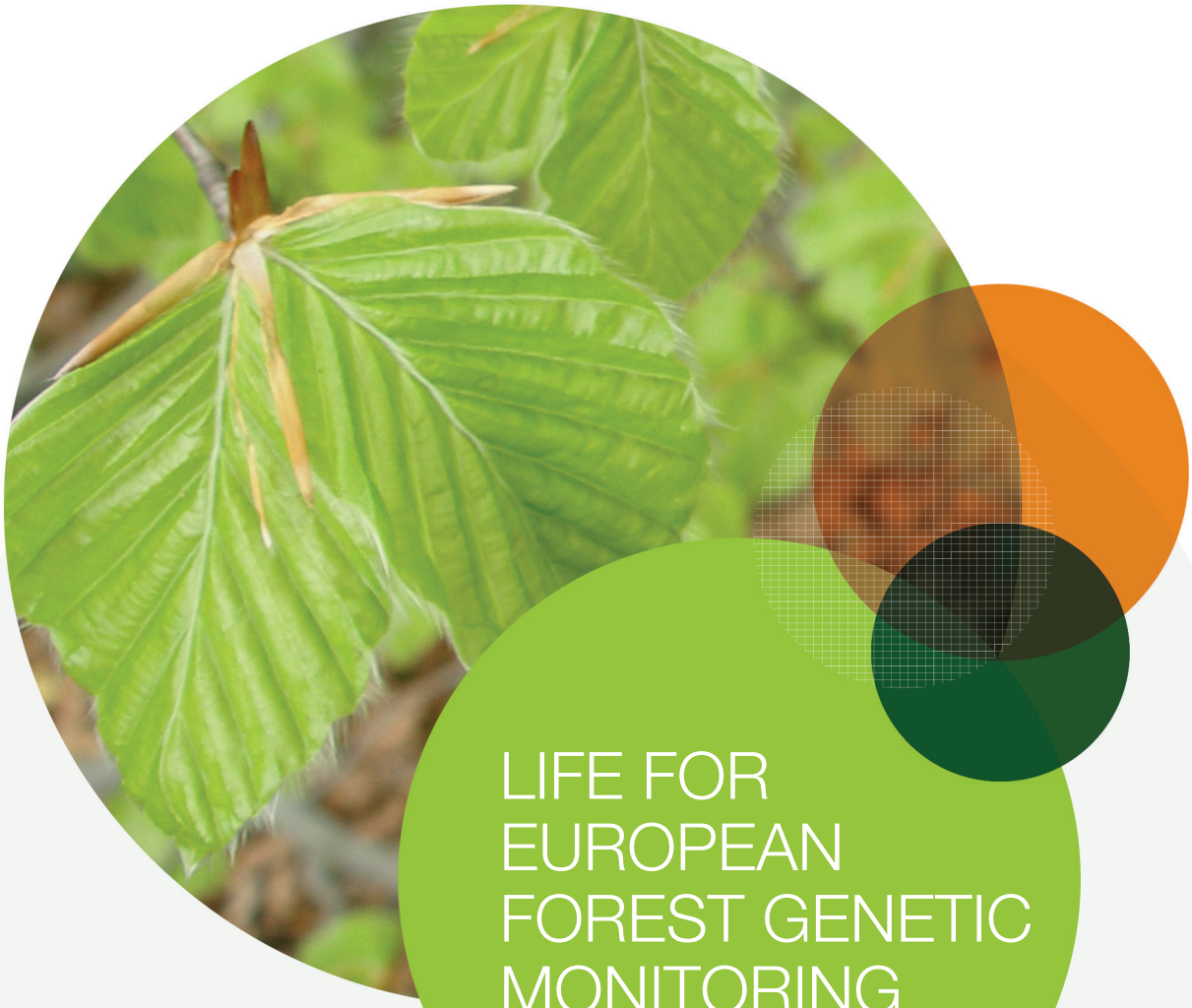


LIFE FOR EUROPEAN FOREST GENETIC MONITORING SYSTEM

Layman's Report No. 1

LIFE GEN MON

LIFE13 ENV/SI/000148

Project is financially supported by the European Union's LIFE financial mechanism.

Table of contents

Short summary

Long-term adaptability of forest ecosystems, is highly dependent on biodiversity, and biodiversity starts at the lowest level: the gene. Because of this utmost importance of genetic diversity, forest genetic monitoring is a crucial component of any sustainable forest management. It makes it possible to detect potentially harmful changes in forest adaptability before these are seen on a larger scale.

