

Mixed species forest management Lowering risk, increasing resilience

REFORM

REsilience of FORest Mixtures

Miren del Río

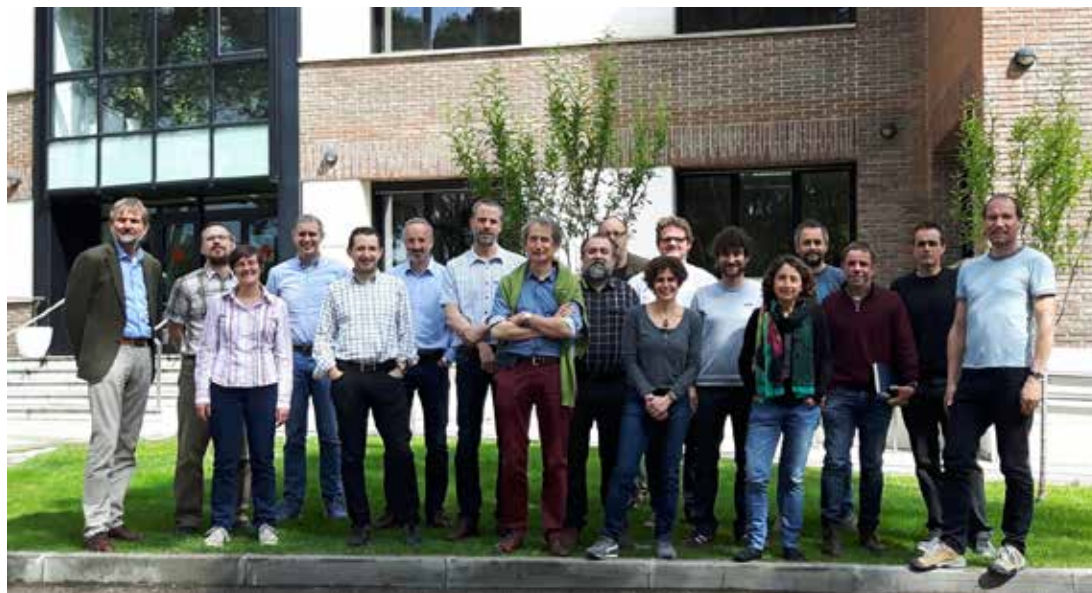


Workshop, Latvia 5 April 2018



- Austria: BOKU A. Nothdurft
- Belgium: UCL Q. Ponette
- France: INRA H. Jactel
CNRS X. Morin
- Germany: TUM H. Pretzsch
- Italy: UNITUS A. Barbati
- Latvia: SILAVA A. Jansons
- Lithuania: ASU G. Brazaitis
- Norway: NMBU A. Brunner
- *Poland: AUK M. Pach
- Spain:** **INIA** M. del Río
UVA F. Bravo
- Sweden: SLU M. Löff

13 Partners from 11 countries!



Estimation of monospecific vs mixed forests proportion in Europe

- 20 EU COUNTRIES (Biosoil Biodiversity database)
- Assessment year: 2006-2007
- Sampling units 2907 fixed-area plots
- Sampling plot radius = 25 m, size = 1963.5 m²
- Measured variables: dbh by species

CRITERIA: *Species BA > 15%*

tree by tree mixtures

BIOSOIL plots (%)



