THE SECOND REPORT ON THE STATE OF THE WORLD'S FOREST GENETIC RESOURCES

COUNTRY REPORT

SWITZERLAND

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.

SWITZERLAND
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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

Preface

Switzerland adopted a new forest law in 2016 to specifically link forest protection with adaptation to climate change. The plan prioritized the rejuvenation of forests, enhancing their genetic adaptive capacity and thus helping to secure their long-term sustainability. The new law allows for assisted migration of tree species and distant but suitable sources of forest reproductive material.

Switzerland's new forest law uses regeneration as the best opportunity to adapt tree populations to changing climate. Regeneration, whether natural or artificial, establishes the genetic composition of the stand, providing an opportunity to expand genetic diversity and thus enhance the adaptability of the forest.

Given Switzerland's complex geography, one priority of the Swiss research program on adaptation of forests to climate change is to have a scientific basis to determine which tree species will do best in different locations. The research program investigated how forest ecosystems would change under different climate scenarios. The research results offer guidance to forest owners and managers to consider different species compositions, since the trees that are germinating today will live in a drastically changed climate already by the time they are middle-aged.

The research program, the adoption of the Forest Policy 2020 and its extension to 2030, the publication of a national strategic action plan for biodiversity, the revision of the Federal Forest Law, and federal funding for an adaptive management regime are all designed to ensure that forests both deliver sustainable ecosystem services and will be productive under changing climate conditions.

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Abbreviations and Acronyms

Executive summary

In Switzerland by 2050 reduced ecosystem services and protective functions of forests are projected in case of inaction due to climate change. Therefore, at the national level ambitious measures are being taken to adapt forests to increasingly dry conditions, higher incidence of storms, and increased pest and disease problems. Across the country the following management actions are being implemented: diversify species, diversify structure (near to nature), increase genetic diversity within tree species, increase resilience within tree species, and reduce time to harvest (diameter) to reduce risk to wood industry. Future species are being selected by region and locality and rejuvenation of advanced age structure forests are national priorities.

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

Chapter 1. Value and importance of forest genetic resources

The main role of forests and the forest sectors in Switzerland:

- Environment: Protection of soil and water, erosion control, flood protection and reducing flood risk, avalanche control, production of clean water, public recreation, biodiversity conservation, wood for building and energy.
- Wood: Forest area has been expanding steadily and stands at 32.1% of total land area. Growing stock per hectare is stable at a high level (354 m3 o.b./ha). Above ground biomass has expanded slightly. Carbon stock in harvested wood products in Switzerland in 2015 was nearly 18 million tons. Total employment in the forest sector has remained roughly stable and was 59 thousand people in 2015. Between 2000 and 2015, employment in the paper sector about halved but in the forestry sector itself, it tripled, to reach 12 thousand people. In 2015, wood accounted for 4% of primary energy supply of which more than half direct from the forest and rather less than half from co-products and residues of the industries.

Economic, environmental, social and cultural values of forest genetic resources in Switzerland:

Swiss forests are in their majority near to nature mixed stands with relatively high biodiversity and advanced age structure. 25% of forest is protected for conservation of biodiversity (MCPFE classes 1 and 2), and 43% of forest and other wooded land is has designated protective functions (MCPFE class 3). 43 thousand ha of forest is considered undisturbed by man.

Regarding genetic resources, most forest tending is via natural regeneration, thus the importance of the long-term adapted genetic resources is high. However, due to climate change some tree species and their genetic provenance may not be adapted to climate change. Thus the paradigm of local is better is changing, and management including with southern provenance, assisted migration, and non-native species must be considered. Nevertheless, the hope that the genetic diversity and the plasticity of the species will allow forest management with local tree species to continue on most of the forest stations remains important. For these reasons, natural forest regeneration, which guarantees maximum genetic diversity, remains highly recommended and applied.

