Climate Change and Forest Systems

New horizons for research and innovation

Novotel Hotel
115 N Tsarigradsko Shosse Blvd
1784 Sofia (BG)

5 June 2018

Co-organised with:

In cooperation with:

Bulgarian Presidency of the Council of the European Union

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Programme

4th June 2018

Meeting between COST Actions and the COST Scientific Committee (Venue: Novotel Hotel, Paris room)	18.15 – 19.30
Social Dinner with all participants (Venue: Novotel Hotel, Restaurant)	19.30 – 22.00

5th June 2018

Venue: Novotel Hotel, Rooms Europe 1, 2 and 3

Coffee and arrival	*08.30 – 09.00*
1. **Introduction and welcome** Welcome words by COST / SCAR FOREST / Bulgarian Ministry of Education and Science	09.00 – 09.30
2. **Welcome round and check-in** All participants briefly introduce themselves	09.30 – 10.15
3. **Setting the scene** Short inputs on the current state-of-play	10.15– 11.00
Coffee break	*11.00 – 11.20*
4. **Announcing, discussing and selecting questions** People bring forward their question with the offer to host a discussion table. After all tables have been chosen by someone sharing a question, the other participants are invited to think about which table they want to join first.	11:20 – 12.00
5. **Pro-Action Café Round 1: What is the quest behind the question** Every participant is invited to challenge the table host and different facets of the question are explored.	12.00 – 12.45
Lunch	*12.45 – 14.00*
6. **Pro-Action Café Round 2: What is missing** The participants aim to make the picture more complete, redefine and deepen the discussion on the question (e.g. questions not asked yet, perspectives or options not considered yet).	14.00 – 14.45
7. **Pro-Action Café Round 3: What is next** What did we learn? What next steps will each of us take? What are possible actions (individually and together in variable geometry)?	14.45 – 15.30
Coffee break	*15.30 – 15.45*
8. **Presentation of results** Wrap up of the results by the hosts of the tables	15.45 – 16.45
9. **Next steps and closing of the meeting** Short input from high-level policy maker in the field (MEP) and COST on the next steps, feedback by all participants	16.45 – 18.00
Cocktail party	*18.00 – 18.30*

COST Connect – Climate Change and Forest Systems: New horizons for research and innovation

Climate changes and related extreme events, increasingly affect forests and their associated ecological, sociological and economic systems requiring pro-active adaptation measures for maintaining their sustainability. In parallel, the mitigation potentials of forests and forestry wood chains are progressively included in the international climate regime following the Paris agreement[1]. Increased knowledge and better understanding of interactions between climate and forest systems will be crucial in the future for supporting innovations and actions to combat climate change and to reach some of the Sustainable Development Goals and targets[2]. In this global context, COST (European Cooperation in Science and Technology[3]) and SCAR FOREST[4] (Standing Committee on Agricultural Research - Strategic Working Group on Forests and Forestry Research and Innovation) jointly organised this event and explored new horizons for research and innovation in the forest-based sector.

The event was organised under the auspices of the Bulgarian EU-Council presidency, in cooperation with the Bulgarian Ministry for Education and Science, and co-organised with the Standing Committee on Agricultural Research which coordinates national research programmes and represents 37 countries.

Objectives of the workshop

This COST Connect was co-organised together with SCAR FOREST as an interactive workshop involving related COST Actions and scientific communities, stakeholders and policy makers to facilitate dialogue and discussion on future research agendas in the field.

The aim was to gather various actors working on climate change and the forest-based sector, to further develop synergies and collaboration activities, linked to the ongoing discussions in frame of the Sustainable Development Goals.

The event helped to:

- support the cooperation of COST Actions' stakeholders working in the area;
- fight against dispersion of resources and fragmentation of research activities;
- promote synergies with activities funded through other EU programmes;
- promote joint activities for open calls;
- promote networking for relevant partnerships.

In this particular case, the potential questions answered were built around the identification of future research cooperation and funding opportunities, promotion of COST Actions strategic research roadmaps and priorities for FP9 as well as building on COST experiences in relation to widening participation.

Methodology

The workshop was based on the concept of the “Pro Action Café”, which is a methodology allowing for creative and inspiring conversations. Participants were invited to share their questions (around projects – seed ideas) and get group input (deeper questions – knowledge – experience) from others. A Pro

[1] See http://unfccc.int/paris_agreement/items/9485.php and https://ec.europa.eu/clima/policies/international/negotiations/paris_en

[2] For information on the Goal 13 “Take urgent action to combat climate change and its impacts” see https://sustainabledevelopment.un.org/sdg13 and Goal 15 “Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss” see https://sustainabledevelopment.un.org/sdg15.

[3] www.cost.eu

[4] https://scar-europe.org/index.php/forest

Action Café is an innovative yet simple methodology for hosting conversations about questions, projects, and concerns that matter to the attendees.

In a Pro Action Café, topics are brought forward by participants themselves. There is no set agenda, only overall guiding questions and "setting-the-scene" presentations with the intention of deepening the learning process of everyone. Short setting-the-scene presentations provided a possibility for COST and stakeholders to bring in key information relevant for the discussion and to inspire questions. After the introduction and the setting the scene presentations parts, there were three rounds of conversation in café style – each guided by a few generic questions to help getting into the subject and narrow down the ideas.

About this booklet

This booklet contains all relevant information on COST, SCAR FOREST and other participants. You will learn more about us (see section *About COST* on page 8), about the organiser SCAR FOREST (see section *About SCAR FOREST* on page 9) and about the invited stakeholders relevant to the field (described under *Stakeholders in the field of Climate Change and Forest systems participating in the event* on page 64). Their presentations can be found as of page 10, the results of the three discussion rounds can be found on page 47.

You will also find a list of participants with contact details for your follow-up activities (see *List of participants* on page 75).

About COST

COST is a pan-European intergovernmental framework of 37 COST Member Countries[5] and a Cooperating State[6] funded by the EU enabling researchers and innovators to set up their interdisciplinary research networks in Europe and beyond. Through its bottom-up nature, COST anticipates and complements the activities of the EU Framework Programmes, acting as a bridge to the less-connected and less-supported research communities in some COST Member States defined as Inclusiveness Target Countries. Beyond COST Members, COST allows, once mutual benefit has been ascertained, the involvement of participants from Non-COST Countries and Specific Organisations, such as EU bodies, offices and agencies, European RTD and International Organisations, in COST Actions and other activities.

COST provides a unique way to jointly develop ideas and new initiatives across all science and technology fields and different stakeholders from public and private institutions, NGOs, industry and SMEs across Europe and beyond, thereby playing a very important role in building the European Research Area (ERA).

COST principal instrument are COST Actions. Their activities span from organising conferences, meetings, training schools, short-term-scientific-missions or other networking activities (see Figure 1). Although COST prides itself on funding networks on high-risk, innovative and emerging research themes, COST does not set research priorities (bottom-up approach).

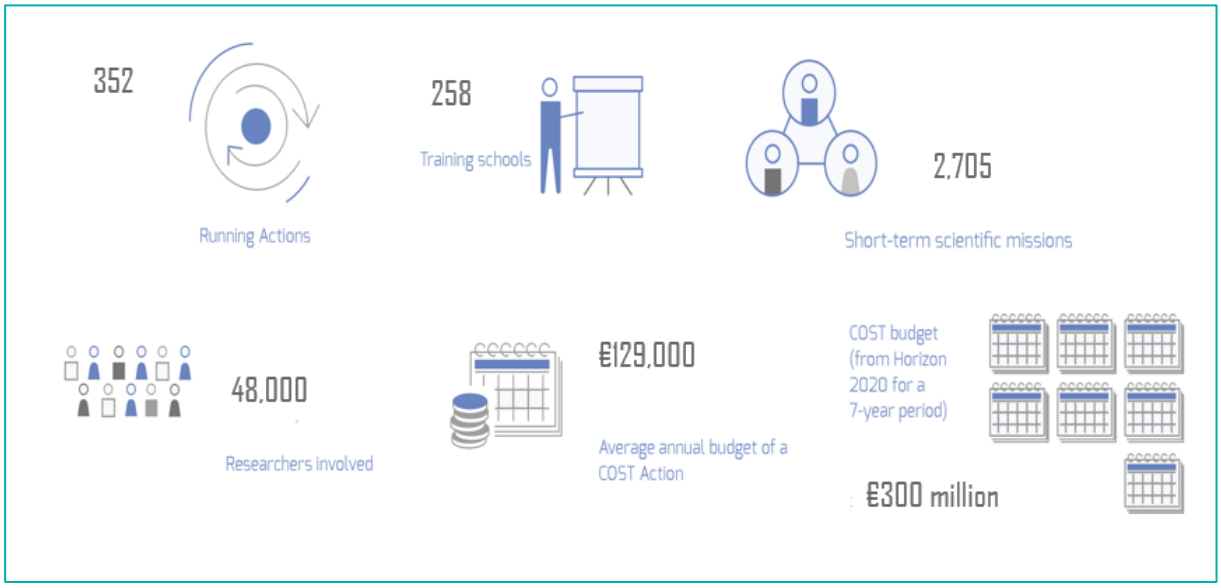


Figure 1 Data throughout the year 2016

You can browse through all the running COST Actions[7].

[5] Albania, Austria, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Montenegro, The Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, United Kingdom and the former Yugoslav Republic of Macedonia.

[6] Israel

[7] http://www.cost.eu/COST_Actions/all_actions

About SCAR FOREST

SCAR FOREST mission is to be a source of advice on European forest-based research and innovation (R&I), thus contributing to the development of a coherent and ambitious forest-based research area. Under current mandate (2016-2019), the main objective is to promote and strengthen transnational research and cooperation to meet the challenges of adaptation to and mitigation of climate changes, and of increasing sustainability and competitiveness of the EU's forest-based sector, by sustainably providing biomass and products for a growing bio-based economy, and other ecosystem services for societal wellbeing. Specific objectives of SCAR FOREST include:

- promote forest-based systems and value-chain approaches with due considerations of synergies and interrelations with other sectors;
- provide strategic intelligence by mapping national forest R&I capacities, policies, strategies;
- engage in knowledge-based input to public debates on forest-related EU policy areas and global issues (climate change, water, bioenergy, biodiversity, plant health, trade, etc.);
- advise on R&I support to the implementation of national forestry policies and the EU Forest Strategy.

