amelioration of these matters.

Part 3: State of forest genetic resources conservation

Chapter 6. *In situ* conservation of forest genetic resources

The objective of this chapter is to provide a narrative of the current state of *in situ* conservation of forest genetic resources, and the needs, challenges and opportunities for improving it in your country. The chapter should provide information that complements the species-specific data countries submit through the questionnaire. Information on the following topics or issues should be presented:

- State of *in situ* conservation efforts in your country
- Approaches used for *in situ* conservation (e.g. specific *in situ* conservation units, conservation of forest genetic resources in forests and other wooded lands managed for multiple uses, conservation of forest genetic resources within protected areas)
- Organization of *in situ* conservation efforts at national (or subnational) level(s), including main players and stakeholders
- Needs, challenges and opportunities for improving *in situ* conservation of forest genetic resources in your country

- Priorities for capacity building and research in this area

The National Focal Points may consider the following guiding questions in preparing the content of this chapter:

- ✓ How would you assess the state of *in situ* conservation of forest genetic resources in your country?

In terms of diversity, all native woodlands are legally covered by the Flora, Fauna and Natural Habitats Protection Regulations (S.L. 549.44) and the Trees and Woodlands Protection Regulations (S.L. 549.123). In 2018, Environment and Resources Authority published the Trees and Woodlands Protection Regulations (S.L. 549.123), which ameliorates the previous regulation on the conservation of trees and woodlands, whilst affording protection to an additional 30 tree species in the Maltese Islands, protect trees in urban public open spaces and increase controls on activities and alien species that may harm trees. These Regulations propose that persons carrying out interventions on protected trees are licensed. The obligations in the new Regulations are also supported by substantial increases in penalties, which are based on the rarity or protection status of the tree/s.

The status of *in situ* conservation is regularly reported by habitat⁹ in compliance with the Habitats Directive.

As of end 2011, Malta had 27 terrestrial sites (21 SAC & 6 SAC/SPA) covering 42 km² or 13.3 % of land area. 22 Management Plans cover 19 of these sites (one site, MT24, is split on four Management Plans) and 8 are covered by a Conservation Order. Management agreements are in place with NGOs for 10 sites to tackle management measures listed in the Natura 2000 management plans specific to the particular sites.

Moreover in 2017, 30 additional Tree Protection Areas (TPAs) have been designated under the auspices of the Trees and Woodlands Protection Regulations (SL 549.123). Through the declaration of these TPAs, these trees and woodlands are being given the well-deserved protection for current and future generations. The total number of TPAs over the Maltese Islands currently is of 60, of which 48 are in Malta, 10 are in Gozo and 2 are in Comino.

Activities listed under Regulations 24 and 25 of the Flora, Fauna and Natural Habitats Protection Regulations (SL 549.44), are prohibited without permission from the ERA. The applications for permission to carry out such activities involving flora and fauna species listed respectively in Schedules V (b) and VI (b) and Schedules V (a) and VI (a) are reviewed and evaluated by the Environmental Permitting Unit within the ERA. Permits are generally issued for research, education and conservation, provided that such activities will not adversely affect the conservation status of species in question. Permits are also issued for other activities linked with the rescue and rehabilitation of injured protected species. Reports of illegal activities received from members of the general public are also investigated by the Enforcement and Compliance Directorate within ERA.

- ✓ What approaches are being used for *in situ* conservation of forest genetic resources in your country?

Genetic diversity is protected *in situ* through legislative measures that address diversity at subspecies, species, habitat and community level. Cooperation with NGOs and foreign entities is also regularly carried out through the establishment of mutual interest projects relative to conservation measures.

In terms of *in situ* conservation, Malta has a national ecological network as set up by the Flora, Fauna and Natural Habitats Protection Regulations (S.L. 549.44), under the Environment Protection Act (CAP 549), as indicated in question 3 further above. The EU's Natura 2000 (N2K) network and Tree Protected Areas (TPAs) form part of this ecological network. Various protected areas have management plans (or conservation orders in some cases) that have been set up as legal requirements to prepare conservation measures. Access to genetic resources is also managed through the implementation of the Nagoya Protocol by virtue of S.L. 549.111, which also serves to guarantee the sharing of benefits (monetary and non-monetary); these benefits are generally of interest to the development of knowledge about local biodiversity and conservation.