BA ≥ 5	43	33	18	5	2	0
BA ≥ 15	60	32	7	0	0	0
BA ≥ 20	68	28	4	0	0	0

Overview of mixed forests in Europe

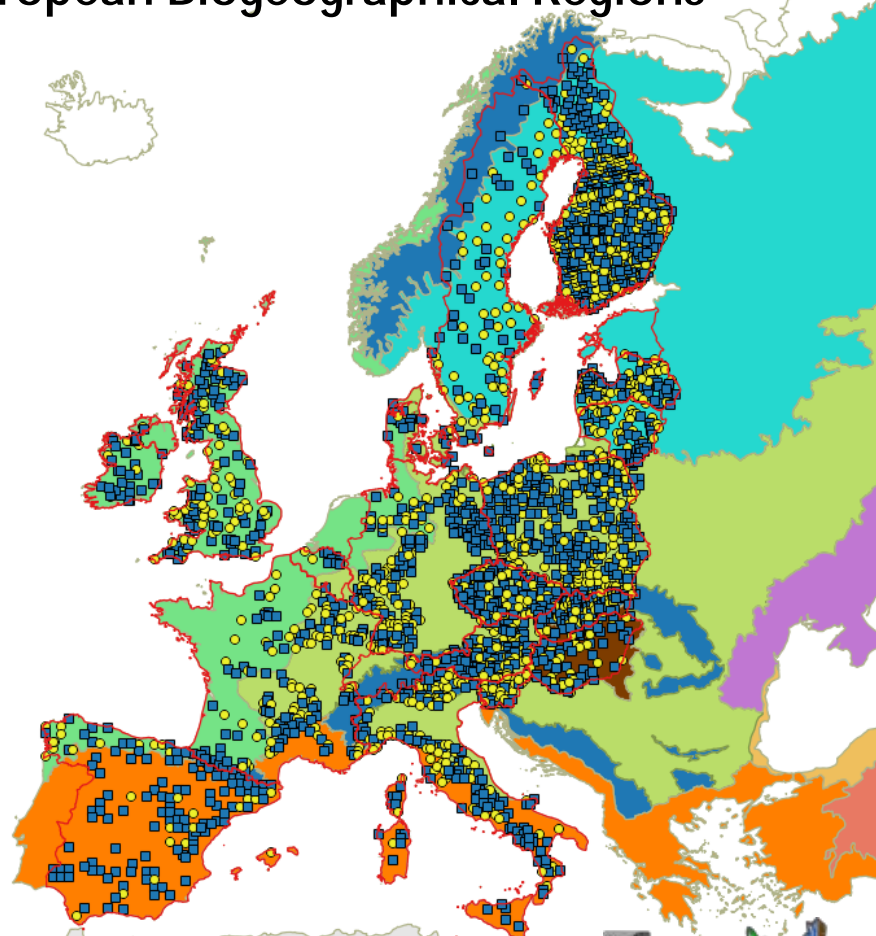
Mixed stands widely widespread across European Biogeographical Regions

Number of tree species (BA³ 15%)