Stakeholder presentations presented during the COST Connect event

Jean-Luc Peyron, SCAR Forest

The Strategic Working Group

- **20 member states** (AT, BE, BG, CZ, DE, EE, ES, FI, FR, GR, HU, IE, IT, LT, LV, NO, PL, SE, SK, UK)
- **Observers**: European Forest Institute (EFI), Forest Technology Platform (FTP)
- **Core group**
  - Jean-Michel Carnus (FR, Inra) ➔ Jean-Luc Peyron (FR, Ecofor)
  - Martin Greimel (AT, Bmnt)
  - Karin Perhans (SE, Formas)
  - Kalliopi Radoglou (GR, Duth)
  - Secretariat: Anaïs Jallais ➔ Annabelle Amm (FR, Ecofor)
- Terms of reference 2016 - June 2019

Missions (2016 – 2019)

- *to be a source of advice on European forest-based research and innovation (R&I), thus **contributing to the development of a coherent and ambitious forest-based research area**.*
- ***to promote and strengthen transnational research and cooperation** to meet the challenges of adaptation to and mitigation of climate changes, and of increasing sustainability and competitiveness of the EU's forest-based sector [...]*

Specific objectives

- **Promote forest-based system and value-chain approaches** with consideration of other sectors
- **Provide strategic intelligence** by mapping national forest research and innovation capacities, policies, strategies
- **Facilitate knowledge-based input** to public debates
- Provide advice on research and innovation support to the implementation of national forest policies and **EU forest strategy**

Activities

- Governance of the group
  - Widening the group
  - Joint meetings with SUMFOREST ERA-Net
  - Preparing the new ERA-Net Cofund FORESTVALUE
  - Taking into account Member States that don't take part in ERA-NETs
  - Launching and monitoring activities
    1. Mapping forest bioeconomy research and innovation capacities
    2. Assessing forest-related ERA-Nets and COST Actions
    3. Organising a SCAR-COST event on climate change and forest
    4. Towards a synthesis report on global forest R&I cooperation.

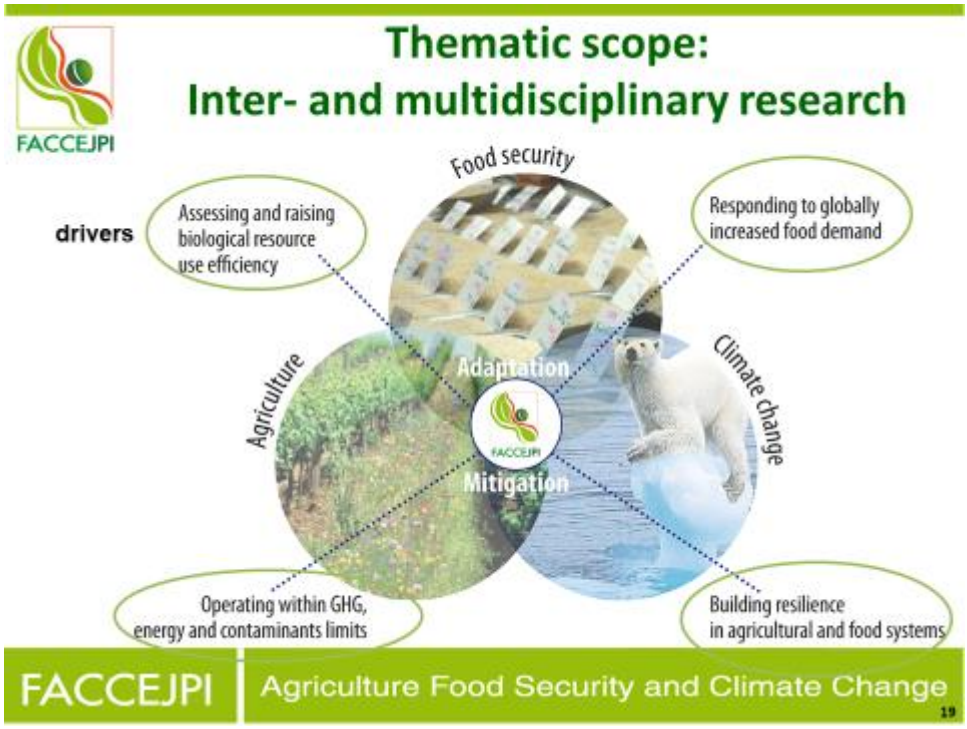
2016-19 deliverables

- D1: report on synthesis on forest bioeconomy research and innovation (2017Q4) **DONE**
- D2: report on assessment of forest-related Eranets and COST actions - 2018Q1 (final report of external study) **DONE**
- D3: workshop on climate change and forests and reflection paper on new horizons for research and innovation– 2018Q2 (COST connect event, 4-5th June 2018) **ongoing**
- D4: position paper on research and innovation needs for future forests and forest-based sector in Europe – 2018S2
- D5: report and policy brief on global cooperation in forest research and innovation – 2019S1

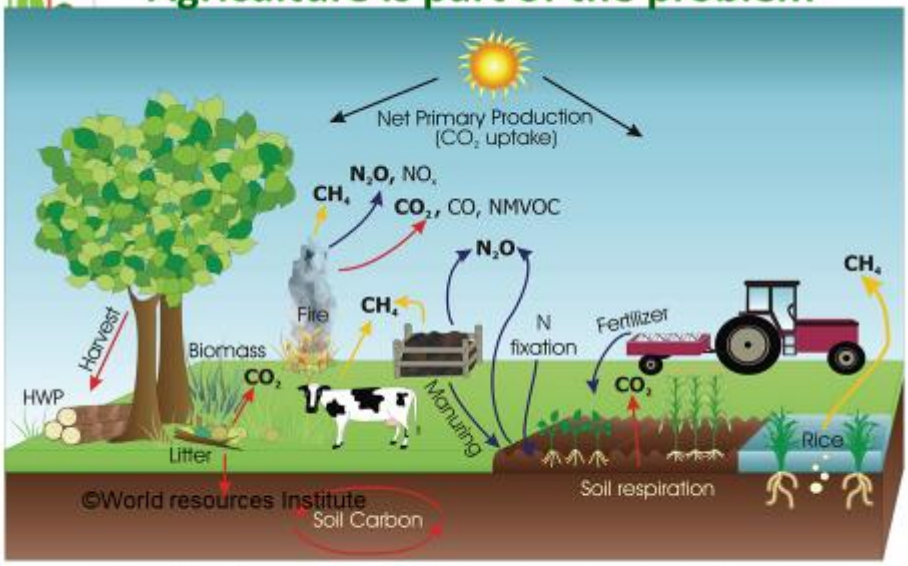
CASA, Support to SCAR

7

Christine Bunthof, JPI FACCE



Agriculture is part of the problem



Agriculture is directly reponsible for ca. 13% of emissions

But can also part of the solution!

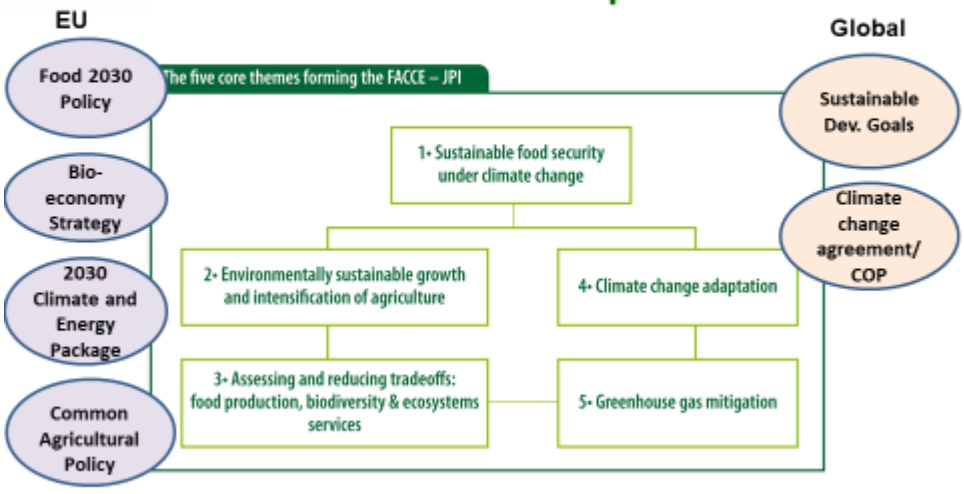
Example: Carbon sequestration in soils: brings benefits on many fronts