The introduction of genetic monitoring into conservation programmes and sustainable forest management gives us the tool we need to assess changes in a species' or population's genetic variation over time. It can thus serve as an early warning system in assessing a species' response to environmental change over the long term.

Co-funded by the European Union's LIFE+ programme (the Financial Instrument for the Environment) and national funding sources, the LIFEGENMON project aims to give the foundation for European forest genetic monitoring system.

Coordinated by Prof. Dr. Hojka Kraigher from the Slovenian Forestry Institute, it joins together six partners from three European countries (Germany, Greece and Slovenia) and runs from July 2014 to June 2020.

The problem

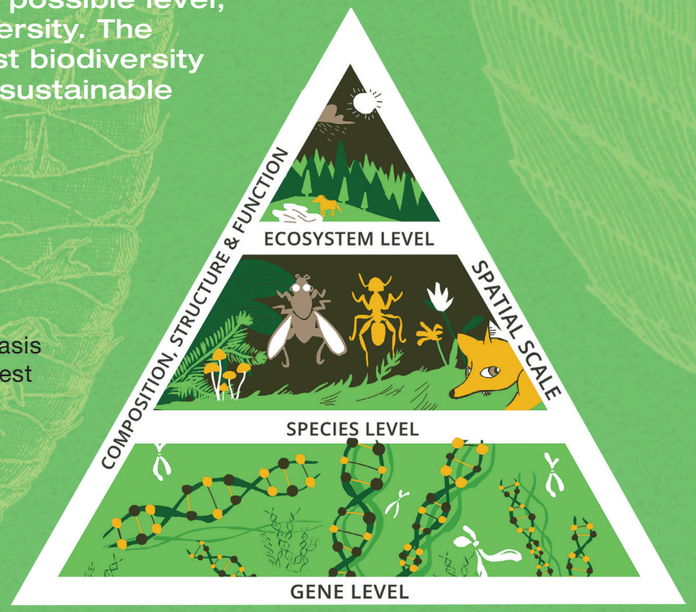
While the total area of forests in Europe has remained stable in recent years (European Environmental Agency 2018), forest genetic resources undergo a number of stress factors: climate change, air pollution, unsustainable forest management, invasive species, urbanization and forest fragmentation, to name a few. These human induced hazards are taking a toll on forest biodiversity, which in turn diminishes genetic diversity and places at risk the future adaptive potential of European forests. To ensure the maintenance of genetic variation in natural forest tree populations, we need an early warning system. Subtle but significant adverse changes may not be visible to the naked eye for years, whereas genetic monitoring is designed to do just that.

Approach taken

Introducing genetic monitoring into conservation programmes and sustainable forest management practices, gives us the tool we need to detect and assess any significant changes in adaptive and neutral genetic variation over time. Genetic monitoring can be applied at the species and population level and can serve as an early warning system. It may aid the assessment of a species response to environmental change over the long term.

WHY LIFEGENMON?

The adaptability of future forest tree generations relies on conserving biodiversity on every possible level, including genetic diversity. The conservation of forest biodiversity is the foundation for sustainable forest management.



Genetic diversity is the basis for evolution of future forest generations to changing environments.

(Drawn by D. Finžgar)

Here's what we're doing to tackle the problem:

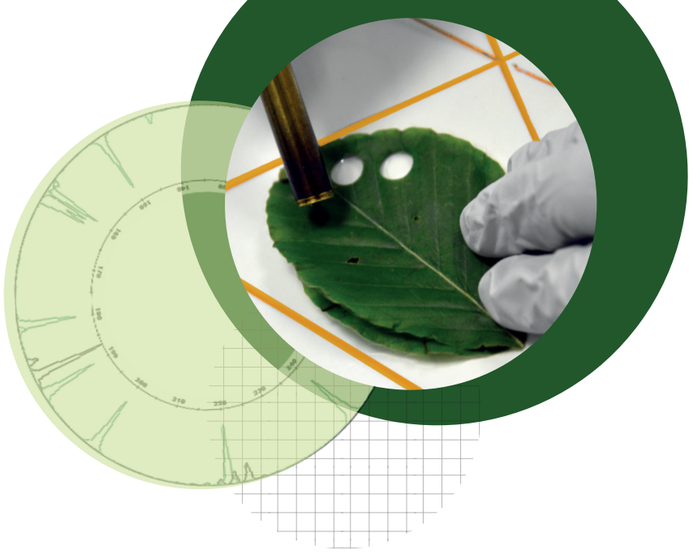
- We define optimal indicators and verifiers for monitoring changes in genetic diversity over time across a transect from Bavaria to Greece. The indicators are defined for two selected target species, a stand-forming broadleaf and a stand-forming coniferous species;
- We produce guidelines for forest genetic monitoring for an additional five forest trees species, which differ in their biology and distribution, so that we can introduce forest genetic monitoring at a national, regional and EU scale;
- We write a Manual for Forest Genetic Monitoring. It can be used at the national and the EU level;
- We draw a decision support system for the optimal choice of forest genetic monitoring level based on needs and means;
- We organize a series of workshops and training sessions for the forestry sector to equip it for forest genetic monitoring based on standardized procedures in their territories;
- We prepare background professional documents and guidelines for policymakers at the national, regional and EU level to support the development of possible new regulations. We discuss and disseminate forest genetic monitoring practices among different stakeholders to promote the use of this early warning system as a tool for sustainable forest management;
- We establish a well-functioning, internationally linked team of forestry professionals involved in forest genetic monitoring.

LIFEGENMON Transect

The project area ranges from Bavaria (Germany) to the Aegean Sea (Greece), with forest genetic monitoring sites established in Germany, Slovenia and Greece.

Expected Results

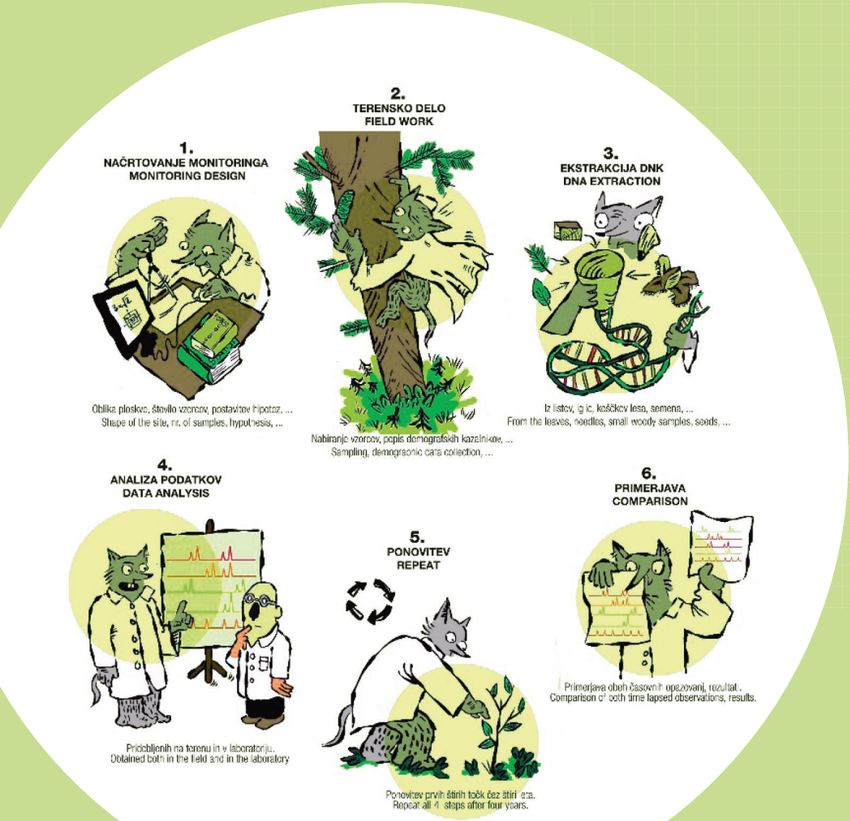
The project is preparing the basis for a future Forest Genetic Monitoring system on the national, regional and EU scales. It aims at implementation of genetic monitoring in national and European environmental legislation.



Main results and outputs

- Genetic monitoring regions delineated for seven species or species complexes within the transect countries;
- Six genetic monitoring sites set up in three countries (two sites per country: one for *Fagus sylvatica* and one for *Abies alba/Abies borisii-regis*);
- Database developed for storing demographic and genetic data, including raw genetic data;
- Minimum and optimal number of indicators and verifiers defined for three monitoring levels;
- Costs of genetic monitoring per species/level/indicator assessed (as part of the Manual for Forest Genetic Monitoring);
- Protocols for the collection of demographic and genetic data standardized;
- Species/species group specific guidelines and strategies established for the European forest genetic monitoring system;
- Handbook entitled Manual for Forest Genetic Monitoring, containing practical advice on forest genetic monitoring including implications for sustainable forest management, prepared and published;
- Decision support system prepared.

