

TEMPLATE

Output factsheet: Strategies and action plans

Version 1

Project index number and acronym	CE614 - SUSTREE
Lead partner	BFW
Output number and title	O.T1.1 - Transnational delineation model of conservation and forest seed transfer zones in climate change
Responsible partner (PP name and number)	National Agricultural Research and Innovation Centre (NAIK ERTI) - PP4
Project website	https://www.interreg-central.eu/Content.Node/SUSTREE.html
Delivery date	19 th July 2019 (updated on 20.01.2020)

Summary description of the strategy/action plan (developed and/or implemented)

Climate change will disrupt the link between climate and the local adaptation of forest tree populations creating physiological stress that leads to the so-called "adaptation lag". Therefore, forest managers are confronted with the challenge of finding adapted planting materials for reforestation. As such, there has been considerable interest in developing models to aid our understanding of the limits of species distribution and their adaptive capacities in order to develop adaptive management strategies for the future.

With a harmonized provenance trial dataset evaluating the adaptive performance of more than 10,000 populations of 7 major European tree species, we developed within the SUSTREE project so called Universal response function (URF) models. The URF models integrate both climatic and genetic factors in predicting phenotypic variation in functional traits and allow us to evaluate not only single populations growing under specific climate conditions but the overall phenotypic space expressed throughout a wide climatic spectrum. Thus, universal response functions can be used to identify either the best seed provenances for a specific site climate or the best planting site for a specific seed provenance. These URFs were used as delineation models of 7 major tree species of Europe (*Picea abies*, *Abies alba*, *Pinus sylvestris*, *Larix decidua*, *Fagus sylvatica*, *Quercus petraea* and *Quercus robur*) to predict the location of optimum seed sources or planting materials suitable for a given combination of the planting site and according to the different climate scenarios. The output from these delineation models was depicted as spatially explicit maps of best seed sources under the current climate (1961-90) and two climate change scenarios (RCP 4.5 and RCP 8.5). These maps were also integrated into a decision support tool SusSelect smartphone App (Output OT3.2).

NUTS region(s) concerned by the strategy/action plan (relevant NUTS level)

Germany:

DE211, DE212, DE213, DE214, DE215, DE216, DE217, DE218, DE219, DE21A, DE21B, DE21C, DE21D, DE21E, DE21F, DE21G, DE21H, DE21I, DE21J, DE21K, DE21L, DE21M, DE21N, DE221, DE222, DE223, DE224, DE225, DE226, DE227, DE228, DE229, DE22A, DE22B, DE22C, DE231, DE232, DE233, DE234, DE235, DE236, DE237, DE238, DE239, DE23A, DE241, DE242, DE243, DE244, DE245, DE246, DE247, DE248, DE249, DE24A, DE24B, DE24C, DE24D, DE251, DE252, DE253, DE254, DE255, DE256, DE257, DE258, DE259, DE25A, DE25B, DE25C, DE261, DE262, DE263, DE264, DE265, DE266, DE267, DE268, DE269, DE26A, DE26B, DE26C, DE271, DE272, DE273, DE274, DE275, DE276, DE277, DE278, DE279, DE27A, DE27B, DE27C, DE27D, DE27E, DE300, DE401, DE402, DE403, DE404, DE405, DE406, DE407, DE408, DE409, DE40A, DE40B, DE40C, DE40D, DE40E, DE40F, DE40G, DE40H, DE40I, DE803, DE804, DE80J, DE80K, DE80L, DE80M, DE80N, DE80O, DED21, DED2C, DED2D, DED2E, DED2F, DED41, DED42, DED43, DED44, DED45, DED51, DED52, DED53, DEE01, DEE02, DEE03, DEE04, DEE05, DEE06, DEE07, DEE08, DEE09, DEE0A, DEE0B, DEE0C, DEE0D, DEE0E, DEG01, DEG02, DEG03, DEG04, DEG05, DEG06, DEG07, DEG09, DEG0A, DEG0B, DEG0C, DEG0D, DEG0E, DEG0F, DEG0G, DEG0H, DEG0I, DEG0J, DEG0K, DEG0L, DEG0M, DEG0N, DEG0P

Poland:

PL213, PL214, PL217, PL218, PL219, PL21A, PL224, PL225, PL227, PL228, PL229, PL22A, PL22B, PL22C, PL411, PL414, PL415, PL416, PL417, PL418, PL424, PL426, PL427, PL428, PL431, PL432, PL514, PL515, PL516, PL517, PL518, PL523, PL524, PL613, PL616, PL617, PL618, PL619, PL621, PL622, PL623, PL633, PL634, PL636, PL637, PL638, PL711, PL712, PL713, PL714, PL715, PL721, PL722, PL811, PL812, PL814, PL815, PL821, PL822, PL823, PL824, PL841, PL842, PL843, PL911, PL912, PL913, PL921, PL922, PL923, PL924, PL925, PL926