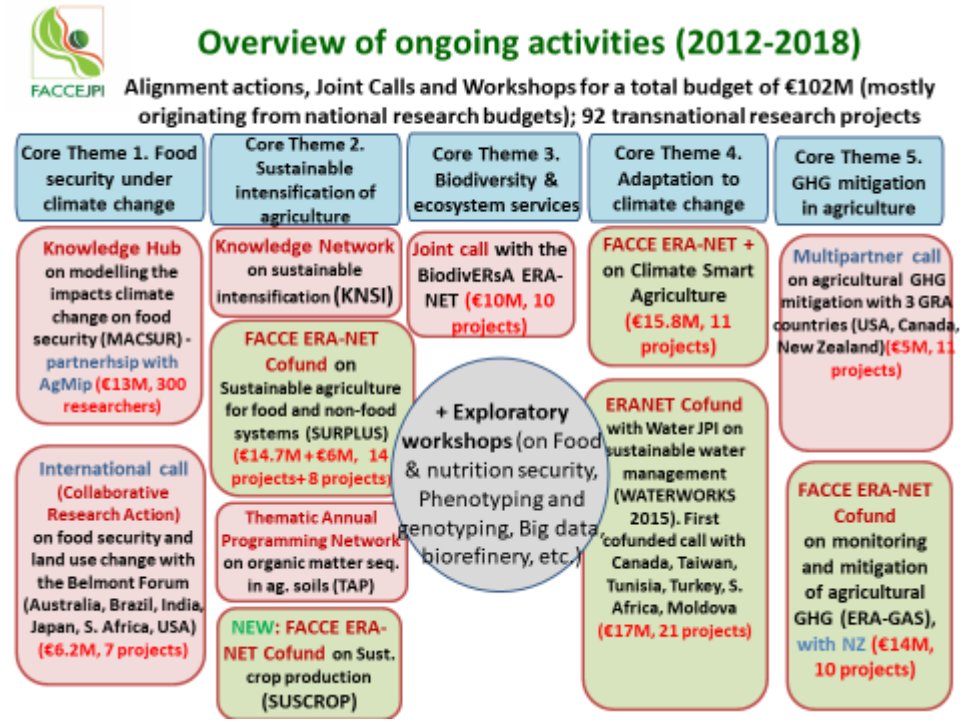
Common vision and mission

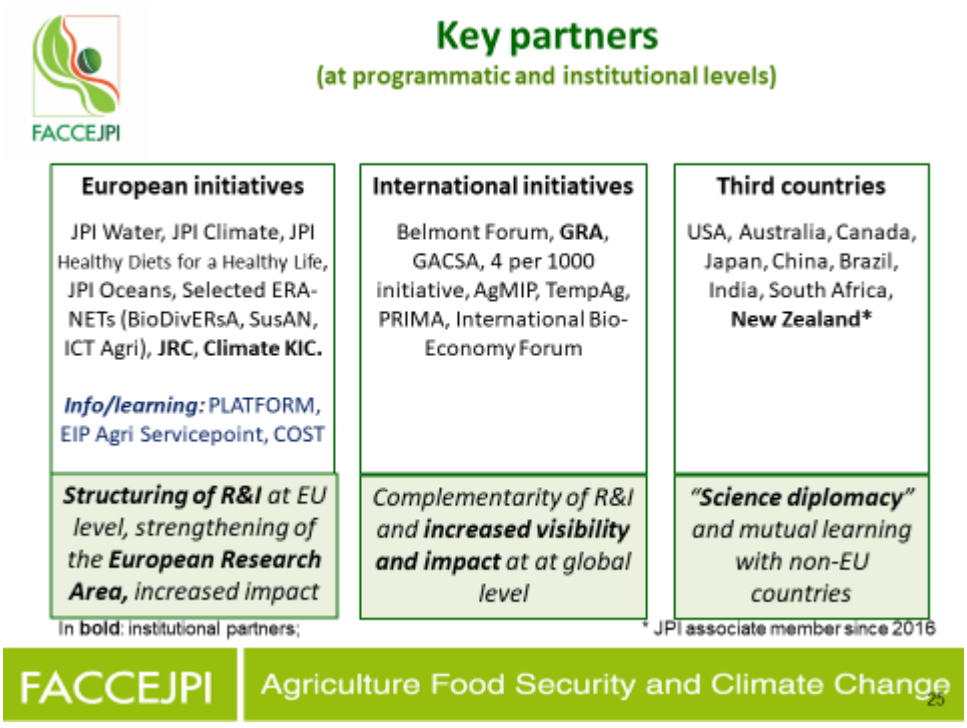
Vision: Create an **integrated European Research Area** that addresses the challenges of Agriculture, Food Security and Climate Change with a view to achieving sustainable growth in agricultural production, meet increasing food demand and develop a European bio-based economy, while maintaining and restoring ecosystem services

Mission: Promote the integration and **alignment of national research resources** in Europe under a common research strategy, to address the diverse challenges in agriculture, food security and climate change

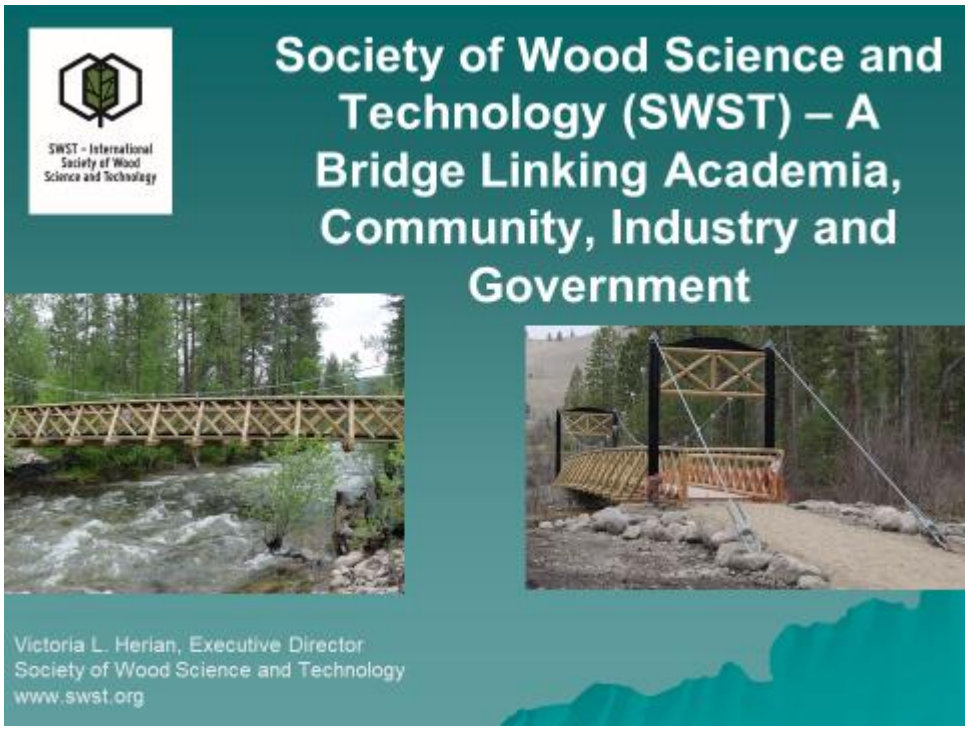
Strategic Research Agenda: 5 Core Themes that provide evidence for EU and international policies




FACCEJPI
Overview of ongoing activities (2012-2018)
Alignment actions, Joint Calls and Workshops for a total budget of €102M (mostly originating from national research budgets); 92 transnational research projects
Core Theme 1. Food security under climate change
Core Theme 2. Sustainable intensification of agriculture
Core Theme 3. Biodiversity & ecosystem services
Core Theme 4. Adaptation to climate change
Core Theme 5. GHG mitigation in agriculture
Knowledge Hub on modelling the impacts climate change on food security (MACSUR) - partnerhsip with AgMip (€13M, 300 researchers)
Knowledge Network on sustainable intensification (KNSI)
Joint call with the BiodivERsA ERA-NET (€10M, 10 projects)
FACCE ERA-NET + on Climate Smart Agriculture (€15.8M, 11 projects)
Multipartner call on agricultural GHG mitigation with 3 GRA countries (USA, Canada, New Zealand)(€5M, 11 projects)
FACCE ERA-NET Cofund on Sustainable agriculture for food and non-food systems (SURPLUS) (€14.7M + €6M, 14 projects+ 8 projects)
+ Exploratory workshops (on Food & nutrition security, Phenotyping and genotyping, Big data, biorefinery, etc.)
ERANET Cofund with Water JPI on sustainable water management (WATERWORKS 2015). First cofunded call with Canada, Taiwan, Tunisia, Turkey, S. Africa, Moldova (€17M, 21 projects)
FACCE ERA-NET Cofund on monitoring and mitigation of agricultural GHG (ERA-GAS), with NZ (€14M, 10 projects)
International call (Collaborative Research Action) on food security and land use change with the Belmont Forum (Australia, Brazil, India, Japan, S. Africa, USA) (€6.2M, 7 projects)
Thematic Annual Programming Network on organic matter seq. in ag. soils (TAP)
NEW: FACCE ERA-NET Cofund on Sust. crop production (SUSCROP)


FACCEJPI
Key partners
(at programmatic and institutional levels)
European initiatives
JPI Water, JPI Climate, JPI Healthy Diets for a Healthy Life, JPI Oceans, Selected ERA-NETs (BioDivERsA, SusAN, ICT Agri), JRC, Climate KIC.
Info/learning: PLATFORM, EIP Agri Servicepoint, COST
International initiatives
Belmont Forum, GRA, GACSA, 4 per 1000 initiative, AgMIP, TempAg, PRIMA, International Bio-Economy Forum
Third countries
USA, Australia, Canada, Japan, China, Brazil, India, South Africa, New Zealand*
Structuring of R&I at EU level, strengthening of the European Research Area, increased impact
Complementarity of R&I and increased visibility and impact at at global level
"Science diplomacy" and mutual learning with non-EU countries
In bold: institutional partners;
* JPI associate member since 2016

Victoria Herian, Society of Wood Science and Technology



SWST – International Society of Wood Science and Technology

Purposes of Society:

--Promote wise use of wood
--Protect our forest resources through development of new ideas and procedures
--Establish forums for exchange of ideas, communication of knowledge and development of high standards for wood research
--Foster quality education at all levels of wood science

SWST – International Society of Wood Science and Technology

SWST Benefits/Services: Wood and Fiber Science Journal

- Official publication, quarterly

- Original papers of professional concern, or based on research dealing with the science, processing, and manufacture of wood and lignocellulosic materials
- Electronic Version available

