Project Database of ICP Forests

PROJECT DESCRIPTION

PROJECT INFORMATION

Project title:	Modelling forest ecosystem services on Genetic Conservation Unit (Project FORGENIUS)
Project ID:	209
Contact person:	Hendrik Davi // hendrik.davi@inrae.fr

PROJECT DESCRIPTION

Objectives & Methods

FORGENIUS project will develop methods and tools providing greater insight into the characteristics and the value of all forest-relevant GenRes collections presently existing in 35 European countries, and linked through the EUFGIS Information System (http://portal.eufgis.eu). FORGENIUS will create novel services for users within and outside the conservation communities and significantly increase and improve data quantity and quality in the European forest genetic resources (Forest GenRes) information system that describes all accessions. The services created by FORGENIUS will also allow end-users to characterise prospective new genetic conservation units. The continent-wide collection of in situ Forest GenRes accessions (http://portal.eufgis.org/), called Genetic Conservation Units (GCUs), is coordinated by the European Forest Genetic Resources Programme (EUFORGEN) since 1994. GCUs are selected to represent forest tree stands, which are adapted to unique sets of environmental conditions and have distinct genetic, phenotypic, and/or ecological characteristics. However, decisions on the inclusion of accessions into the collection rely mostly on non-standardized local observations, rather than on quantitative scientific assessment. End-users in the fields of Forest GenRes conservation, management and breeding, and forest policy-making, thus need improved data, standards and tools to harness the full value of this unique collection. This is the mission of FORGENIUS. **FORGENIUS will significantly increase and improve data quantity and quality in the existing European forest genetic resources (Forest GenRes) information system.** To do so, it will use state-of-the-art indices ranging from genomics and phenotyping to remote sensing and predictive models. FORGENIUS will improve data and analytical tools for the entire Forest GenRes collection (100+ tree species and 3000+ GCUs) available as a service for end-users, serving as example for other GenRes programmes in the EU and beyond.

In WP1 – Assessing GenRes resilience capacity by remote-sensing and modelling- we will develop predictions of in-situ GenRes collections' resilience based on remote sensing data. A particular focus will be put on inter-specific and intra-specific variability, by combining advanced remote sensing methods, capable of providing the necessary data on all GCUs, process-based models and machine learning approaches. WP1 will:

i. parameterise these models at the population-specific level, based on field-measured data from species subset FS;
ii. scale-up the modelling to all GCUs, for those models that take as input remote-sensing data directly;
iii. for other models, currently requiring field-measured data, develop remote-sensed variables as proxies for field data, by running the models on FS;
iv. scale-up models from (iii) to broaden the assessment of the resilience of forest GenRes collections (growth, survival and reproduction) to climate change and in the face of extreme events.

One carbon-based (CASTANEA, Dufrêne et al., 2005) will be used to assess more accurately the health and resilience of GCU through simulating yearly dynamics of growth, seeds production, leaf deficit level and tree mortality. To ensure the global reliability and estimate the uncertainty of the simulations, simulations done on ICP Forests sites and ICOS sites to evaluate the ability of the model to reproduce carbon sequestration and carbon stock, simulate the Leaf Area Index, the defoliation, the seed production and the mortality. Simulation will be done on 15 tree species for which the model was already used in the past: *Abies alba, Cedrus atlantica, Fagus sylvatican, Picea abies, Pinus halepensis, Pinus nigra, Pinus pinaster, Pinus sylvestris, Pinus uncinata, Pseudotsuga menziesii, Quercus ilex, Quercus petraea, Quercus pubescens, Quercus robur, Larix decidua*.