The predominant social and cultural use of forests in Switzerland is recreational. Daily walking, exercising, hiking, and human health have a very significant economic and social value. Further, Switzerland is a mosaic landscape and forests provide microclimatic environmental benefits such as temperature regulation, buffering from traffic noise and clean air.

Contribution of forest genetic resources to sustainable development in Switzerland:

Forest ecosystem services greatly add to the productivity of the agricultural sector, providing soil and water protection and environmental regulation of temperature, humidity, and pollinators. Further, tourism is an essential part of the Swiss economy and forests are part of this idyllic landscape. Switzerland is a mountainous country with extensive infrastructure such as transportation, energy generation and settlements in vulnerable areas. Finally, forests will only be able to continue contributing these services if trees and forests are resilient. Therefore, FGR and the selection of species and provenance is at the heart of the selection of adapted provenances and species.

Priorities for enhancing the contribution of forests and forest genetic resources to sustainable development in Switzerland:

Forest policy in Switzerland places highest priority on adaptation of forests to climate change. According to Swiss research, temperature is expected to rise 4 degrees above current levels by 2080. This means that it is urgent to transform forests through tree species of genetic provenance adapted for survival in a warmer and dryer environment with associated threats such as increased incidence of pests and forest fire. Natural forest regeneration, which allows adapted tree species to grow at the expense of others, will probably in many places meet this challenge.

Constraints in Switzerland to increasing awareness on the value and importance of forest genetic resources:
The economic value to the ecosystem and society of forest ecosystem services in Switzerland is generally not reflected by subsidies or incentives for forest managers. Regarding forest management for wood, the price is low, extraction is expensive, and Switzerland has a small country disadvantage in terms of economies of scale. Therefore, an increasing amount of forests is unmanaged or even abandoned and this is putting their services in danger. A general public and political belief about forests is that their services are for free and require no management. As long as this belief prevails, forest ecosystem services will be under-valued and endangered by climate change and the economic difficulties around producing wood. Particularly considering adaptation, Particularly considering adaptation, because of financial disinterest, unexploited older forests are falling behind and may be a hazard for the delivery of forest services in the future.

Part 2: State of diversity in forests and woodlands

Chapter 2. State of forests

State of Swiss forests:
Switzerland is a mountainous country in central Europe with almost a third forest cover. Forest area has been expanding steadily and stands at 32.1% of total land area. 57% of forests are under a management plan or equivalent, which is compulsory although the system varies according to canton, holding size and ownership. Growing stock per hectare is stable at a high level (354 m3 o.b./ha). Above ground biomass has expanded slightly. Carbon stock in harvested wood products in Switzerland in 2015 was nearly 18 million tons. A regular national forest inventory provides information meanwhile for policy making and international reporting.

Trends affecting forests and theirmanagement in Switzerland:

- The Swiss forest and climate research program of 2009-2017 concluded the following: global temperature rise since 1880: 0.85 degrees C, in Switzerland 1.8 temperature rise for same period
- by 2100 possible increase in temperature in Switzerland of 4.8 degrees C (over 1980-2009av)
- 3 of last 10 years the warmest in recorded history
- Evidence for increased bark beetles (Ips typographus- Spruce and Anoplophora glabripennis- broadleaf) incidence and mortality due to increased temperature and dry summer periods
- Though most tree species grow better in warmer and more humid conditions, it is becoming generally dryer, and higher mortality is occurring in pine (Pinus sylvestris, P mugo), silver fir (Abies alba), spruce (Picea abies), beech (Fagus sylvatica), and maple (Acer pseudoplatanus).
- In Switzerland much regional differentiation, habitat change forcing species migration, impacts in growth, mortality, and rejuvenation.
- Expected higher incidence of storms makes rejuvenation essential, shorter recuperation time
- Protection forest in danger due to advanced age structure and drought, increased fire danger.
- Selection of future species, for example grand fir (Abies grandis), Douglas fir (Pseudotsuga menziesii), beech (Fagus orientalis), oak (Quercus petraea and Q robur)
- By 2050 reduced forest protective functions expected, which gives time if we act now

Drivers of change in the forest sector and the consequences for forest genetic resources:
As mentioned in the previous point, climate change adaptation issues such as temperature rise, increased drought, fires, pests, and storms are driving change in the forest sector.