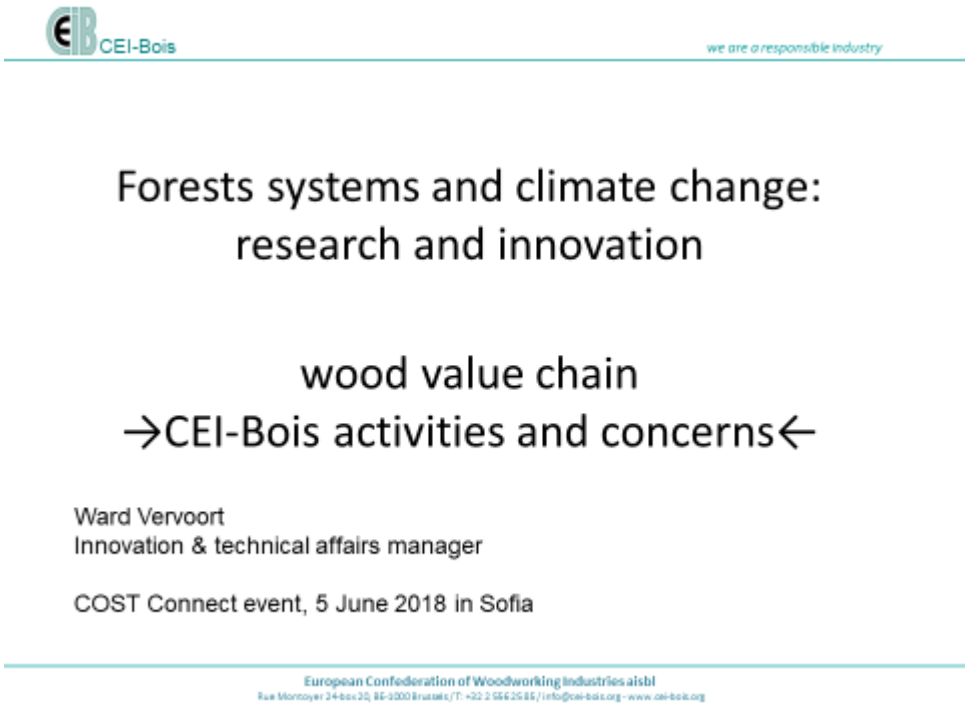
SWST Benefits/Services: BioProducts Business eJournal

- Official publication, published online upon layout completion
- Original papers of business and management topics in forest-based resources
- Open access

SWST Benefits/Services:

- Accreditation
- Visiting Scientist Program
- Awards
- Regional Workshops – 1st in Kuchl, September 2017, COST FP1407
- Short Term Scientific Missions (STSM) (in development stage)

Ward Vervoort, European Confederation of wood-working industries



CEI-Bois

we are a responsible industry

please visit www.cei-bois.org

* 22 national and European member organisations * € 129 billion in 2015 * >> 1 million workers * 170 000 enterprises plus 120 000 companies in the furniture sector *

European Confederation of Woodworking Industries

Brussels

CEI-Bois

we are a responsible industry

CEI-Bois and its working structure

EU advocacy = core activity

expert working groups:

"much ado about climate change"

Sustainability WG	LCA TF	Construction WG	RD&I WG	Trade WG	Social Affairs WG
• LULUCF • RED • SFM • Low-carbon economy	• Biogenic carbon in GWP	• EPD, LEVEL(s) • Climate - smart wood construction	FTP ERA-NETs • WoodWisdom -Net • Forestterra • Sumforest • ForestValue	(activities not directly related to climate change)	
• Wood availability					

European Confederation of Woodworking Industries aisbl
Rue Montoyer 24-box 10, BE-1000 Brussels / T: +32 2 566 25 85 / info@cei-bois.org - www.cei-bois.org

Climate change is omnipresent:
e.g. impact on policies and trends in building with wood

CEI-Bois — *we are a responsible industry*

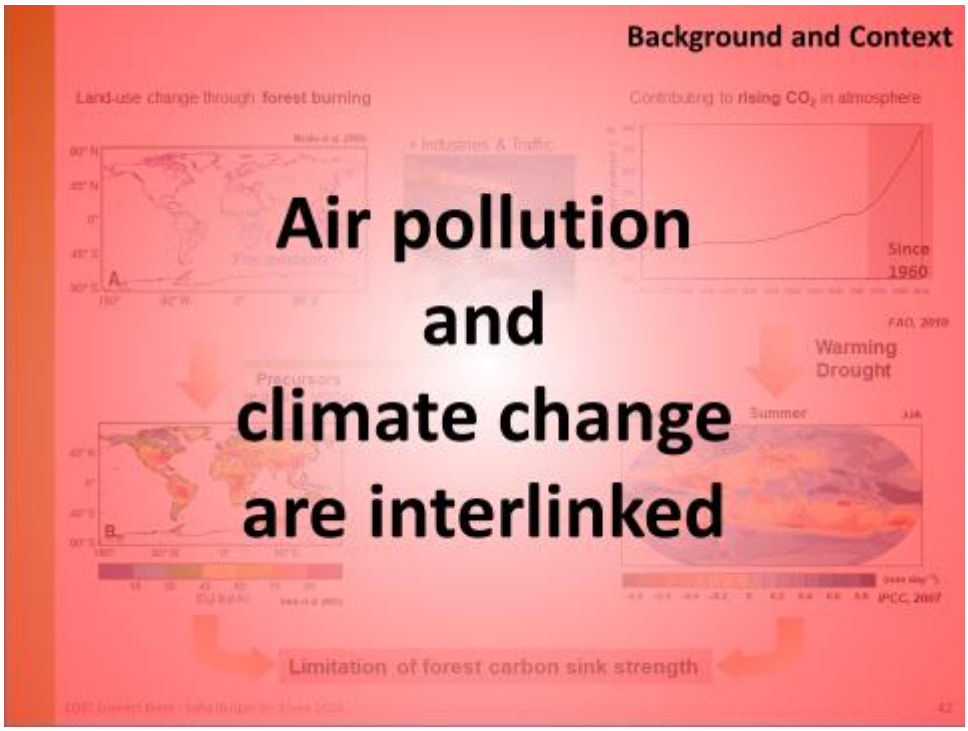
Specific wood industry issues under climate change and changing forest systems

a. **Sustainable availability of wood for industrial use**:
   → FTP Vision 2030 target: 30 % increased harvesting
   → wood mobilisation under climate change mitigation & adaptation policies
   → new uses for hardwood species (European Hardwoods Innovation Alliance)
   → land use changes
   → shifting species composition; pests; forest fires (wildfires)

b. **Integration of societal demands; scientific coherence regarding role of forests and the use of wood in a climate change context:**
   → sustainable forest management: what more is required?
   → inherent properties of wood (energy content and biogenic carbon storage thanks to photosynthesis) seem to be under permanent fire by changing LCA methodological approaches

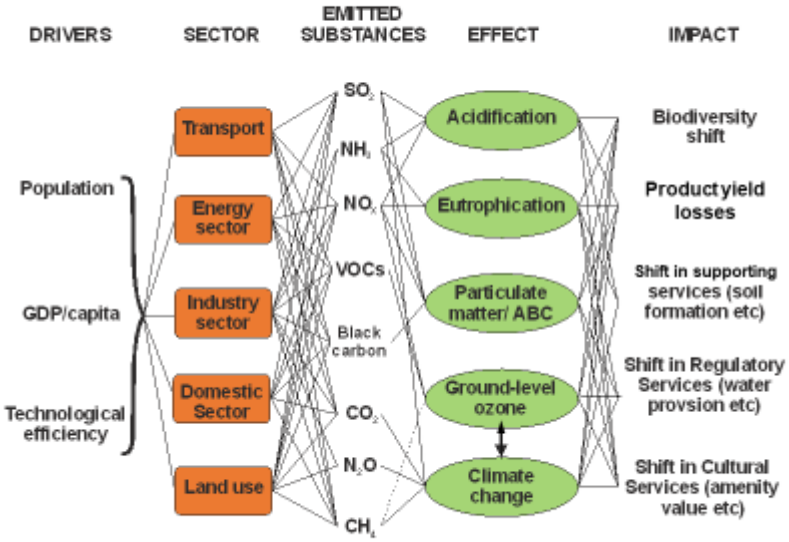
European Confederation of Woodworking Industries aisbl
Rue Montoyer 24-box 10, BE-1000 Brussels / T: +32 2 5662585 / info@cei-bois.org - www.cei-bois.org

Pierre Sicard, International Union of Forest Research Organizations



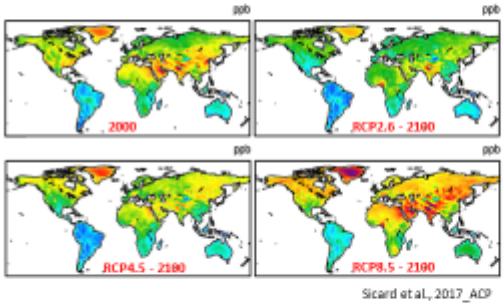
Interlinkages are everywhere

By Johan Kuylenstierna



Ground-level ozone: a paradox

- **Forests** provide & regulate important **ecosystem services**.
- Surface O_3 is the **most damaging air pollutant for vegetation**.



Sicard et al., 2017_ACP

- Emission control policies => **disparate spatial effects** on surface O_3 levels.
- The background levels **will increase** at NH mid-latitudes by 2100 **up to 85 ppb**.

In the context of **global climate change** and adjustment policies' implementation, integrated research & monitoring are **urgently** needed for predicting how climate change and air pollution are interacting with forests.

Research Groups

IUFRO RG7.01.00 - Address complex **effects of air pollution & climate change on forest ecosystems** through several areas of forest sciences to provide prospects for adaptation & mitigation strategies.

7.01.01 - Detection & monitoring
A. Augustaitis (Lithuania)

7.01.02 - Genetic, biochemical & physiological processes
Z. Feng (China)

7.01.03 - Atmospheric deposition, soils & nutrient cycles
E. Du (China)

7.01.05 - Modelling & risk assessment
A. De Marco (Italy)

7.01.07 - Multiple stressors on ecosystems
M. Kozlov (Finland)

7.01.08 - Hydroecology
Y. Serengil (Turkey)

7.01.09 - Ground-level ozone
P. Sicard (France)

7.01.10 – Nitrogen & sulfur deposition
H. Sase (Japan)

COST FP0903 - *Climate Change & Forest Mitigation and Adaptation in a Polluted Environment*

The main objective was to increase understanding of state & potential of forest mitigation & adaptation to climate change and air pollution.