q S (1 sp) = 60%
 • M (2-4 sp) = 40%

BiogeoRegions2011

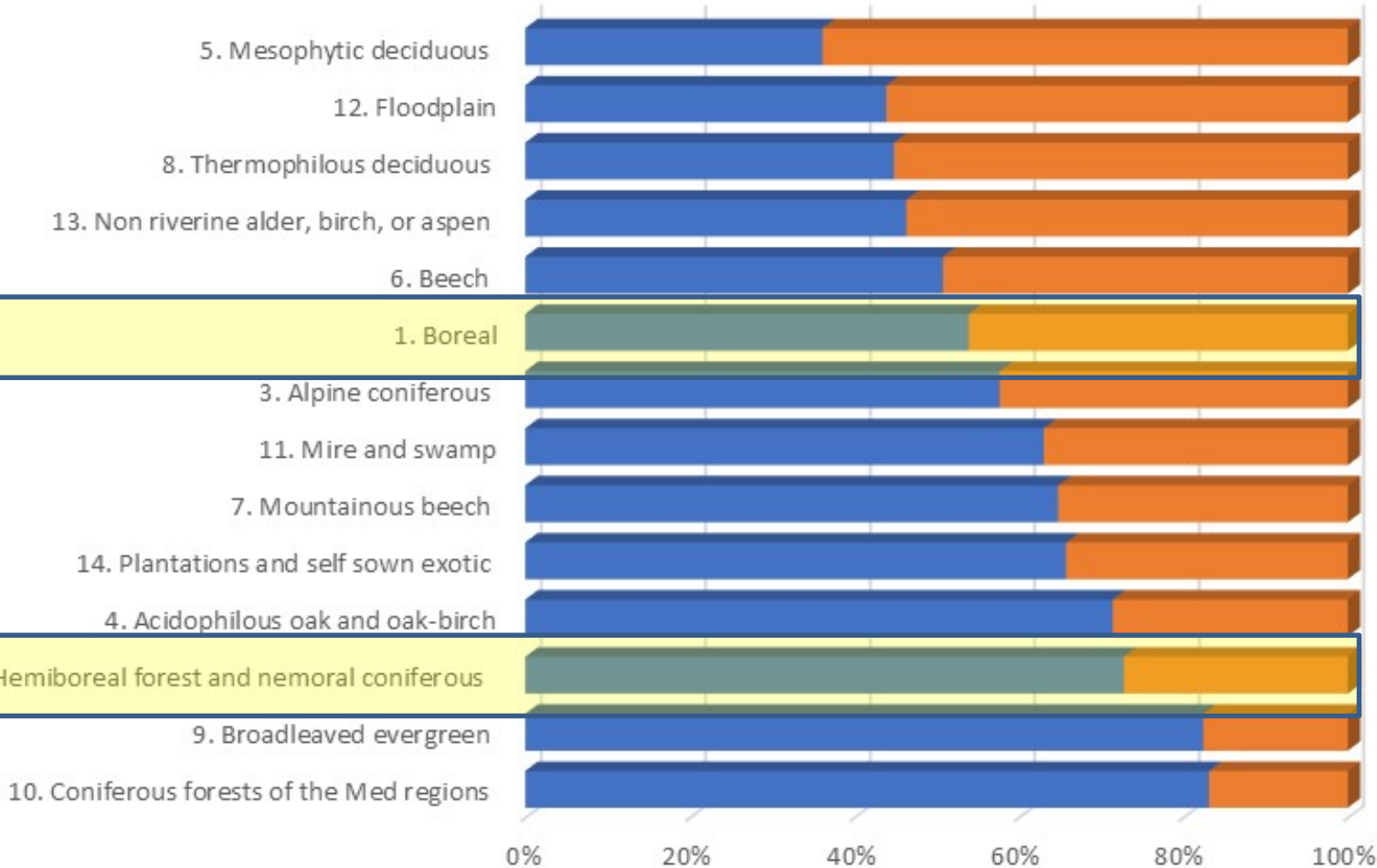
<input checked="" type="checkbox"/>	Alpine Bio-geographical Region
<input checked="" type="checkbox"/>	Anatolian Bio-geographical Region
<input checked="" type="checkbox"/>	Arctic Bio-geographical Region
<input checked="" type="checkbox"/>	Atlantic Bio-geographical Region
<input checked="" type="checkbox"/>	Black Sea Bio-geographical Region
<input checked="" type="checkbox"/>	Boreal Bio-geographical Region
<input checked="" type="checkbox"/>	Continental Bio-geographical Region
<input checked="" type="checkbox"/>	Macaronesian Bio-geographical Region
<input checked="" type="checkbox"/>	Mediterranean Bio-geographical Region
<input checked="" type="checkbox"/>	Pannonian Bio-geographical Region
<input checked="" type="checkbox"/>	Steppic Bio-geographical