⁹ Habitats Directive: Report on Implementation Measures, <http://cdr.eionet.europa.eu/mt/eu/art17/>

In line with the provisions of the Habitats Directive, Malta has also carried out a number of control and/or eradication programmes for the removal of invasive alien species, particularly in Natura 2000 sites such as Kemmuna, Il-Magħluq tal-Baħar ta' Marsaskala, L-Għadira s-Safra, Il-Qortin tal-Magun u l-Qortin il-Kbir (Gozo), L-Inħawi tar-Ramla tat-Torri u tal-Irdum tal-Madonna, Majjistral Park and Dwejra (Gozo). The invasive species addressed by such interventions include amongst others *Agave* spp., *Carpobrotus* spp., *Arundo donax*, *Yucca* spp.; *Schinus therebintus*; *Malva arborea* and *Opuntia ficus indica*.

Regulation 28 of the Flora, Fauna and Natural Habitats Protection Regulations (SL 549.44) addresses a number of issues related to the control of alien species. These include, inter alia:

- 1) the possibility to regulate the importation and/or keeping of any species of flora and fauna, if deemed that such importation and/or keeping may harm or lead to the endangering of biodiversity of Malta; and
- 2) the possibility to develop eradication or control plans and related programmes for established alien species, invasive species and those alien species with a potential to become established and subsequently invasive.

The Environment and Resources Authority is preparing a National Strategy for Preventing and Mitigating the Impact of Invasive Alien Species in the Maltese Islands, in line with the NBSAP to ensure the proper implementation of Council Regulation (EU) No. 1143/2014 on the prevention and management of the introduction and spread of invasive alien species and related implementing national legislation.

- ✓ How is *in situ* conservation of forest genetic resources organized in your country, and who are the main players/stakeholders in this area?

The main players related to the implementation of the mentioned management plans and conservation orders are the Environment & Resources Authority (ERA), Ambjent Malta (AM), the Ministry for the Environment, Climate Change and Planning (MECP) & environmental NGOs. The latter also covered by Management Agreements with Environment and Resources Authority (as the Competent Authority) and/or the MECP (as the Ministry responsible for the environment).

- ✓ What are the needs, challenges and opportunities for improving *in situ* conservation of forest genetic resources?

Needs:

- Trained personnel
- More related studies

Challenges:

- Land use change and land degradation
- Habitat fragmentation and modification
- Limited scientific information and uncertainty surrounding the genetic variation distribution within *in situ* conservation area
- Climate change
- Introduction of invasive alien species, including pests and diseases
- Suspected intraspecies or hybridization with introduced related species (e.g. *Ulmus* spp., *Pinus* spp.)

Opportunities:

- The conservation of *in situ* conservation can contribute to the safeguarding of biodiversity and the maintenance of ecosystem services.

- ✓ What are the priorities for capacity building and research in this area?

A priority for capacity building and research in *in situ* conservation is to recruit trained personnel which are experts in this area. This would help to enhance in gaining more related and reliable scientific information in the local context with respect to *in situ* conservation.

Chapter 7. <i>Ex situ</i> conservation of forest genetic resources
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The objective of this chapter is to provide a narrative of the current state of *ex situ* conservation of forest genetic resources, and the needs, challenges and opportunities for improving it in your country. This chapter should also describe how the *ex situ* conservation efforts complement, or are linked to, the *in situ* conservation efforts. The chapter should provide information that complements the species-specific data countries submit through the questionnaire. Information on the following topics or issues should be presented:

- State of *ex situ* conservation efforts in your country
- Approaches used for *ex situ* conservation (e.g. *ex situ* conservation stands, provenance and progeny trials, seed banks, clonal collections, etc)
- Organization of *ex situ* conservation efforts at national (or subnational) level(s), including main players and stakeholders
- Needs, challenges and opportunities for improving *in situ* conservation of forest genetic resources
- Priorities for capacity building and research in this area

The National Focal Points may consider the following guiding questions in preparing the content of this chapter:

- ✓ How would you assess the state of *ex situ* conservation of forest genetic resources in your country?

Ex situ conservation in Malta is lacking as the country does not yet have a structured repository that addresses this need. The University of Malta manages the Argotti Botanic Gardens & Resource Centre, which holds collections of indigenous plants, however such collections are very limited in diversity and are not representative of the genetic diversity present in Malta.