Challenges and opportunities these trends and drivers create for the conservation, use and development of forest genetic resources:
The above-mentioned trends and drivers are prompting the migration of native species above an altitudinal gradient. Furthermore, more consideration will be given to non-native or non-local species where no native or local species are identified to replace actual forests. In some cases this may create conflict with biodiversity policy. Further, complementing natural regeneration with nurseries, planting and protecting young trees has additional budgetary and management challenges. Purchasing seeds, seedlings, and appropriate genetic material for planting also has challenges with availability and additional effort. The presence of game may also be a major problem when regenerating certain forest species. The management of game in future years will therefore be of great importance.

Chapter 3. State of other wooded lands

State of other wooded lands in Switzerland:
In Switzerland these lands are classified as “shrub vegetation”, “linear woods”, “cluster of trees”. These are reported under agricultural land as orchards, vineyards, horticulture, alpine meadows with linear woods and clusters of trees.

Trends affecting other wooded lands and their management:
In Switzerland, a mosaic landscape, forestry species that would be in for example agroforestry or silvo-pastoral systems are not particularly prevalent and considered generally by farmers as less productive systems.

Drivers of change in other wooded lands in Switzerland and consequences for forest genetic resources:
Many farms are only barely surviving economically and could benefit from the added advantages in productivity, soil protection, and increased production from mixed cultivation.

Challenges and opportunities for conservation, use and development of forest genetic resources:
Switzerland could potentially benefit in climate adaptation and mitigation from the integration of FGR in agricultural lands. A study by the Federal Office for Agriculture indicates that if 13.3% of agricultural lands in Switzerland were agroforestry systems, this would compensate 13% of national emissions from agriculture. For the European region, if 9% of agricultural lands were planted with trees, this would compensate 43% of agricultural emissions.

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

Tree and other woody plants species considered as “forest genetic resources” in Switzerland:
The list of woody plants in Switzerland shows 224 native and 47 frequent non-native species, resulting in 271 woody plant species being forest genetic resources in the largest sense (FGR s.l.). The list can be subdivided based on life form into 89 tree species, 132 shrub species and 50 dwarf shrub species. The 89 tree species comprise 35 frequent non-native tree species and, among the native tree species, 5 frequent hybrid taxa, resulting in 49 native tree species being forest genetic resources in the strictest sense (FGR s.str.). The national principle and promotion of close to nature silviculture implies to work with native species from local/regional provenances and mostly use natural regeneration.

Number of native and introduced species managed or utilised in the forestry context:
The demand for reproductive material for plantations is declining (1975: approx. 1.5 Mio, 2015: approx. 1 Mio). In general, the number of species is currently stable in Switzerland. This situation is likely to change in future years.

Trends and drivers of change in the number of species and threats to species:
The search for suitable species for lowland forest stations could lead to an increase in some species used in the future but currently no clear trend is perceived as forest owners preferred to work with natural regeneration and local provenances of species they know already.

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

State of the genetic diversity of trees and other wooded plant species in Switzerland:
The Forest and Climate Change research program summarizes previous quantitative-genetic findings and supplements them with new studies from Switzerland: Experiments with some important main tree species reveal a high level / temperature differentiation, for example. with Picea abies and dryness e.g. among the oaks (Quercus spec.). Phenological characteristics such as the emergence of provenances at different altitudes also suggest genetic differentiation for some deciduous tree species, but this is not transferable in all species since phenology is based on different species-specific control mechanisms (photoperiodicity, temperature sum). The current paneuropean GenTree project, with cooperation of the Ecological Genetics group at the Swiss national research institute WSL contains sample plots in Switzerland and will reveal in the near future more information on adaptive traits for several species.