Overview of mixed forests in Europe

Proportion of single vs mixed stands by European Forest Types

EFTs classification source: Barbati et al., 2014 FORECO

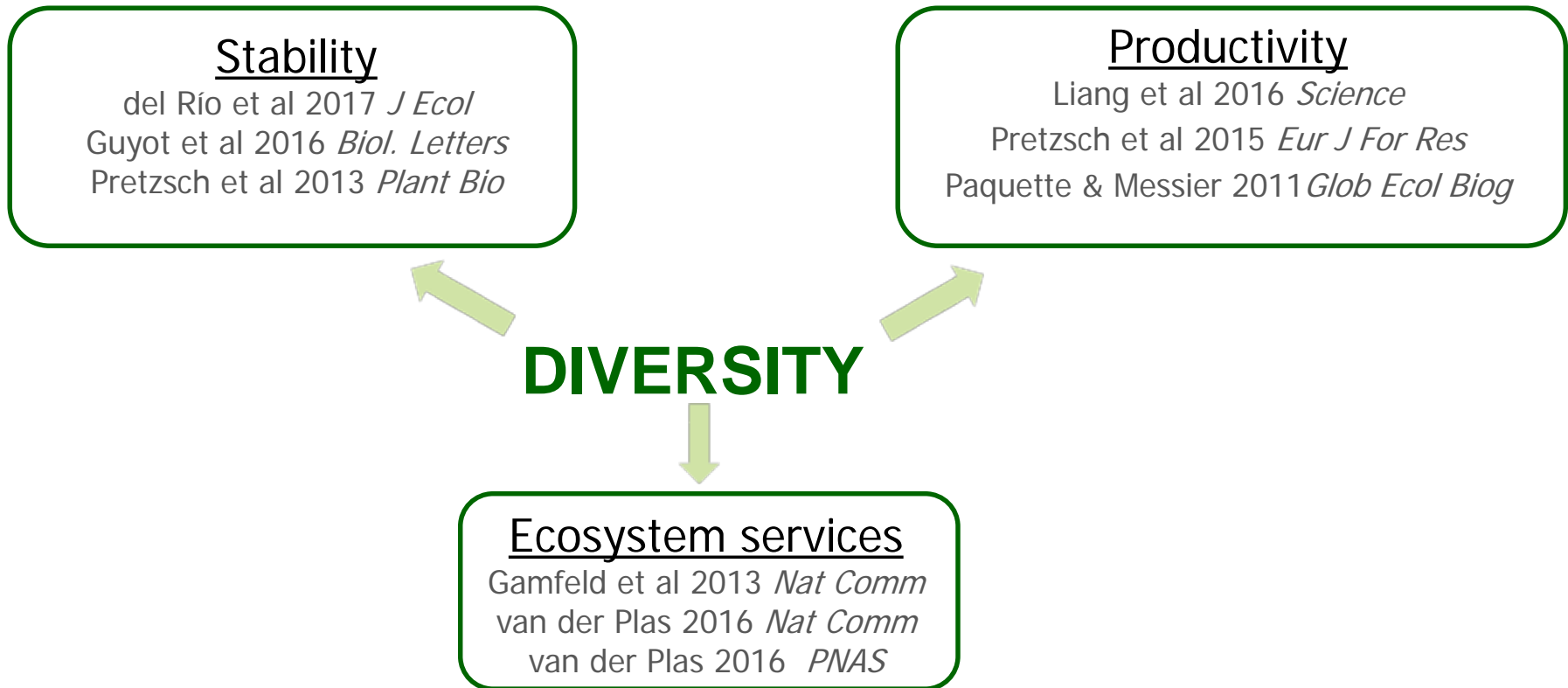


Picea abies, Pinus sylvestris, Betula sp., Populus tremula

Main EFTs & species composition in Nordic countries

Picea abies, Pinus sylvestris, Betula sp., Quercus robur, Ulmus glabra, Tilia cordata

Increasing number of studies in mixed species forests



But there is the need of further knowledge on:

- Mixing effect on resistance and resilience to extreme drought (contrasting results)
- Thinning reactions in mixed stands as adaptive strategy
- Effect of mixed forests reactions to climate change on provision of ecosystems services (ES)
- Silvicultural guidelines and forest models for mixed stands adaption to climate change



Aim and Objectives

AIM: to provide risk resilient forest management alternatives to stakeholders and policy makers

Specific objectives, to:

- i. Determine the role of mixing species on reducing the vulnerability
- ii. Identify Management regimes to improve the resilience
- iii. Adapt growth models to simulate mixed forest dynamics
- iv. Analyse the effect of risk resilient forest management on the provision of Ecosystem services
- v. Transfer the project results to stakeholders and policy makers