Forest Genetic Monitoring



Genetic monitoring lets us observe changes in populations over time, meaning we can infer relevant components and evaluate consequences. Genetic monitoring thus has prognostic value as well as being a way of safeguarding the conservation of processes that maintain genetic variation in natural populations.

Forest genetic monitoring is therefore a crucial component of any sustainable forest management since it enables the detection of potentially harmful changes in forest adaptability before they are seen on higher levels.

Over the long term, forest genetic monitoring will improve adaptive forest management and enhance the resilience of forests to climate change. Resilient forests can continue to provide ecosystem services to society alongside conservation of biodiversity.

Highlights

Prof. Dr. Hojka Kraigher

Slovenian Forestry Institute:

Forest genetic monitoring allows us to detect potentially harmful changes to forest genetic variability before they become visible to the human eye.

Dr. Barbara Fussi,

Bavarian Office for Forest Seeding and Planting (ASF), Germany

Genetic variation, as an integral part of biological diversity, needs special attention, and its monitoring can ensure its effective conservation.

Prof. Dr. Aravanopoulos Filipos A. Aravanopoulos,

School of Forestry and Natural Environment,
Laboratory of Forest Genetics and Tree Breeding,
Aristotle University of Thessaloniki, Greece

Genetic monitoring elucidates processes that maintain genetic variation in natural populations, introduces prognosis and helps define tools for forest gene conservation, policy and management.

Mark Walter,

Bavarian Office for Forest Genetics (AWG), Germany

The importance of genetic diversity is fairly unknown to the general public. And most environmental education programs or games on biodiversity address diversity on ecosystem or species level. In order to create awareness of the genetic level, we had to come up with entirely new concepts and games.

The LIFEGENMON project: Long-term benefits

Long-term qualitative environmental benefits

Forest genetic monitoring will provide insights into the current state of genetic diversity in a given forest population. Changes in the indicators observed will alert foresters to any alteration underway, allowing for early intervention. Forest genetic monitoring will thus contribute to improved adaptive forest management over the long term, resulting in forests that are more resilient to the impacts of climate change and other stress factors.

Long-term qualitative economic benefits

Through implementation actions, the monitoring itself is discussed with forestry professionals and policymakers. Forestry professionals look into solutions to incorporate monitoring into their daily work. They need to be within the budget of forestry services, which policy has to take into account. The goal is to produce a self-sustainable monitoring system that would not rely on occasional project funding.

Long-term qualitative social benefits

The transferability and replicability of LIFEGENMON results is an important factor in assuring future social benefits such as rural community resilience (job creation, protected homes, lives and livelihoods) and preservation of recreational, historical and cultural resources of forests so that they can be enjoyed by future generations.

Continuation of the project actions

All project activities are aimed at preparing the after-LIFE communicaion plan, its long-term effects and impacts.

LIFEGENMON Factsheet

LIFEGENMON is co-funded by the European LIFE, the Financial Instrument for the Environment, and national funding agencies. Coordinated by Prof. Dr. Hojka Kraigher from the Slovenian Forestry Institute, it involves six partners from three European countries: Germany, Greece and Slovenia.

Duration: **1 July 2014 to 30 June 2020**

Budget: **5,484,162 EUR**

EU contribution: **2,734,952 EUR (49.87%)**

Co-financing: The project LIFEGENMON is co-financed by the European LIFE financial programme, national ministries in Slovenia, Germany, Greece, and all project beneficiaries.

Goal: Develop a system for European Forest Genetic monitoring in order to support the long-term maintenance of forest genetic resources adaptability to changing environment.