Trends in the genetic diversity of these species and in the state of the populations:
We can consider that at present this diversity is at least stable. Furthermore, as populations have the potential to migrate to higher altitudes in our country (Alps and Jura mountain ranges act as effective vertical buffers), the trend is seen as currently stable.

Current and emerging technologies for assessing and/or monitoring the genetic diversity of these species:
In any case, in the future adaptation will be a big issue for FGR. That’s why it is crucial to continue the current research of the GenTree research project on adaptive genetic variation (e.g. SNPs & GEA).

Challenges and opportunities for increasing the availability of information on the genetic diversity of these species:
For a better understanding of epigenetic adaptation processes as well as migration processes a long-term genetic monitoring is necessary for exemplary target species.

Priorities for capacity building and research:
Maintenance and further development of the currently strong competence center for forest/tree genomics at the Swiss national research institute WSL.

Part 3: State of forest genetic resources conservation

Chapter 6. In situ conservation of forest genetic resources

State of in situ conservation of forest genetic resources:
Good.

Approaches used for in situ conservation:
In 1914 the National Forest Reserves Network was established, (BAFU 2012ff), building on National Park (1914ff) and Research Forest Reserves (WSL/ETH/BAFU 1948ff)

State of protected areas, 2014: 2'407 reserves, 67'854 ha

Types of protected areas:
(a) National Park without Active Intervention (MCPFE class I, Park)
(b) Forest Reserves with minimum Active Intervention (MCPFE class II, Naturwaldreservat)
(c) Forest Reserves with Conservation through Active Management (MCPFE class IV, Sonderwaldreservat)

Organisation of in situ conservation efforts and players/stakeholders:
Establishment of national tree seed programs
in 1986: Storage and Mediation by the National Seed Agency (Lagerung und Vermittlung durch Nationale Saatgutvermittlungsstelle, WSL). Private and public forest owners.

A process for the establishment and further development of the national in situ conservation system has been initiated. The Swiss National Cadaster of Dynamic Gene Conservation Units (GCU, Projekt Generhaltungsgebiete Schweiz / Nationaler Kataster der Generhaltungsgebiete, NKG), integrating earlier initiatives for the establishment of forest tree gene reserves (Arbeitsgruppe Genreservate / Projekt Wälder von besonderem genetischen Interesse BGI, 1994-2003) has recorded 23 new entries for GCU for seven pilot species. Swiss federal university ETH Zurich and Cantonal Forest Administration.

Needs, challenges and opportunities for improving *in situ* conservation of forest genetic resources:
Due to the current campaign on the seven pilot species and the planned 2nd campaign for seven other species the number of entries in the Swiss National Cadaster of Dynamic Gene Conservation Units (GCU, Projekt Generhaltungsgebiete Schweiz / Nationaler Kataster der Generhaltungsgebiete, NKG) will further increase significantly in 2020/2021.

Priorities for capacity building and research:
No extension programmes on national level, but occasionally on cantonal or communal level by making use of National Cadaster of Seed Stands and respective offers of public and private nurseries.
Maintainance and further development of the running project on Swiss National Cadaster of Dynamic Gene Conservation Units (GCU, Projekt Generhaltungsgebiete Schweiz / Nationaler Kataster der Generhaltungsgebiete, NKG)

The national principle and promotion of close to nature sylviculture implies to work with native species from local/regional provenances and mostly use natural regeneration. So the demand for reproductive material for plantations is declining (1975: approx. 1.5 Mio, 2015: approx. 1 Mio).

A recent study on the handling of forest reproductive material under climate change may lead to a reactivation of the respective services (2017: Projekt Umgang mit forstlichem

Vermehrungsgut in einem sich ändernden Klima, FoVeKlim, WSL) – but this does not imply an initialization of a national FGR extension program at the moment.