- **Triplet-transects (observational)**

Pinus sylvestris- Fagus sylvatica

Pinus sylvestris-Quercus petraea

Pinus sylvestris- Picea abies

- **NFI data (observational)**

- **Case studies (experimental) (13)**

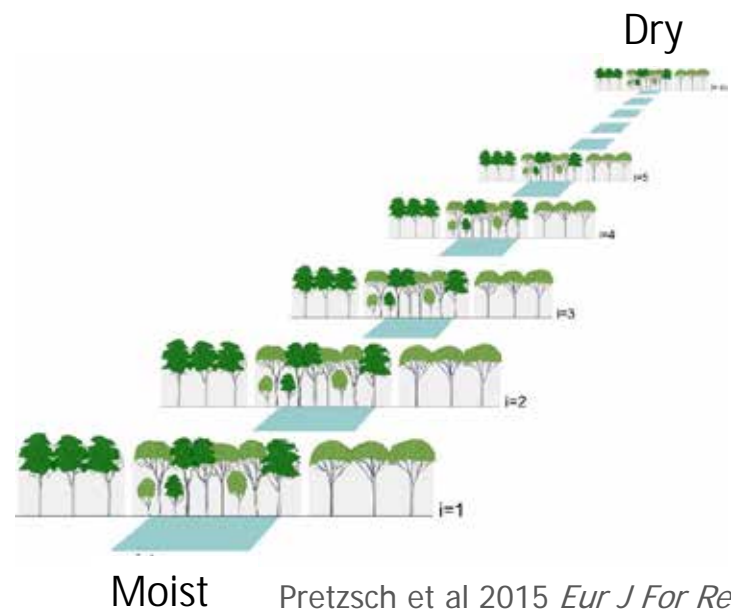
Long term plots

Thinning experiments

Intensive monitoring plots

- **Models (modelling)**

ForCEEPS, PINEA, Prognaus, SILVA, SIMANFOR



Pretzsch et al 2015 *Eur J For Res*
Heim et al 2017 *Ann For Sci*



Methods: operational platforms

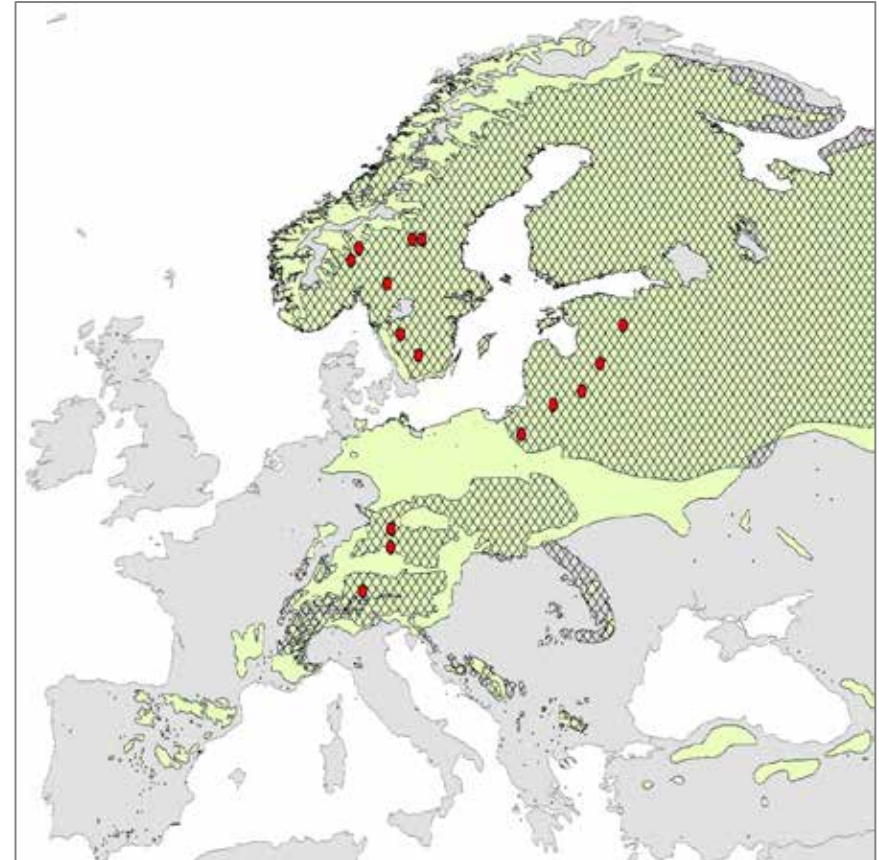
- Triplet-transects (observational)