LIFE FOR EUROPEAN FOREST GENETIC SYSTEM

Partners: Slovenia: Slovenian Forestry Institute (coordinating beneficiary); Slovenia Forest Service; Centre for Information Service, Co-operation and Development of NGOs (CNVOS)
Germany: Bavarian Office for Forest Genetics
Greece: Aristotle University of Thessaloniki, Faculty of Forestry and Natural Environment; The Decentralized Administration of Macedonia – Thrace, General Directorate of Forests & Rural Affairs
Project website: **http://www.lifegenmon.si/**

Project portal: **http://znanjezagozd.si/en/**

Publisher: Slovenian Forestry Institute, *Silva Slovenica* Publishing Centre, Ljubljana 2018

Title: LIFEGENMON Layman's Report No. 1

Authors: the LIFEGENMON Project team (in alphabetical order): Paraskevi Alizoti, F. A. Aravanopoulos, Evangelia Avramidou, Roland Baier, Marko Bajc, Tjaša Baloh, Pavlos Bekiaroglou, Gregor Božič, Andrej Breznikar, Tina Divjak, Domen Finžgar, Nikitas Fragiskakis, Barbara Fussi, Pavlos Hassalidis, Melita Hrenko, Darius Kavaliauskas, Katja Kavčič Sonnenschein Fotis Kiourtsis, Monika Konnert, Hojka Kraigher, Ermioni Malliarou, Tanja Mrak, Iakovos Papadopoulos, Boris Rantaša, Chrysi Sarvani, Ines Štraus, Živan Veselič, Urša Vilhar, Veronika Vodlan, Mark Walter, Marjana Westergren, Peter Železnik, Laura Žižek Kulovec

Advisory Board members: Ricardo Alia, Vlatko Andonovski, F.A. Aravanopoulos, Dalibor Ballian, Tjaša Baloh, Sandor Bordacs, Franz Brosinger, Barbara Fussi, Jason Hubert, Davorin Kajba, Fotis Kiourtsis, Monika Konnert, Heino Konrad, Alenka Korenjak, Hojka Kraigher, Saša Orlović, Despina Paitairidou, Boris Rantaša, Mari Rusanen, Živan Veselič, Veronika Vodlan, Marjana Westergren

Authors of photos: Gregor Božič, Domen Finžgar, Hojka Kraigher, Boris Rantaša, Urša Vilhar

Editor-in-chief: Prof. Dr. Hojka Kraigher

Technical editor: Urša Vilhar

Language editor: Jean McCollister

Design: Iz principa

Price: Free

The electronic issue of this publication is available at **http://www.lifegenmon.si**.

Data Beneficiary
Name of beneficiary: **Slovenian Forestry Institute**
Contact person: **Prof. Dr. Hojka Kraigher**
Postal address: **Večna pot 2, 1000 Ljubljana, Slovenija**
Telephone: **+386-1-2007800 + direct no. +386-1-2007820**
Fax: **+386-1-2573589**
E-mail: **hojka.kraigher@gozdis.si**

Silva Slovenica

REPUBLIC OF SLOVENIA
MINISTRY OF THE ENVIRONMENT AND SPATIAL PLANNING

Project is financially supported by the European Union's LIFE financial mechanism.

LIFE GEN MON
LIFE FOR EUROPEAN FOREST GENETIC MONITORING SYSTEM

Slovenia:

GOZDARSKI INŠTITUT SLOVENIJE
SLOVENIAN FORESTRY INSTITUTE
Slovenian Forestry Institute (coordinating beneficiary)

ZAVOD za GOZDOVE SLOVENIJE
Slovenia Forest Service

CNVOS
Centre for Information Service, Co-operation and Development of NGOs
Centre for Information Service, Co-operation and Development of NGOs

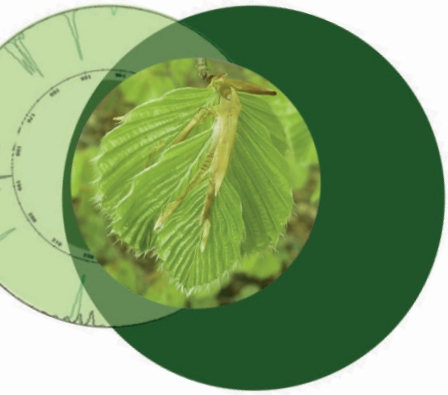
Greece:

Aristotle University of Thessaloniki, Faculty of Forestry and Natural Environment

Hellenic Republic - Decentralized Administration of Macedonia & Thrace General Directorate of Forests & Rural Affairs

Germany:

ASP BAYERISCHES AMT FÜR FORSTLICHE SAAT- UND PFLANZENZUCHT
Bavarian Office for Forest Seeding and Planting



LIFE GEN MON

LIFE FOR EUROPEAN FOREST GENETIC MONITORING SYSTEM