The Plant Protection Directorate within the Ministry For Agriculture, Fisheries, And Animal Rights manages a small *in vivo* collection of indigenous plants developed as part of an EU funded project in 2015.¹⁰

- ✓ What approaches are being used for *ex situ* conservation of forest genetic resources in your country?

Some *ex situ* activities are carried out by NGOs, however these are not coordinated by the national authorities and not necessarily fulfil national priorities;

Malta is currently undergoing a project for the establishment of a national genebank which will host *ex situ* collections of wild, semi-natural and cultivated plants occurring in Malta, including heirloom varieties and landraces. This facility will operate to assess amongst others, any trends in plant biodiversity over the long term, in accordance with the *Second Global Plan of Action on Plant Genetic Resources for Food and Agriculture* and the *Global Plan of Action for the Conservation, Sustainable Use and Development of Forest Genetic Resources*.

- ✓ How is *ex situ* conservation of forest genetic resources organized in your country, and who are the main players/stakeholders of *ex situ* conservation?

The main player in *ex situ* conservation as of 2020 is the University of Malta which manages a limited number of collections. In the coming years, Malta will have a national genebank which will operate in a systematic manner to address *ex situ* conservation needs for plant genetic resources, including forest genetic resources.

¹⁰ Project On The Study And Sustainable Conservation Of Varieties Of Local Plants: <http://www.pjantimaltin.eu/>

- ✓ What are the needs, challenges and opportunities for improving *ex situ* conservation of forest genetic resources?

In terms of status of genetic diversity, there are limited studies but trees are overall rare in the Maltese Islands. In view of this, national policy, including laws, were enacted to address such matter. A TWNSAP is also being developed to compliment relevant measures in the NBSAP. This will also address priorities for capacity building and research.

As Malta does not yet have a genebank which operates to systematically hold and manage collections of plant genetic resources occurring in Malta, the main challenge is infrastructural. Deficiencies in capacity also exist, both in managing and preserving collections, as well as establishing improvement projects that aim to develop populations that address contemporary needs such as resistance to biotic and abiotic threats. Knowledge about intraspecific diversity is also lacking for many tree species, therefore it is not possible to establish targeted plans to utilize genetic resources, improve them or priorities them in terms of genetic value.

- ✓ What are the priorities for capacity building and research in this area?

The building of information about the status of national genetic resources and establishing interdisciplinary cooperation, and raising public awareness are capacity building priorities.

Once established the national genebank will be tasked with documenting and researching plant genetic resources in Malta, with a view to document, monitor, valorize or characterize them. Such research will include the establishment of herbaria, collaboration with other entities for the biochemical and genetic characterization of genetic resources, survey of the genetic diversity, etc. This would assist in building knowledge about local biodiversity and encourage research and/or development projects with national or international interest.

The Plant Protection Directorate operates a micropropagation laboratory which aims to multiply fruit trees and may in the future be involved to complement the work of the national genebank for the sanitation, storage, multiplication and regeneration of plant germplasm by *in vitro* techniques. For this scope, research on micropropagation of the species of interest will have to continue and it may be involved in regional projects for this purpose with a view to identify suitable protocols for the sanitation, storage, multiplication and regeneration of plant material.

Environment and Resources Authority carries out and coordinates research and data gathering in line with its legal obligations and national requirements. In this regard, Environment and Resources Authority:

- Provides elective titles for suggested studies for the consideration of the University of Malta covering various habitats, species, general and new emerging issues and other relevant topics;
- Sets up Memoranda of Understanding with relevant public entities with the aim of enhancing collaboration on joint topics, sharing of data and technical expertise;
- Commissions various studies for the gathering of data and provision of monitoring frameworks in line with legal obligations and issues of national interest;
- Engages in service and collaboration agreements, with research/academic entities with the aim of engaging such entities in the carrying out of surveys, studies, monitoring, assessments and research, as deemed necessary, on matters relating to environment and resources
- Dissemination of studies carried out by the UoM through annual symposia, e.g. the annual Biology Symposium organised by UoM and sponsored by ERA.