Research Groups

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The main objective was to increase understanding of state & potential of forest mitigation & adaptation to climate change and air pollution.

COST Connect Event - Sofia (Bulgaria) - 5 June 2018 45

Research Challenges & needs

- Improve understanding of pollution and climate change effects on forest services.
- Improve the knowledge on the adaptive and mitigate potential of forest management tools to pollution and climate change.

➡ Definition of Sustainable Forest Management to decrease the forests vulnerability & maintaining wood production and other environmental services in a polluted environment.

Knowledge gaps & opportunities

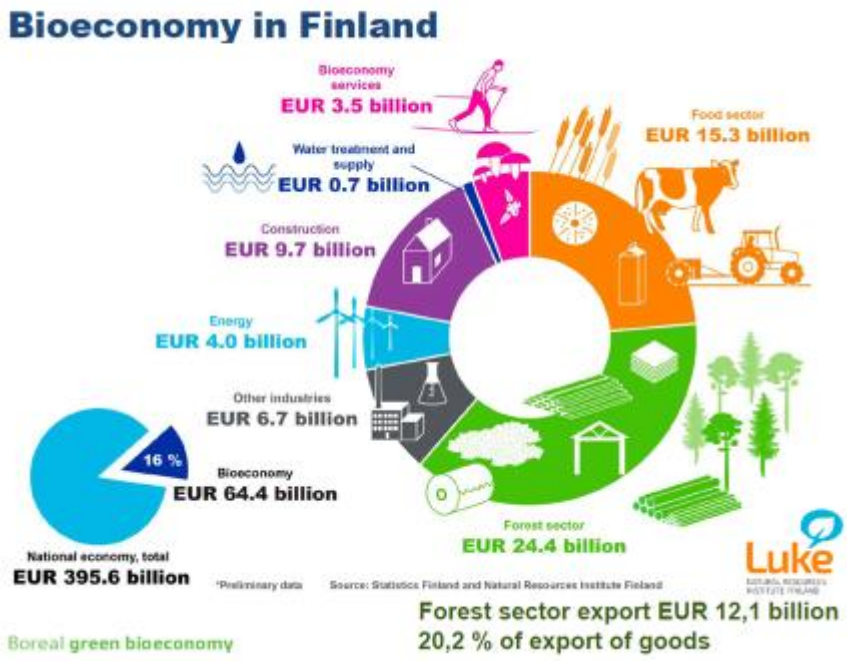
Knowledge gaps

- Ozone concentrations and impacts on vegetation in Southern Hemisphere, Eastern Europe, Caucasus and Central Asia, South-East Asia and Africa (field-based evidence).
- Ozone-oriented forest management practices.
- Economic valuation of ozone impacts on crops, ecosystems and human health.
- Transfer to stakeholders and policy.

Opportunities

- Active monitoring of ozone concentrations (rather than passive samplers).
- Use of Earth Observation data.
- Big data validation and analyses (e.g. TOAR, GAW database).
- Greening cities to improve air quality (ozone) and citizens well-being.

Taneli Kolström, LUKE Natural Resource Research Institute



Over 100 years of research excellence

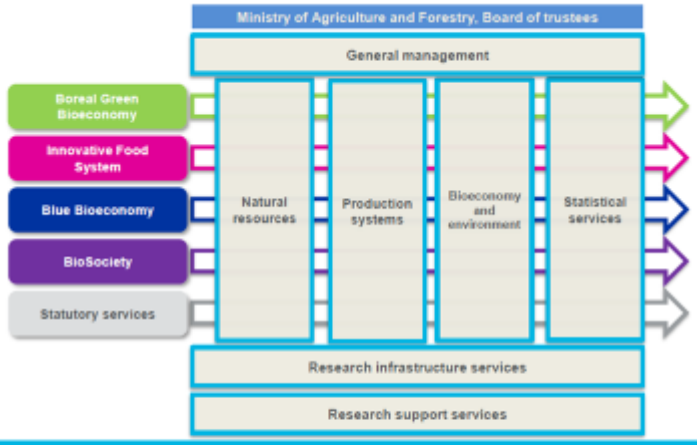
Metla was participating 16 COST actions, chairing one,
FP1207 Orchestrating forest-related policy analysis in Europe (ORCHESTRA) by Prof Tuula Packalen

MTT was participating 17 COST actions

Luke now involved in 4 COST actions.

Luke
NATURAL RESOURCES INSTITUTE FINLAND

Luke Natural Resources Institute Finland



120 M€
Turnover
90 M€
Research & customer portfolio
30 M€
Statutory services

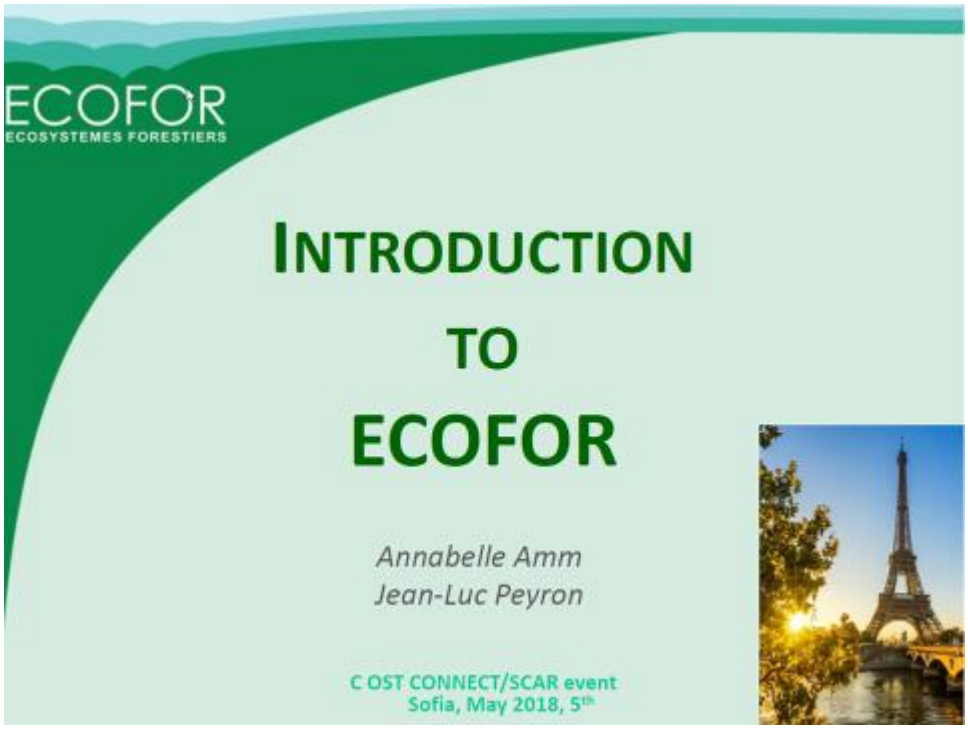
25
Locations in Finland
HQ in Helsinki
Present in 11 campuses with universities, research institutes and polytechnics

1300
Employees
50 research professors
650 researchers

We are one of the four Statistical Authorities in Finland.
We contribute for the European Statistical System and for the international statistical framework for the UNECE and OECD statistics

Luke
NATURAL RESOURCES INSTITUTE FINLAND

Annabelle Amm, ECOFOR



ORIGIN

- **1990**
  - Ministerial conference on the protection of forests in Europe
  - Strasbourg
  - Resolution S6 :
    European Network for Research into Forest Ecosystems
- *« Each signatory country is invited to organize a mechanism for national cooperation, in the framework of its own appropriate structures, and then, to participate in the international activity of this network, together with the other countries »*
- **1993**
  - Creation of ECOFOR
  - Creation of EFI

2

WHAT IS ECOFOR ?

- A French public body
- Research coordination and science policy interface between its members: **research, monitoring, education, policy, and management** organisations
- Tropical & temperate forest ecosystems.

3

WHAT IS ECOFOR ?

- A French public body
- Research coordination and science policy interface between its members: **research**, **monitoring**, **education**, **policy**, and **management** organisations
- Tropical & temperate forest ecosystems.

4

GOALS AND CHALLENGES

- **Overall goal** : Progresses in forest research and management through better :
  - responses to the forest-based sector and society expectations
  - uses of scientific results.
- **Specific goals**
  - Knowledge progresses (research priorities, information systems)
  - Knowledge integration (disciplines, scales, themes)
  - Knowledge valorisation (professionals, decision makers, society)
- **Societal challenges**
  - Biodiversity and ecosystem services, and associated bundles
  - Resilience to changes, risks and uncertainties
  - Bioeconomy of the forest-based sector

5

PRIORITIES

- **Developing scientific excellence**
  - Mapping of research capacities
  - Observation and experimentation infrastructures
- **Meeting societal challenges**
  - Research agenda
  - Forest monitoring
  - Research programmes to inform policies
  - Indicators of sustainable forest management
- **Fostering innovation**
  - Expertises, foresight exercises and studies
  - Recommendations, precautions, management tools

6

MEANS

- **Core funding**
  - Financial contributions of members
  - In-kind contributions of members (permanent staff)
- **Additional resources**
  - Projects
- **Intangible capital resulting from past activities**
  - Professional experience
  - Information systems.

7

CONCLUSION

- **Ecofor tries to answer the need to interface**
  - The activity of multiple members
  - Science, practice and public policies
  - Different scientific disciplines
  - Various forest-based public policies
  - Local, national, European and international forest issues.

8

THANK YOU FOR YOUR ATTENTION !

9

Thomas Bucha, National Forest Research Centre of Slovakia.