Chapter 7. *Ex situ* conservation of forest genetic resources

State of ex situ conservation of forest genetic resources:
Good, 220 carefully selected seed stands, which are regularly monitored and periodically harvested. https://www.wsl.ch/de/ueber-die-wsl/versuchsanlagen-und-labors/versuchsgarten/gewinnung-und-lagerung-von-saatgut.html

Approaches used for ex situ conservation of forest genetic resources:
Ex-situ conservation stands, storage facilities for seed, pollen or other tissue

Organisation of *ex situ* conservation and main players/stakeholders:
Ex-situ systems are complemented with the establishment of *in situ* conservation systems
(1) 1980: Seed&Conservation Orchards (diverse initiatives, WSL/Cantons)
(2) 1986: National Seed Agency (Nationale Saatgutvermittlungsstelle, WSL)

Needs, challenges and opportunities for improving ex situ conservation of forest genetic resources:
Due to improvement of knowledge and infrastructure for seed storage in private nurseries the demand for storage services of the national agency is declining (2018: 315 provenances of 93 species).

Priorities for capacity building and research:
According to probable new results from genomics research on forests/tree, establishment of new Seed&Conservation Orchards for rare or endangenerd species (diverse initiatives, WSL/Cantons) will have to be taken into consideration.

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

Chapter 8. The state of use

National (or subnational) strategies, guidelines and/or recommendations for using forest genetic resources:

No national coordination mechanism on FGR but occasionally on cantonal or communal level by making use of National Cadaster of Seed Stands and respective offers of public and private nurseries.

The recently completed large national Research Program on Forest under Climate Change (2009-2016: Forschungsprogramm Wald & Klimawandel WSL/BAFU) brought insights to potential species shifts and important improvements for future adaptive management of forests and could be a basis for a future coordination mechanism of FGR. The current GenTree research project on adaptive genetic variation (e.g. SNPs & GEA) will bring insight to forest/tree adaptation capacity and the underlying mechanisms. Both initiatives do not imply an initialization of a national FGR coordination mechanism at the moment.

Roles of registered seed stands, seed orchards and other sources in the supply of forest reproductive material:

(1) National Research Program on Forest under Climate Change (Forschungsprogramm Wald & Klimawandel WSL/BAFU) brought insights to potential species shifts and important improvements for future adaptive management of forests as well as of FGR

(2) Swiss National Cadaster of Seed Stands (Nationaler Kataster der Samenerntebestände, NKS) shall be maintained, improved and completed according to future conditions

(3) Swiss National Cadaster of Dynamic Gene Conservation Units (Projekt Generhaltungsgebiete Schweiz / Nationaler Kataster der Generhaltungsgebiete, NKG) will provide more precise information on demography and genetics of selected populations covered by a unit (GCU)

Production of and demand forforest reproductive material:

So far, the production of forest reproductive material meets the demand of this material because the production capacities have adapted to the decline in demand in recent years. However, needs will increase in the coming years due to local great forest decline associated with the summer drought observed in recent months. According to the theory of supply and demand, production capacities should logically adapt in the future.

Import and export of forest reproductive material:

Switzerland trade FRM with neighbors' countries

Certification and rules of forest reproductive material produced and traded in Switzerland:

Switzerland takes part in the OECD Program Forest Seed and Plant Scheme and the Forest reproductive material is certified accordingly. At national level, the Forest Division of the Swiss Federal Office for the Environment is responsible to approve forest reproductive material. However, the certificates of origin for material sold in and outside Switzerland (export) are signed and validated by the responsible canton. These certificates are linked to the Swiss National Cadaster of Seed Stands (NKS) and support the planting of appropriate material.

Needs, challenges and opportunities related to the use of forest genetic resources:

In the future, due to management action containing assisted migration/assisted geneflow measures of implementation there will be an increasing need for exchanging FRM between countries and planting FRM of non-autochthonous provenances/species. Therefore, the legislation has to be adapted correspondingly.