Part 4: State of use, development and management of forest genetic resources

Chapter 8. The state of use

The objective of this chapter is to provide a narrative of the state of forest genetic resources use, and the needs, challenges and opportunities in this area in your country. This chapter should also describe briefly how the production of forest reproductive material is organized in your country. The chapter should provide information that complements the species-specific data countries submit through the

questionnaire. Information on the following topics or issues should be presented:

- State of forest genetic resources use in your country
- Trends in production of and demand for forest reproductive material

- Certification of forest reproductive material
- Needs, challenges and opportunities related to the use of forest genetic resources
- Priorities for capacity building and research in this area

The National Focal Points may consider the following guiding questions in preparing the content of this chapter:

- ✓ How would you assess the state of forest genetic resources use in your country?

Malta due to its small size does not have a timber production industry, therefore the role of forest genetic resources is mainly to provide ecosystem services.

- ✓ Are there national (or subnational) strategies, guidelines and/or recommendations for using forest genetic resources in your country?

The National Biodiversity Strategy & Action Plan 2012 – 2020 (NBSAP) for Malta¹¹ serves as a national policy driver to integrate biodiversity concerns into relevant sectoral or cross-sectoral plans, programmes and policies, especially those that can have a bearing on Malta’s biological and natural resources. This policy has been given the theme “working hand-in-hand with nature” and a long-term vision that “All Maltese citizens will value the importance of Malta’s biodiversity and work hand-in-hand with nature in their daily lives. Efforts aimed at sustainable and more resource-efficient choices and actions by local communities and relevant sectors have contributed to a significant improvement in the status of Malta’s biodiversity and associated ecosystem services, for the well-being of present and future generations.” Sustainable use of biodiversity, including forest genetic resources, is addressed under Theme 5: Sustainable Use of Biological Resources, which objectives aim towards the establishment of a source of local plants to relieve the pressure arising from the demand for native species of trees and shrubs for use in forestation, landscaping and planting for site stabilisation and restoration.

While reflecting national priorities for biodiversity, these targets are also complementary to the 2020 global Aichi targets defined in the Strategic Plan for Biodiversity 2011-2020 under the framework of the UN Convention on Biological Diversity (CBD) as well as the targets defined in the EU Biodiversity Strategy to 2020.

A national plan for plant genetic resources that holistically addresses the recommendations of the Global Plan of Action for the Conservation, Sustainable Use and Development of Forest Genetic Resources, as well as the Second Global Plan of Action for Plant Genetic Resources for Food and Agriculture, is not yet developed in Malta; this national plan, which will include provisions on sustainable utilization, shall be developed in the coming years.

- ✓ What are the roles of registered seed stands, seed orchards and other sources in the supply of forest reproductive material?

There are no registered seed stands or registered seed orchards in Malta.

- ✓ Does the production of forest reproductive material meet the demand of this material in your country?

Naturally occurring trees and shrubs, as well as mature trees planted decades or centuries ago, serve as the sole source of seeds and cuttings for forestation projects.

- ✓ Does your country import or export forest reproductive material?

In general, Malta does not import or export forest reproductive plant material for use in forestation projects;

propagation of plant material is normally carried out through indigenous stocks. Mature saplings are usually purchased though tender, and the supplier is required to present a copy of the Malta Official Register¹² form / Plant Passport. Locally sourced seeds are disseminated to the public during public events at no cost.

- ✓ To what extent is the forest reproductive material produced and traded within your country certified by a relevant national (or subnational) authority, and what rules are used for this purpose?

Plant reproductive material in general is regulated by the Plant Protection Directorate within the Rural Affairs Department of the Ministry For Agriculture, Fisheries, And Animal Rights. Forest reproductive material is addressed by the Forest Reproductive Material Regulations¹³ Subsidiary Legislation 433.10. The scope of these regulations is to transpose Council Directive 1999/105/EC on the marketing of forest reproductive material, to ensure that any forest reproductive material produced, placed on the market in Malta or being transshipped through Malta prior to its transport to another Member State meets specified standards of quality. These regulations do not apply to forest reproductive material in the form of planting stock or parts of plants intended to be used for purposes other than forestry, or intended to be exported or re-exported to third countries

- ✓ What are the needs, challenges and opportunities related to the use of forest genetic resources?

Capacity and expertise on production of high-quality sanitized forest reproductive material is lacking; Malta is developing such expertise through the Ministry for the Environment, Climate Change and Planning and through the Plant Protection Directorate, however the large biodiversity for which expertise is required and the contrasting small workforce of experts dedicated to this task, meeting such objective is challenging. Resource mobilization is an important need for addressing these issues.