Overview Spruce-pine triplets

18 triplets unthinned

8 triplets to be thinned

* 10 countries



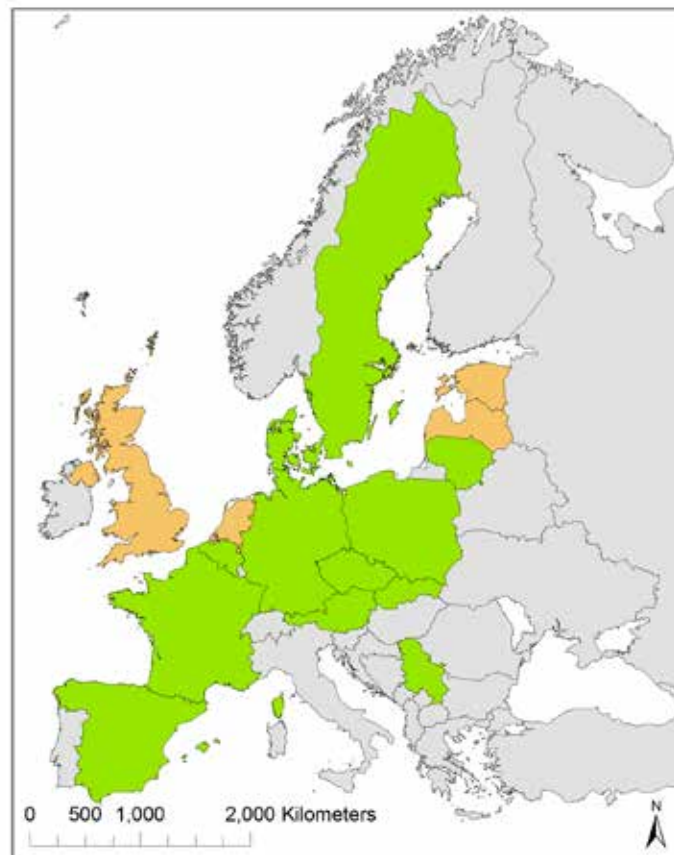
- Triplet-transects (observational)