Chapter 9. The state of genetic improvement and breeding programmes

Approaches used for tree improvement and/or breeding:
There is no tree improvement or breeding program in Switzerland

Prioritisation of uses and traits:
See above

Organisation, main players and stakeholders of tree improvement and/or breeding programmes:
Each canton is organized according to its capabilities and characteristics. The Confederation advises and participates in forest management efforts implemented locally.

Use of current and emerging technologies in tree improvement and/or breeding:
There is no tree improvement or breeding program in Switzerland

Needs, challenges, and opportunities for tree improvement and/or breeding:
None, there is no breeding program in Switzerland, rather the national focus is on in-situ conservation and promotion of species.

Priorities for capacity building and research
Switzerland doesn't currently prioritize this topic.

Chapter 10. Management of forest genetic resources

Genetic considerations in managing natural and planted forests, as well as other wooded lands:
The regeneration of forests carried out mainly by natural means guarantees a maximum of genetic diversity within the forest stands. In the case of plantations, forest managers ensure the use of provenances adapted to local conditions. Forest nurseries manage their seed stands so that they can offer a wide range of provenances to meet specific demands.

Current and emerging technologies used in the management of forest genetic resources:
Currently traditional management.

Consequences of the trends and/or changes in the forest sector for forest genetic resources and their management:
The potential consequences are an increased need for genetic knowledge for forest species that will be adapted in the future to low altitude extreme stations.

Needs, challenges and opportunities for improving the management of forest genetic resources:
Given the complexity of maintaining forest genetic resources under climate change, a paradigm shift towards a cybernetic approach to gene conservation is indicated. What is needed is a large-scale network of generating areas as well as a correspondingly coordinated long-term and large-scale demographic and genetic monitoring of the target populations of these generational areas. Due to the recent development in computer science, the necessary database systems are technically feasible.

Priorities for capacity building and research:

Action, including research needs, should be included in the development of a National Strategy on Forest Genetic Resources and its implementation.

Part 5: State of capacities and polices

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

Operation and structure of the national coordination mechanism on forest genetic resources:
Switzerland does not have a centralized institutional mechanism, rather a policy framework- please see institutions involved below

Main institutions/stakeholders dealing with forest genetic resources and their responsibilities:

- Federal Office for the Environment FOEN, Forest Division, Ecosystem Services and Silviculture Section: technical, financial, and reporting responsibility
- Federal Technical University (ETH) Zurich: direct responsibility to exchange information in technical processes (EUFORGEN), as well as providing data for FAO reporting, including under contract with the FOEN. Please see chapter 12 for a more detailed description of ETH areas of action.
- Cantons, communities, Nurseries

Policies and strategies relevant to forest genetic resources:
The Policies and strategies are integrated in the following:
1) Federal Office for the Environment 2004: Swiss National Forest Programme 2004-2015 (Swiss NFP)
2) Federal Office for the Environment 2013: Forest Policy 2020
3) Federal Office for the Environment 2012: Swiss Biodiversity Strategy
4) Federal Office for the Environment 2015: Biodiversität im Wald: Ziele und Massnahmen (aid to implementaion, in German only)
5) Federal Office for the Environment 2017: Action Plan Swiss Biodiversity Strategy

Developing of specific legislation and/or regulations on forest genetic resources:
Switzerland hasn't developed any specific legislation and/or regulations on forest genetic resources

State of research and development on forest genetic resources:
The state of research and development on forest genetic resources in Switzerland is good and continuing.

State of education and training on forest genetic resources
The state of education and training on forest genetic resources in Switzerland is good. At university level (ETH, MSc Environmental sciences UMNW, major in Forest and Landscape Management, the absence since dropping the former MSc course Forest Genetics could have been filled by the establishment of a new course on up- to-date MSc course Tree Genetics – Concepts and Applications (http://www.vorlesungsverzeichnis.ethz.ch/Vorlesungsverzeichnis/lerneinheit.view?lerneinheitId=134315&semkez=2019W&ansicht=KATALOGDATEN&lang=de).