- ✓ What are the priorities for capacity-building and research in this area?

Priority is given to propagation of indigenous genetic resources, their conservation as well as their characterization, both at genetic and biochemical level.

Chapter 9. The state of genetic improvement and breeding programmes

The objective of this chapter is to provide a narrative on the current state of tree improvement and breeding programmes in your country, as well as the needs, challenges and opportunities in this area. This chapter should also describe how tree improvement and breeding programmes are organized in your country, and who are the main players and stakeholders. The chapter should provide information that complements the species-specific data countries submit through the questionnaire. Information on the following topics or issues should be presented:

- Approaches used for tree improvement and/or breeding
- Prioritization of uses and traits in tree improvement and/or breeding
- Organization of tree improvement and/or breeding programmes
- Use of current and emerging technologies in tree improvement and/or breeding
- Needs, challenges and opportunities for tree improvement and/or breeding
- Priorities for capacity building and research in this area

The National Focal Points may consider the following guiding questions in preparing the content of this chapter:

- ✓ What are the approaches used for tree improvement and/or breeding in your country?

Genetic improvement and plant breeding does not commonly take place in Malta, particularly in connection

¹² Register of professional operators involved in activities related to the propagation, growing, trading, import, production, warehousing, dispatching, and treatment of plants, plant products and propagation materials.

¹³ Forest Reproductive Material Regulations Subsidiary Legislation 433.10:

<https://legislation.mt/eli/sl/433.10/eng/pdf>; Enacted by: L.N. 273 of 2004:

<https://legislation.mt/eli/ln/2004/273/eng/pdf>; Amended by: L.N. 17 of 2011:

<https://legislation.mt/eli/ln/2011/17/eng/pdf>, L.N. 454 of 2013: <https://legislation.mt/eli/ln/2013/454/eng/pdf>.

with trees and woody plants which characterize forest genetic resources. The development of a national gene bank in the coming years will lead to the development of knowledge at genetic level of the indigenous plant biodiversity which may be utilized to motivate breeding programmes in partnership with foreign entities.

- ✓ Which uses and traits are prioritized in tree improvement and/or breeding?

Not applicable.

- ✓ How are tree improvement and/or breeding programmes organized in your country, and who are the main players and stakeholders?

Not applicable.

- ✓ Which current and emerging technologies are used in tree improvement and/or breeding?

Not applicable.

- ✓ What are the needs, challenges and opportunities for tree improvement and/or breeding?

Expertise in conducting breeding programmes or tree improvement programmes does not exist in Malta, with the exception of one expert who is trained in plant breeding. Expertise about the principles of genetic and biochemical characterization exists within various sectors in Malta, particularly within the University in Malta; such expertise may be tapped into to develop such programmes, however the challenge in this case would be in bridging the gap between various fields of expertise to be directed towards tree improvement programmes.

- ✓ What are the priorities for capacity building and research in this area?

No short or long term plans on developing capacity and research in this area exist.

Chapter 10. Management of forest genetic resources

The objective of this chapter is to provide a narrative on how genetic considerations are taken into account in managing natural and planted forests, as well as other wooded lands, in your country. In this chapter, the needs, challenges and opportunities for improving the management of forest genetic resources should also be identified. Furthermore, the consequences of the changes in the forest sector, as identified in Chapter 1, for forest genetic resources and their management should be reviewed. The chapter should also provide any other relevant information on the management of forest genetic resources in your country. Information on the following topics or issues should be presented:

- Management of forest genetic resources in natural and planted forests, and in other wooded lands
- Consequences of the changes in the forest sector for forest genetic resources and their management
- Needs, challenges and opportunities for improving the management of forest genetic resources
- Priorities for capacity building and research in this area

The National Focal Points may consider the following guiding questions in preparing the content of this chapter:

- ✓ How are genetic considerations taken into account, at the practical level, in managing natural and planted forests, as well as other wooded lands, in your country?