The focus of the presentation

- *Forest based sector (FBS) in Slovakia*
- *Problems and destructive processes of FBS*
- *Creative processes within FBS*
- *Vision of the Centre excellence LignoSilva*

Forest based sector (FBS) in Slovakia

State of the FBS: Decline of the classical model oriented to wood production, obsolescence of bussines models, inertia until collapse

Objective: Increasing the competitiveness of the FBS, the need for innovation and investment to new products and services, the need for synergy of the sectors concerned

Process: Change of FBS sector based on wood production to the sector based on knowledge and efficient use of forest resources and to the sector with a high added value

Key role of FBS: Transition from fossil to green economy, leadership in long-term sustainability strategies

Problem of FBS: Grasp the opportunity and manage the process of structural change to a sector with higher added value - bioeconomy

Forest based sector (FBS) in Slovakia

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Key role of FBS: Transition from fossil to green economy, leadership in long-term sustainability strategies

Problem of FBS: Grasp the opportunity and manage the process of structural change to a sector with higher added value - bioeconomy

Problems and destructive processes of FBS

Problems and vulnerabilities:
- Dependence of yields on wood production, low added value
- Unsolved ownership relations, fragmentation of ownership
- Salvage cutting, invasive species, ungulate damage
- Underestimation of quality of forest reproductive material
- Stagnation of forestry activities in the protection, cultivation and tending
- Unpredictable development of wood prices and increasing production costs.
- Redistribution of timber supplies - unclear criteria system
- Export of raw wood
- Missing certification (FSC)
- Paralyzing public procurement

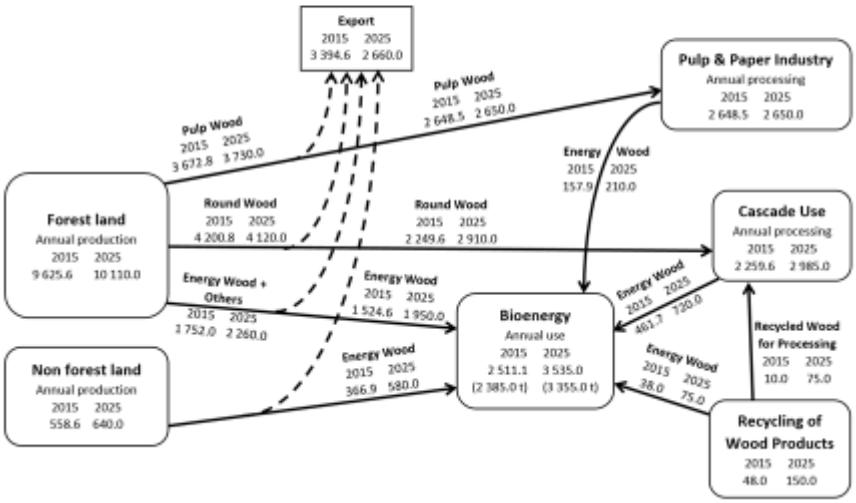
Destruction processes:
- Reduction of Forest Management Plan indicators' binding
- Conflicts between "ecology" and "economy"
- New societal requirements to forests without the creation of appropriate compensation mechanisms
- Non-respect of ownership rights
- Low occurence of target trees in renewal (oak, fir)
- Stagnation in beechwood processing
- Dropping of paper production
- Transfer of investments to countries of fast-growing economies

Source: Lauri Hetemäki: Future of European Forest-Based Sector, SUMFOREST Foresight Workshop, Brussels, December 2, 2014

Creative processes within FBS

New technologies, products and business models ➡ change dendromass flow

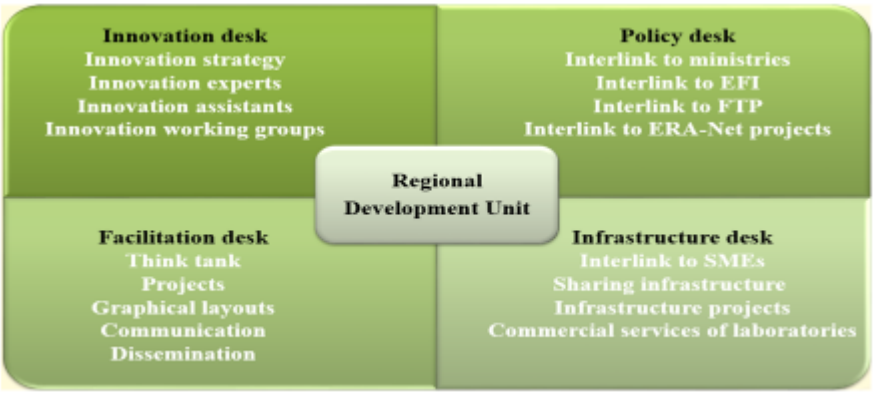
New framework: Bioeconomy – Resilience – Governance (*EFI Strategy, Vienna 2016*)



Vision of the Centre of excellence LignoSilva

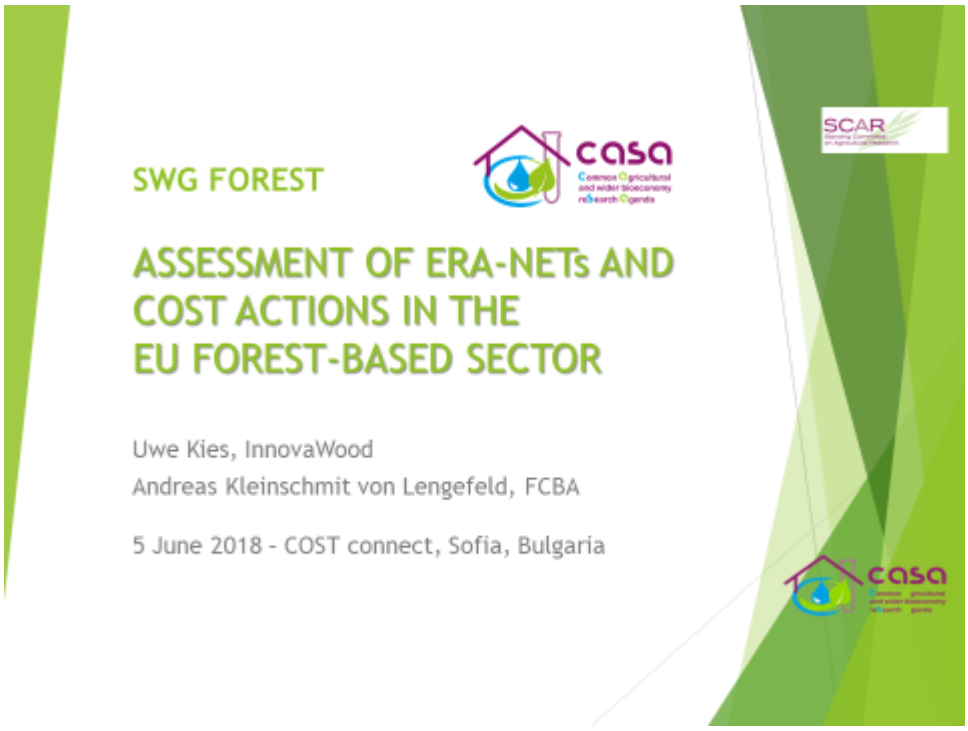
Stimulate sustainable development of the forest-based sector based on the synergy of excellent science and practice following the strategy build on 3 interconnected themes:

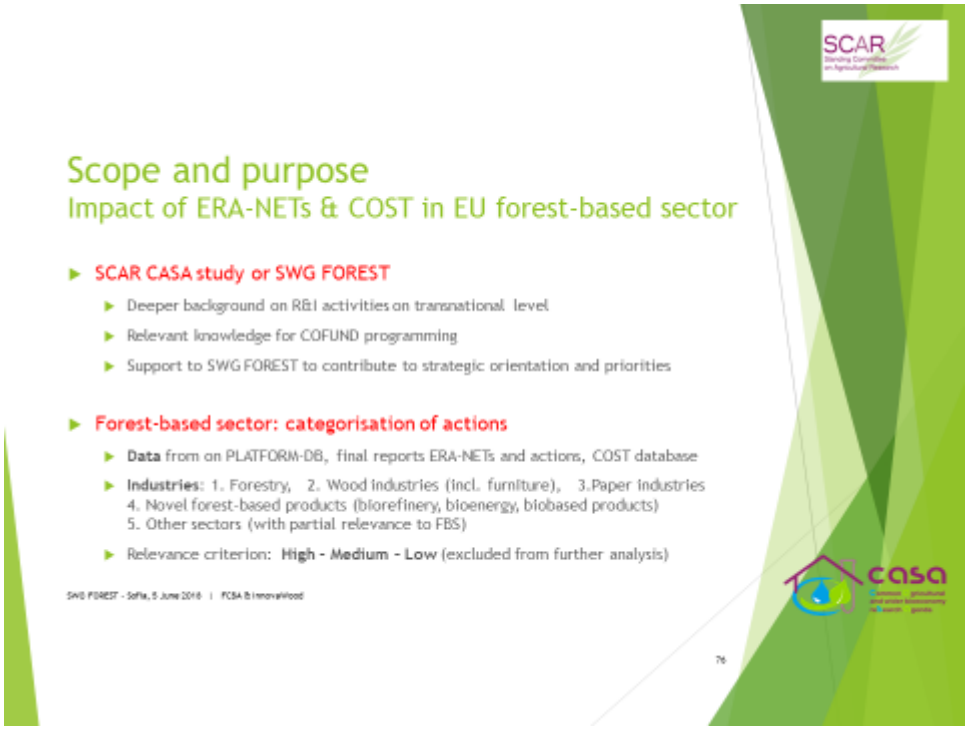
- BIOECONOMY: Creation of applicable innovations in the fields of processing, recycling, energy and chemical use of wood in order to increase added value, efficiency and competitiveness of production and domestic processing of wood
- RESILIENCE: Adaptive forest management aimed at restoring forests, maintaining their ecological stability and providing ecosystem services and sustainable of timber production to meet domestic demand of wood.
- GOVERNANCE integrates 3 pillars of CE: *RESEARCH – INFRASTRUCTURE – COORDINATION AND SUPPORT ACTION*



National Forest Centre – Forest Research Institute

Uwe Kies, INNOVAWOOD





Key results
Overview of ERA-NETs

- **ERA-NETs: 159 projects, 2007-2020**
  - WoodWisdom-Net: 4 Joint calls, **62** funded projects, 84 M€ total funding, 73 M€ national, 11 M€ EU
  - FORESTERRA: 12 Mediterranean countries, 2.5 M€, 2 projects
  - SUMFOREST: EU & EU neighbourhood region, 8.3 M€, 7 projects
  - Other ERA-NETS: BiodiversA 30, others 40 projects
  - Total in the main three ERA-NETs : **95 M€**.
    Total estimated budget incl. other ERA-NETs : **140-185 M€**.