Overview Oak-pine triplets

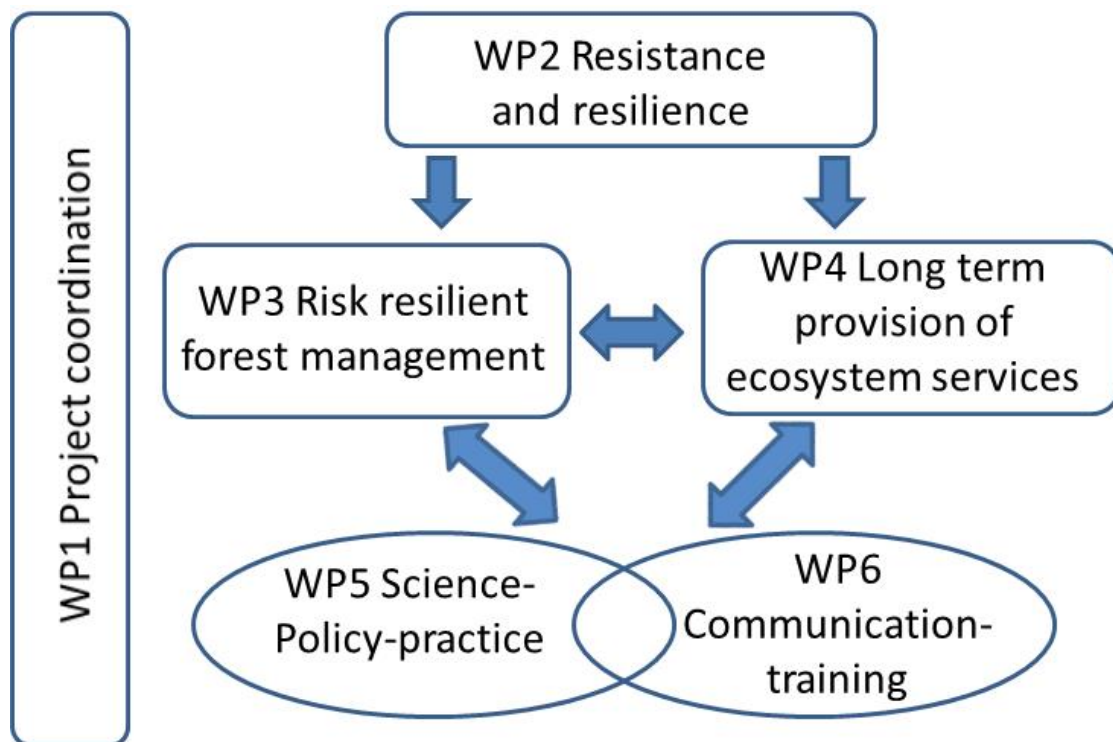
23 triplets unthinned

14 triplets to be thinned or thinned

* 12 (16) countries



Methods: Work Plan



Methods: Work Packages

Abiotic disturbances



2000 1990 1980 1970

Biotic disturbances



WP2 Resistance and resilience

- Comparison of mixed vs monospecific stands
- Identify patterns and drivers
- Linking stand features and vulnerability

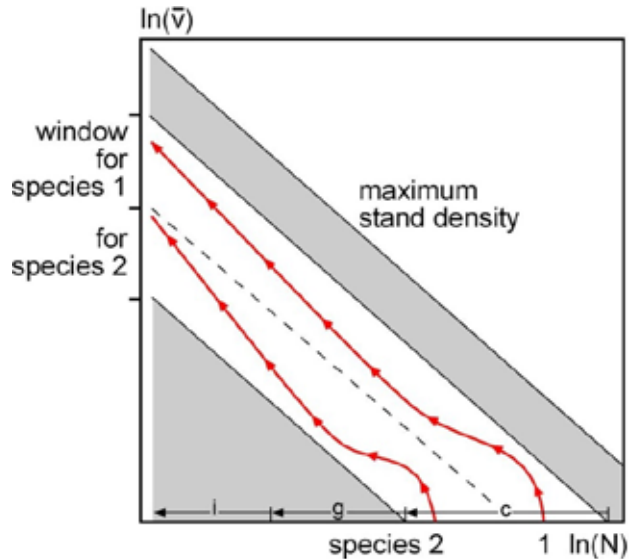
WP3 Risk resilient forest management

- Structure and thinning effect
- Silvicultural guidelines
- Computer algorithms

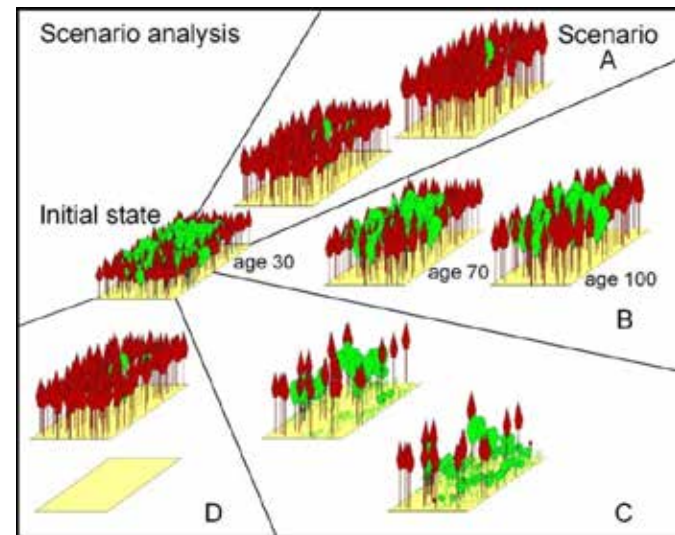


WP4 Long term provision of ecosystem services

- ES estimation in mixed stands
- Simulation of risk resilient effect
- Stand and large scale approaches



(a)