For clonal multiplication of forest reproductive material, the recommendations by Libby, W. J. (1982), Roberds, J. H., & Bishir, J. W. (1997), and Bishir, J., & Roberds, J. H. (1999)¹⁴ are taken into

¹⁴ Libby, W. J. (1982). What is a safe number of clones per plantation?[Conference paper]. In Proceedings of the 3. International Workshop on the Genetics of Host-Parasite Interactions in Forestry. Wageningen (Netherlands). 14-21 Sep 1980.
Roberds, J. H., & Bishir, J. W. (1997). Risk analyses in clonal forestry. Canadian Journal of Forest Research, 27(3), 425-432.
Bishir, J., & Roberds, J. H. (1999). On numbers of clones needed for managing risks in clonal forestry. Forest Genetics. 6 (3): 149-155.

consideration as used as guidelines. This is particularly true for multiplication of plant genetic resources through micropropagation techniques, which makes use of techniques such as clonal somatic embryogenesis, shoot tip meristem cultures, and shoot tip grafting, amongst others.

- ✓ What current and emerging technologies are used in the management of forest genetic resources in your country?

The Environment and Resources Authority makes use from time to time of the information gathered by research institutions such as the University of Malta to gather intelligence about the status of genetic diversity in Malta. Such information may arise from genomic or biochemical characterization studies focus on specific species or other sub-taxa. Such work is to be carried out systematically by a national genebank once it is established after 2022.

- ✓ What are the consequences of the trends and/or changes in the forest sector for forest genetic resources and their management in your country?

A forest sector as understood for timber production or harvesting of other natural raw materials is not present in Malta.

N/A

- ✓ What are the needs, challenges and opportunities for improving the management of forest genetic resources in your country?

Progress is lacking where action is hindered by resource constraints (human, technical and financial). In certain cases progress is lacking because work is yet to commence or preparations are underway. The NBSAP identifies the following needs and challenges in the prospects to manage biodiversity in general; this includes forest genetic resources:

- i. The right market signals are required to support the sustainable use of biological and natural resources, and to leverage private investment as well as reward practices that safeguard biodiversity;
- ii. The full range of values of biodiversity and ecosystem services, as well as the potential role of biodiversity in addressing other environmental challenges (such as climate change), should be recognised at all levels and be fully reflected in decision and policy-making, where relevant;
- iii. Coordinated action and positive incentives, which promote local participation and private-public partnerships, and which lead to successful conservation and sustainable use of biological and natural resources need to be promoted, both within and outside protected areas;
- iv. There is need for strengthening the relationship between policy making and scientific research would ensure that research addresses the needs of policy makers and that in turn, policy development responds to research findings;
- v. Further policy integration of biodiversity concerns in relevant sectors is essential; such mainstreaming should address direct and indirect drivers of biodiversity change, and should build on mutually-supportive measures, which in turn contribute to the achievement of the CBD and EU 2020 targets at a national level;

- ✓ What are the priorities for capacity building and research in this area?

- i. A coherent biodiversity monitoring regime is required to build a stronger knowledge base on the conservation status and trends of species and habitats of European community and national importance, in particular for those currently assigned an “unknown” status;
- ii. Resource mobilisation is needed to improve national capacity in the fields of enforcement, site management, monitoring as well as research and development;

Part 5: State of capacities and policies

Chapter 11. Institutional framework for the conservation, use and development of forest genetic resources

The objective of this chapter is to provide a narrative on the current state of capacities, institutions and policies related to the conservation, use and development of forest genetic resources in your country. This chapter should also identify needs, challenges and opportunities for strengthening the national (or subnational) institutions and policies on forest genetic resources. The chapter should provide information that complements the data countries submit through the questionnaire. Information on the following topics or issues should be presented:

- National coordination mechanisms and other institutions dealing with forest genetic resources
- Policies and strategies relevant to forest genetic resources
- Legislation and/or regulations related to forest genetic resources
- State of research and development on forest genetic resources
- State of education and training (including extension efforts) related to forest genetic resources
- Organization of FGR research, development, education and training at national (or subnational) level(s), including main players and stakeholders
- Needs, challenges and opportunities for strengthening the national (or subnational) institutions and policies on forest genetic resources
- Priorities for capacity building in this area

The National Focal Points may consider the following guiding questions in preparing the content of this chapter:

- ✓ If your country has a national coordination mechanism on forest genetic resources, how does it operate, and what is its structure?

- ✓ Which are the main institutions/stakeholders dealing with forest genetic resources in your country, and what are their responsibilities in this area?