Key results
Overview of ERA-NETs, 2007-2020

Table 2 Actions per ERA-NET and industry value chain in the forest-based sector

ERA-NET	Projects' year range	Relevance		Industry					Total
		High	Medium	Forestry	Wood	Paper	Bio-*	Other*	
WoodWisdom-Net	2007 – 2011	17		4	8	2	3		17
WoodWisdom-Net 2	2010 – 2014	9			7	1	1		9
WoodWisdom-Net 2 and ERA-NET Bioenergy	2007 – 2017	22		8	1	1	12		22
WoodWisdom-Net Plus	2014 – 2018	23		2	12	1	8		23
SUMFOREST	2016 – 2020	7		6	1				7
FORESTERRA	2014 – 2017	2		2					2
BiodivERsA	2009 – 2020	14	16	15				15	30
Other ERA-NETS	1996 – 2020	20	29	16	1	1	10	21	49
ERA-NETS total		114	45	53	30	6	34	36	159
High relevance				48	30	6	30		114
Medium relevance				5			4	36	45

* includes novel fields such as biorefineries, bioenergy, bio-based products
* includes actions focused on other sectors with some relevance for the FBS

Key results
Overview of COST actions, 1991-2019

Table 3 COST actions per domain and industry value chain in the forest-based sector

COST domain	Projects' lifetime	Relevance		Industry					Total
	earliest to latest	high	medium	Forestry	Wood	Paper	Bio-*	Other[#]	
COST FPS	1994 – 2011	52		19	21	12			52
COST FP	2007 – 2019	46		26	12	5	3		46
COST CA	2016 – 2021	4	5	2	2			5	9
Other COST domains	1991 – 2019	8	22	3	2		3	22	30
COST total		110	27	50	37	17	6	27	137

* includes novel fields such as biorefineries, bioenergy, bio-based products
[#] includes actions focused on other sectors with medium relevance for the FBS

- **137** actions in total, **110** high relevance actions, 107 in COST FPS, FP, CA
- **75 M€** total funding estimated

SWE FOREST - Sofia, 5 June 2018 | FCBA & InnovaWood

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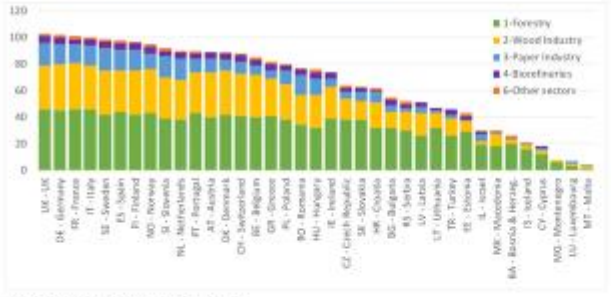
Key results
COST: Pan-European participation

Fig. 2 Cumulative number of country participations in COST actions in the forest-based sector per European countries (137 selected actions, 1990-2017)



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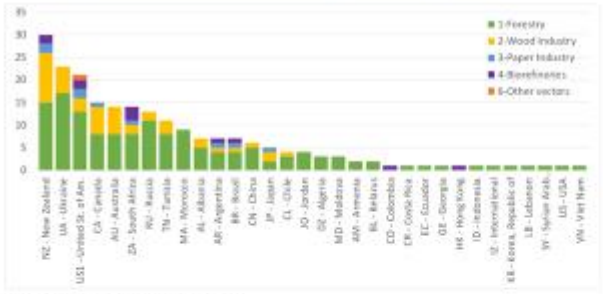
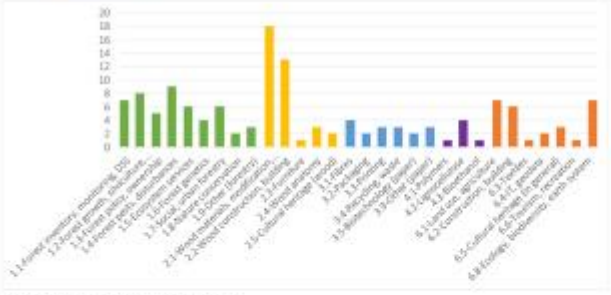
Key results
COST: International outreach

Fig. 3 Cumulative number of country participations in COST actions in the forest-based sector per international and associated countries (137 selected actions, 1990-2017)



Key results
COST: Broad range of thematic fields

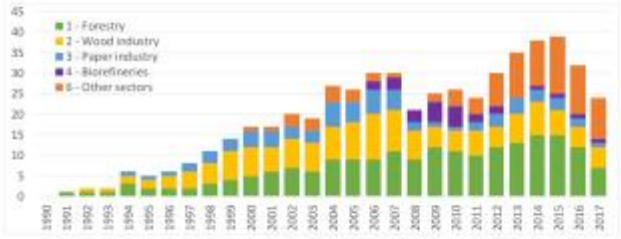
Fig. 5 Frequency of COST actions in the forest-based sector per thematic field (137 actions, period 1990-2017)



Key results

COST: Trends over time (number of active actions per year)

Fig. 4 Frequency of COST actions in the forest-based sector per industry subgroup, 1990-2017

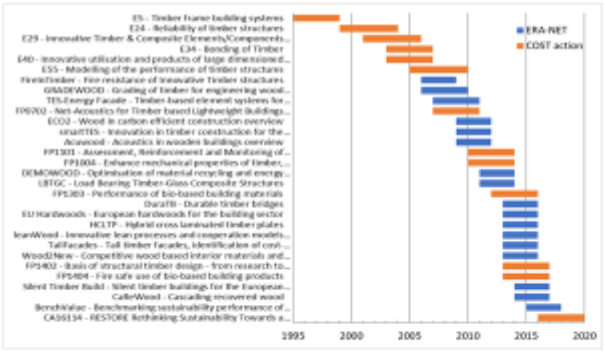


SAVE FOREST - Sofia, 6 June 2018 | FCBA & InnovaWood

Key results

COST as a trigger for R&I collaboration

Fig. 1 Series of ERA-Nets and COST actions in the field of wood construction, 1995-2020



Conclusions & Outlook

Widespread success in fostering high quality R&I in FBS

- European-level research and development actions are well-suited for the forest-based sector, because many questions can be considered too specific to be addressed only through national funding programmes.
- ERA-NET scheme has been the essential backbone for high quality R&I in the SME-dominated FBS. ERA-NET scheme has proven to be the perfect instrument for bottom-up, well-tailored R&I actions.
- **COST actions have prepared the ground for R&I actions in the FBS. Manifold new COST actions should be encouraged in emerging research fields, especially also cooperation with other disciplines, like ICT, engineering, design, socio-economics, health, etc.**

Final report

https://scar-europe.org/index.php/news-display/133-scar-forest-report-assessment-of-era-nets-and-cost-actions