Austria:

AT111, AT112, AT113, AT121, AT122, AT123, AT124, AT125, AT126, AT127, AT130, AT211, AT212, AT213, AT221, AT222, AT223, AT224, AT225, AT226, AT311, AT312, AT313, AT314, AT315, AT321, AT322, AT323, AT331, AT332, AT333, AT334, AT335, AT341, AT342

Hungary:

HU110, HU120, HU211, HU212, HU213, HU221, HU222, HU223, HU231, HU232, HU233, HU311, HU312, HU313, HU321, HU322, HU323, HU331, HU332, HU333

Czech Republic:

CZ010, CZ020, CZ031, CZ032, CZ041, CZ042, CZ051, CZ052, CZ053, CZ063, CZ064, CZ071, CZ072, CZ080

Slovakia:

SK010, SK021, SK022, SK023, SK031, SK032, SK041, SK042

Expected impact and benefits of the strategy/action plan for the concerned territories and target groups

The delineation models are likely to inform forest and nursery managers as well as policymakers about the most suitable planting materials for reforestation of seven major tree species of Europe. Since the delineation models predict the optimum seed sources for future climate under two RCP scenarios and several timeframes (2041-60, 2061-80 and 2081-2100) it accounts for both spatial and temporal uncertainty due to climate change. This allows evaluating the risks as well as benefits of using locally available seed sources or the so-called adapted seed sources. Since the output is integrated into a smartphone app it is likely to inform more stakeholders compared to conventional means of dissemination of project outputs such as project reports and communication briefs.

Sustainability of the developed or implemented strategy/action plan and its transferability to other territories and stakeholders

The delineation models in the form of maps of suitable seed sources under current and future climate scenarios can be extended to any region of Europe where data related to climate growth response are available. The system is powerful yet simple and based on algorithms that can be modified to suit the need of seed deployment of any forest tree species.

The delineation models have been incorporated into the smartphone app SusSelect available on android platforms and a desktop app for Windows. This app is maintained and coordinated by PP4 (NAIK ERTI) and is being used for training and educational purpose by all PP. In addition, the delineation models are also being used in an Interreg DANUBE project (REFOCUS) and the recently awarded Interreg CENTRAL EUROPE cross-fertilization project TEACHER, where BFW is a participant. In the refocus project the delineation models will be applied within the riparian forests of the Danube system and within the TEACHER project, the models will be used within watershed areas of central Europe. This ensures its sustainability and periodic upgrade for utilization by a wide range of stakeholders both within and beyond the territorial boundaries of the project area i.e Central Europe. The PP BFW also won a subsequent national project aiming at “climate smart forestry” and maintaining the forest knowledge platform www.klimafitterwald.at. Delineation models developed in SUSTREE will be integrated into these knowledge platform which is mainly addressed to forest practitioners and small forest owners in Austria.

In the long-term, the PPs aim at providing the transnational seed delineation models also for policy makers and stakeholders throughout EUROPE. Therefore, SUSTREE coordinator BFW presented the models not only at SUSTREE events, but also at other several stakeholder events. The latest presentation will be at Feb. 4, 2020 in Brussels at the conference “Forests for Biodiversity and Climate” organized by the European Commission as contribution to the Green New Deal (https://ec.europa.eu/info/events/international-conference-forests-biodiversity-and-climate_en).

Lessons learned from the development/implementation process of the strategy/action plan and added value of transnational cooperation

During the early stages of the development of the delineation models, it was realized that the robustness of the models depends on data from a wide range of growing conditions. Therefore SUSTREE collaborated with stakeholders both within and beyond central Europe and developed a harmonized dataset of provenance trial data which is the base of these delineation models. A data paper is under preparation aiming at free and unrestricted public use of the dataset for scientific purposes. This will ensure penetration of the developed strategy i.e the delineation models and its associated data within and beyond the territorial boundaries of Central Europe and further fortify the value of transnational cooperation.

References to relevant deliverables and web-links

If applicable, pictures or images to be provided as annex

- D.T1.2.1: Workshop on forest inventory data in Central Europe
- D.T1.2.2: Establishing a GIS-based database for species inventory and soil data
- D.T1.2.3: Collecting soil maps for estimates of water holding capacity
- D.T1.2.4: Derivation of species distribution models (SDM) for the 6 most important tree species within the CE regions
- D.T1.3.1: Review and collection of existing tree species response functions
- D.T1.3.2: Collection of provenance plot data for unified response function (from all EU)
- D.T1.3.3: Summary and report of intraspecific response function and derivation of climate transfer limits
- D.T1.4.2: Maps with delineation models for optimal seed transfer for present and 3 future climate scenarios
- D.T2.2.1: Report on statistics of climate regimes with and among existing provenance delineation
- D.T2.4.3: Policy brief for European policy makers