The Plant Protection Directorate within the Ministry for Agriculture, Fisheries and Animal Rights is the national regulatory entity for plant health; within its remit lie all the dossiers relating to the Commission Genetic Resources Food and Agriculture. The Environment Resources Authority within the Ministry for the Environment, Climate Change and Planning is the national regulator on the environment that manages the dossiers emanating from the implementation of the EU Habitats Directive.

Ambjent Malta within the Ministry for the Environment, Climate Change and Planning is the entity responsible for forestation projects and management of woodlands and forested areas, as well as protected areas and environmental projects.

- ✓ Does your country have specific policies and strategies on forest genetic resources?

Malta's NBSAP covers conservation of all biodiversity in Malta including trees and woodlands (Link: <https://era.org.mt/maltas-national-biodiversity-strategy-action-plan-2012-2020/>).

Malta has set up an inventory of Tree Protection Areas (TPAs), which requirements stem out from the Trees and Woodland Protection Regulations (S.L. 549.123). These Regulations aim to protect trees and woodlands of the Maltese Islands, particularly the native species and communities. Furthermore, Malta is currently developing the Trees & Woodlands National Strategy and Action Plan (TWNSAP) strategy, which will aim to address forest genetic resources.

- ✓ Has your country developed specific legislation and/or regulations on forest genetic resources?

The Trees and Woodland Protection Regulations (S.L. 549.123) build on, and ameliorate, the previous trees and woodland Regulations by affording additional protection to trees and woodlands in the Maltese Islands. About 90 different tree species are now protected under the new Regulations, which include an addition of circa 30 new protected species when compared to the circa 60 tree species covered by the 2011 legislation and its earlier 2001 version. These figures clearly show that the new Regulations have further strengthened Malta's legislative framework on trees. Moreover, mature trees over 50 years of age that are found in urban, public, open spaces are now protected, irrespective of what species it is, thereby giving due regard to the social and cultural element that trees provide to urban areas.

The Regulations establish the requirement to have licensed tree specialists to carry out interventions on protected trees and on trees located within urban, public, open spaces. These individuals will be required to attend specialised courses, focusing on Maltese trees and woodlands, the identification of species, arboriculture and other related matters, thereby ensuring that pruning and other interventions on trees will be done in a diligent manner. Environment and Resources Authority will also establish and publish a Register of Licensed Tree Specialists; such measures are currently not in force to enable the appropriate set-up of a training course and licensing system.

- ✓ What is the state of research and development on forest genetic resources in your country?

R&D is not generally carried out on forest genetic resources except at academic level. Once established the national genebank will be tasked with documenting and researching plant genetic resources in Malta, with a view to document, monitor, valorize or characterize them. Such research will include the establishment of herbaria, collaboration with other entities for the biochemical and genetic characterization of genetic resources, survey of the genetic diversity, etc. This would assist in building knowledge about local biodiversity and encourage research and/or development projects with national or international interest.

- ✓ What is the state of education and training on forest genetic resources in your country?

In terms of status of genetic diversity, there are limited studies, but trees are overall rare in the Maltese Islands. In view of this, national policy, including laws, were enacted to address such matter. A TWNSAP is also being developed to compliment relevant measures in the NBSAP. This will also address priorities for

capacity building and research.

- ✓ What are the needs, challenges and opportunities for strengthening the national (or sub-national) institutional framework on forest genetic resources?
- ✓ What are the priorities for capacity-building in this area?

Chapter 12. International and regional cooperation on forest genetic resources
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The objective of this chapter is to provide a narrative on your country's involvement in international and regional cooperation on forest genetic resources. It should explain how your country has benefited from the international and regional cooperation, and how your country has contributed to the international and regional cooperation, including possible financial support provided to other countries. This chapter should also identify needs, challenges and opportunities for strengthening this cooperation from your country's point of view. The chapter should provide information that complements the data countries submit through the questionnaire. Information on the following topics or issues should be presented:

- International and regional cooperation and/or projects on forest genetic resources your country has been involved in since 2013.
- Benefits and/or results your country has gained from the international and regional cooperation on forest genetic resources
- Needs, challenges and opportunities for strengthening the international and regional cooperation on forest genetic resources

The National Focal Points may consider the following guiding questions in preparing the content of this chapter:

- ✓ Please describe the international and regional cooperation and/or projects on forest genetic resources your country has been, or is, involved in since 2013?

Malta became a member of the EUFORGEN since 2020, as represented by ERA.