WP5

Science-Policy-practice

- Open Access simulation platform
- Marteloscopes
- Policy guides



WP6

Communication-training

- Regional workshops
- Training guides
- Project web site
- Final conference

<http://www.reform-mixing.eu/>

Scientific knowledge

- ü Scientific publications

Science-Practice

- ü Stakeholders engagement (2-6 by country)
- ü Provision *practical tools*
- ü Transnational training forest networks
- ü Open Accesss Simulation Plataform

bi-directionally

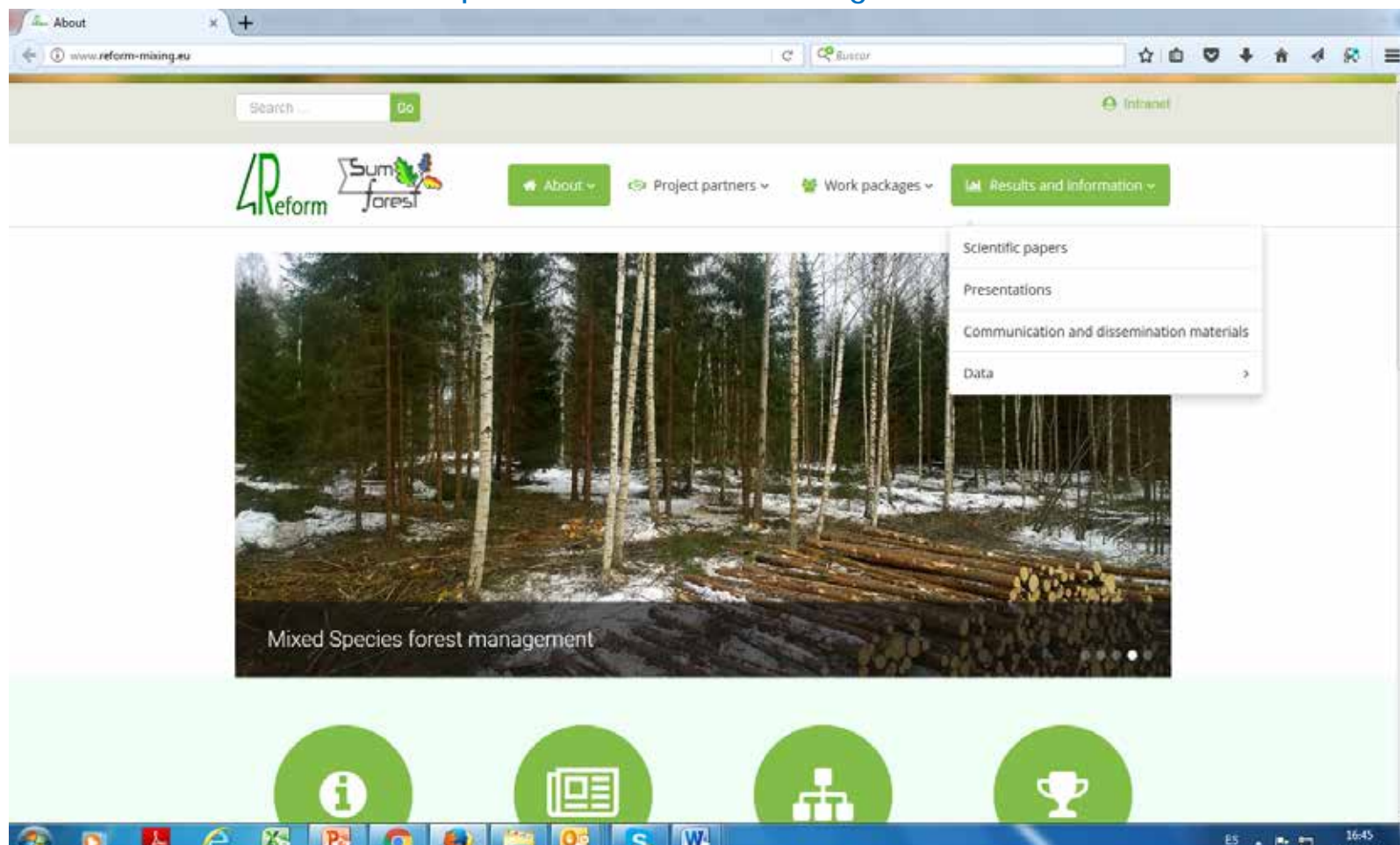
Education and Practice

Science- Policy

- ü Recommendations to forest policy makers for the promotion of resilient mixed forestry.

Expected results and impact

<http://www.reform-mixing.eu/>





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Thank you very much
for your attention!