Needs, challenges and opportunities for strengthening the national (or sub-national) institutional framework on forest genetic resources:
For the moment, the running project concerning the Swiss National Cadaster of Dynamic Gene Conservation Units (GCU, Projekt Generhaltungsgebiete Schweiz / Nationaler Kataster

der Generhaltungsgebiete, NKG) and its focal point, incl. the mandate for representation of Switzerland in the paneurpean FGR-Networks (National Coordinator EUFORGEN, National Focal Point EUFGIS) figures as the platform for national and international exchange of information and strategic development (cf. www.genres.ethz.ch, English version under construction)

Priorities for capacity building:
Continuation on mid-term of both, the current basic mandate (EUFRGEN/EUFGIS) as well as the current project (FGR-GCU Switzerland) in this area.

Chapter 12. International and regional cooperation on forest genetic resources

International and regional cooperation and/or projects on forest genetic resources since 2013:
(1) Active participation of the Swiss Federal Institute of Technology, ETH, Zurich:
(1a) EUFORGEN Steering Committee: national coordinator (http://www.euforgen.org/about-us/how-we-operate/steering-committee/)
(1b) EUFORGEN Working Group "Decision support tool for the management of dynamic genetic conservation units": member and chair (http://www.euforgen.org/about-us/how-we-operate/working-groups/decision-support-tool-for-the-management-of-dynamic-genetic-conservation-units/)
(1c) EUFGIS Network: national focal point (http://portal.eufgis.org/data-providers/)
(2) Active participation of the Swiss Federal Institute for Forest, Snow and Landscape Research, WSL, Birmensdorf:
(2a) EUFORGEN Working Group "Genetic aspects in production and use of forest reproductive material": member (http://www.euforgen.org/about-us/how-we-operate/working-groups/frm-genetic-aspects/)
(2b) EVOLTREE Network: partner (http://www.evoltree.eu/index.php/network/partners)
(2c) GENTREE Network: partner (http://www.gentree-h2020.eu/about/partners/)

Benefits from international and regional cooperation on forest genetic resources:
Essential inputs from the Pan-European strategy for genetic conservation of forest trees and establishment of a core network of dynamic conservation units (EUFORGEN) and the international research cooperation in optimizing the management and sustainable use of forest genetic resources in Europe (GENTREE)

Contributions provided to the international and regional cooperation on forest genetic resources:
Switzerland is an active contributor to EUFORGEN, participates in multiple forest policy processes dealing with the subject (Forest Europe, European Forest Institute and its Integrate Network, FAO, and UNECE). The Federal Technical University in Zurich has a long-term mandate from the Federal Office for the Environment to maintain detailed information on Swiss forest genetic resources, report regularly to the FAO, as well as maintain active participation in multiple technical processes (please see above).

Benefits and/or results applied from the international and regional cooperation for the conservation, use and development of forest genetic resources:
The initiatives on a national strategy for FGR conservation and use (cf. A.4.2) intend to implement regional FGR conservation strategies. They build on the participation in European regional networks:
(1) Membership and collaboration in Pan-European networks for FGR conservation (EUFORGEN, EUFGIS)

(2) Collaboration and exchange of information among research communities and projects (e.g. EVOLTREE, GENTREE)

Needs, challenges and opportunities for strengthening the international and regional cooperation on forest genetic resources:
Continuation on mid-term of both, the current basic mandate (EUFRGEN/EUFGIS) as well as the current project (FGR-GCU Switzerland) in this area. Support of Swiss research contributions to international research programs such as GENTREE ff.

Part 6: Challenges and opportunities

Chapter 13. Recommended actions for the future

Support of and participation in the planned structural upgrade with integration of decision support tool features in EUFGIS database (EUFORGEN phase VI, mandate 2021-26).

Support of complete analyses of huge and complex GENTREE dataset beyond the running time of the project

References
Annexes