The LIFE+ Saving Buskett project (2013 – 2018) was established to improve the conservation of woodland habitats of EU importance at Buskett. Additionally, invasive alien species harmful for the targeted habitats were removed and replaced with new trees typical of the targeted habitats. An after-life conservation plan is being implemented following the completion of the LIFE+ Life Saving Buskett project (2014-2018), to ensure monitoring and continuation of works.

- ✓ How has your country benefited from the international and regional cooperation on forest genetic resources?

International and regional cooperation such as the involvement in regional projects or internationally funded projects are beneficial as they allow for the sharing of knowledge and capacity to achieve conservation and genetic resource management objectives.

- ✓ What contributions has your country provided to the international and regional cooperation on forest genetic resources?
- ✓ How have the benefits and/or results from the international and regional cooperation been applied for the conservation, use and development of forest genetic resources in your country?
- ✓ What are the needs, challenges and opportunities for strengthening the international and regional cooperation on forest genetic resources?

Part 6: Challenges and opportunities

Chapter 13. Recommended actions for the future
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The objective of this chapter is to summarize the challenges and opportunities for forest genetic resources based on the information presented in the earlier chapters. It should also make recommendations for further actions to strengthen the conservation, use and development of forest genetic resources in your country, as well as to increase the international and regional cooperation.

The recommended actions should be structured following the four priority areas of the Global Plan of Action:

- Availability of information on forest genetic resources
- Conservation of forest genetic resources
- Use, development and management of forest genetic resources
- Policies, institutions and capacity building

ANNEX 3

GLOSSARY OF TECHNICAL TERMS

Characterization based on non-molecular information refers to the description and evaluation of forest genetic resources (FGR) based on information obtained from field observations, provenance trials or ecological/climatic zonation of species' distribution range within a country, for example. The characterization of FGR is typically done at the level of populations or provenances. In general, genetic resources are characterized based on traits that are usually heritable, easy to observe by the eye and expressed across different environments.

Characterization based on molecular information refers to the description and evaluation of FGR based on information obtained through molecular markers and/or genomic approaches.

Designated means that an area has been assigned to *in situ* and/or *ex situ* conservation of FGR by law or other arrangement, depending on how a country (or state) has organized its work on FGR.

***Ex situ* accession** refers to a sample of FGR stored in a seed bank or a genotype held in a clonal collection.

***Ex situ* conservation of FGR** refers to the conservation of genetic resources of trees and other woody plant species outside their natural habitats.

***Ex situ* conservation unit** refers to a range of *ex situ* genetic conservation areas of forest trees and other woody plants species (e.g. *ex situ* conservation stands, provenance and progeny trials, and breeding populations).

Extension programmes or activities refers to training and communication efforts targeted to users of FGR (farmers, local communities, forest owners, etc.) with an aim to help them enhance their use of FGR to derive economic and other benefits. Extension activities may include short-term training courses and workshops, field trips, exhibitions, media campaigns and dissemination of information through leaflets, posters and guidelines, or even development of online tools.

Forest genetic resources (FGR) refers to the heritable materials maintained within and among tree and other woody plant species that are of actual or potential economic, environmental, scientific or societal value.

Forest reproductive material refers to any plant tissue that is created by sexual or asexual means (e.g. seeds, pollen and cuttings) and used for the production of new trees or other woody species.

***In situ* conservation of FGR** refers to the maintenance of viable populations of trees and other woody plant species in their natural surroundings, or within the environment to which they are assumed to be adapted.

***In situ* conservation unit** refers to a range of *in situ* genetic conservation areas of forest trees and other woody plants species (e.g. gene reserve forests, genetic conservation units or stands, gene management units or zones, and evolutionary conservation units or stands). Such units can be located in both natural and planted forests.

International research and development cooperation refers to global, regional and subregional research projects (or project proposals), tree breeding programmes and other R&D efforts.

Macropropagation refers to vegetative propagation of planting stock from cuttings, grafting or air-layering.

Micropropagation refers to vegetative propagation of planting stock by *in vitro* technology producing plantlets, micropropagules or somatic embryos.

National adaptation strategy for climate change refers to a national adaptation strategy, action plan and/or programme(s) for climate change.

National biodiversity action plan refers to a national strategy, action plan and/or programme(s) for the conservation and sustainable use of biological diversity.