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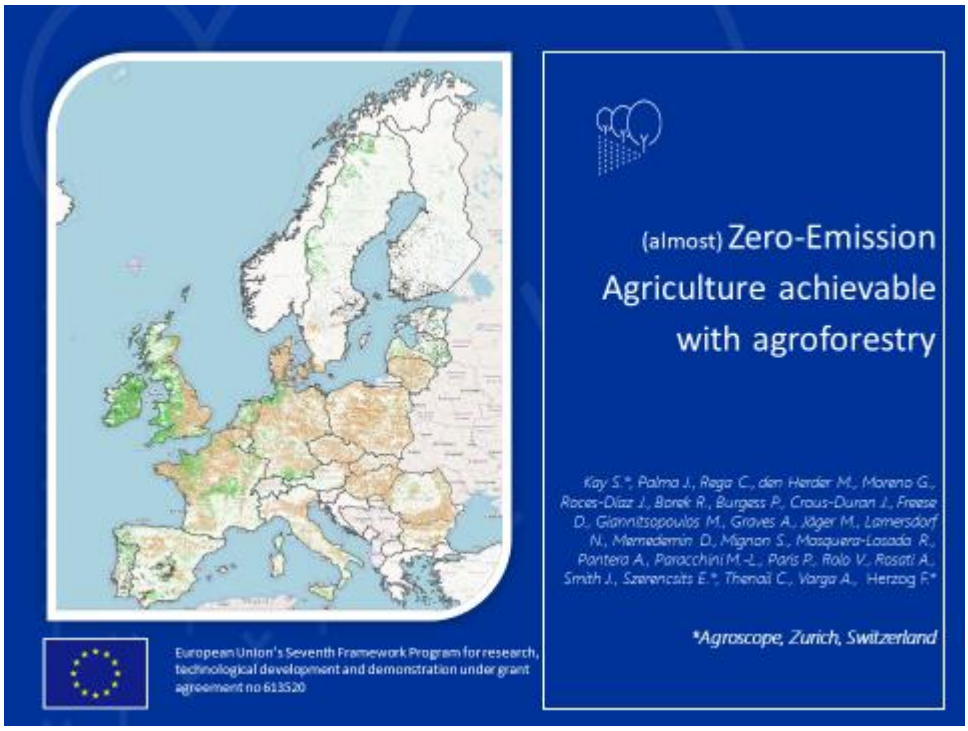
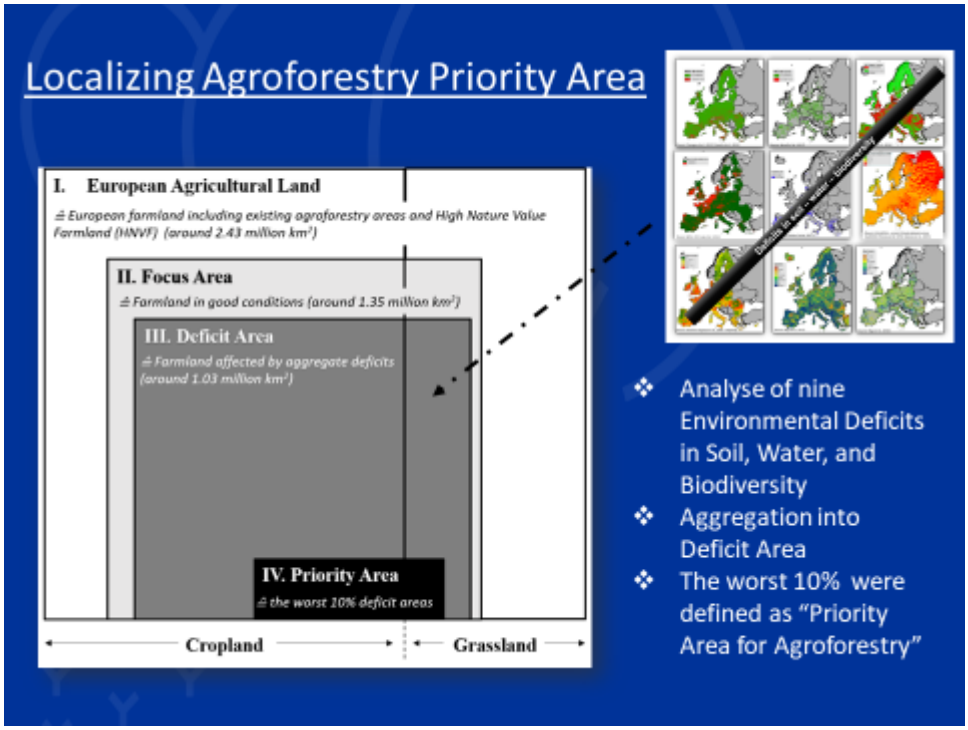
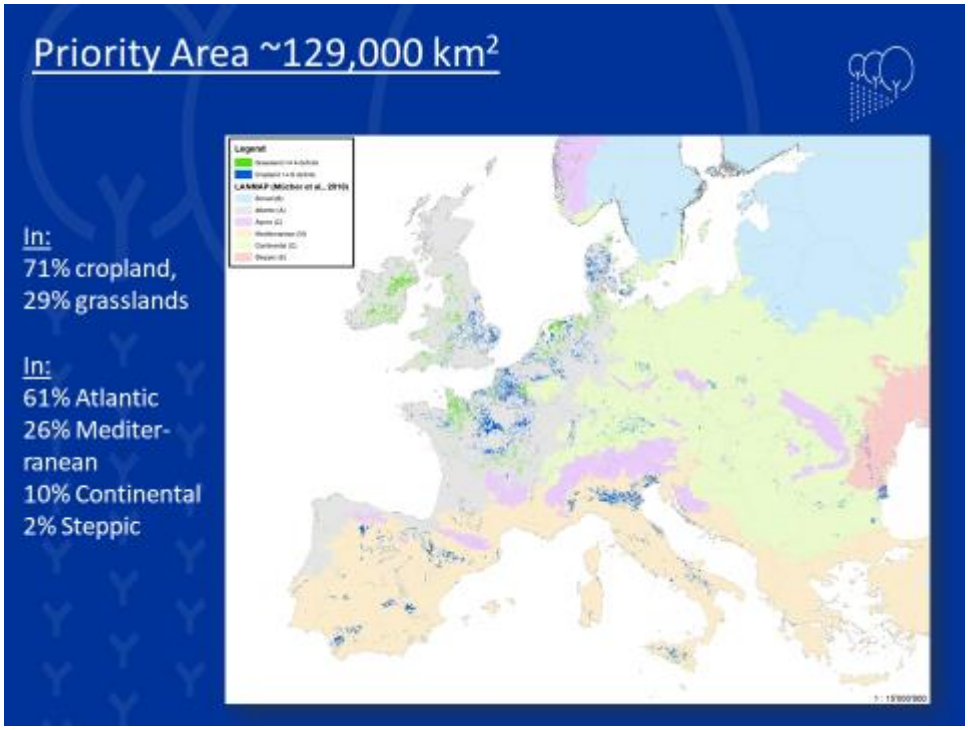




Priority Area ~129,000 km²

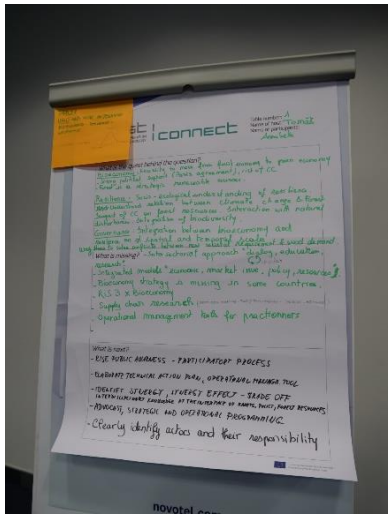


In:
71% cropland,
29% grasslands

In:
61% Atlantic
26% Mediter-
ranean
10% Continental
2% Steppic

Presentation of results

Table 1 (Thomas Bucha) – Who and how to integrate bioeconomy – resilience – governance

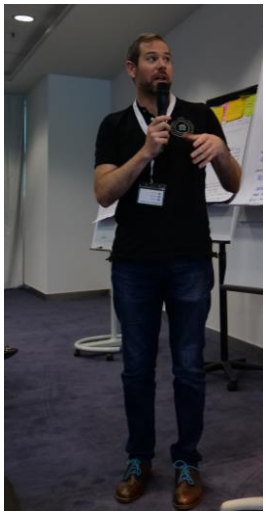


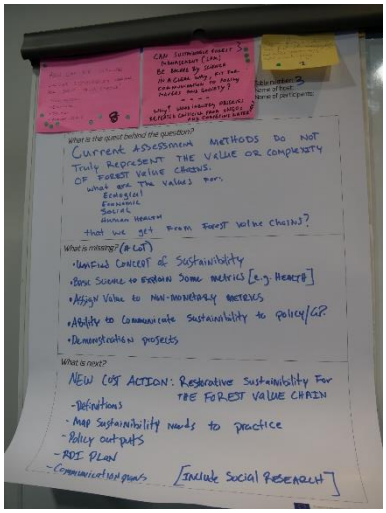
What is the quest behind the question?	**Bioeconomy:** • Necessity to move from fossil economy to green economy • Strong political support (Paris agreement), risk of CC • Forest is a strategic renewable sources **Resilience:** Socio-ecological understanding of resilience. Understand correlation between climate change and forest impact of CC on forest resources. Interaction with natural disturbances. Integration of biodiversity. **Governance:** Integration between bioeconomy and resilience on different spatial and temporal scales. Way to solve conflicts between societal requirement and wood demand.
What is missing?	• Inter-sectorial approach “circular dialog, education, research” • Integrated models “economic, market issue, policy, resources” • Bioeconomy strategy is missing in some countries • RIS 3 x bioeconomy • Supply chain research (forest, wood processing, pulp & paper bioenergy, cascading, recycling) • Operational management tools for practitioners
What is next?	• Raise public awareness • Elaborate technical action plan, operational management tool • Identify synergy, synergy effect – trade off Interdisciplinary knowledge at the interface of markets, policy, forest resources • Advocacy, strategic and operational programming • Clearly identify actors and their responsibilities

Table 2 (Eduardo Notivol) – How do we fill the gap between forest research and forest practice? How do we involve other stakeholders (citizens, politician) in forestry research?

What is the quest behind the question?	Wider impact COST Actions. **FOUR levels**: 1. Policy makers 2. Other science and technology areas 3. Forest practitioners 4. Public/citizens (the lack of sense of property) The "best" impact remains in the network of the COST Action.
What is missing?	• Adaptation of "typical" (scientific) publications to policy makers • Forest extension and journals in native language • Communication professionals for social media / education Way to communicate - Different languages for the different levels.
What is next?	More friendly way to communicate: • Specific platforms for specific topics • Short films on YouTube channels • Closer contact with NGOs Special COST Association about how to communicate. Devoted budget in COST Action for communication not only dissemination. Involve people on forest problems (too general but...)

Table 3 (Michael Burnard) – How can we include wider sustainability measures for forest value chains (ecological, economical, social, health)? Can Sustainable Forest Management (SFM) be backed by science in a clear way, fit for communication to policy makers and society?



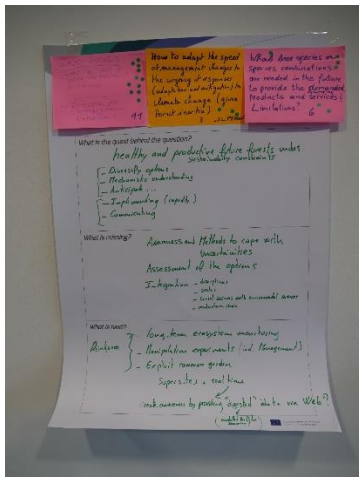


What is the quest behind the question?	Current assessment methods do not truly represent the value or complexity of forest value chains. What are the values for: • ecological • economic • social • human health that we get from forest value chains?
What is missing?	**A lot is missing:** • Unified concept of sustainability • Basic science to explain some metrics (e.g. health) • Assign vale to non-monetary metrics • Ability to communicate sustainability to policy • Demonstration projects
What is next?	New COST Action: Restorative sustainability for the forest value chain • Definitions • Map sustainability needs to practice • Policy outputs • RDI plan • Communication plans [**Include social research**]

Table 4 (Vera Steinberg) –What networking instruments on European level do exist and how can they be supportive to fund networking between forest-related research and innovation stakeholders?

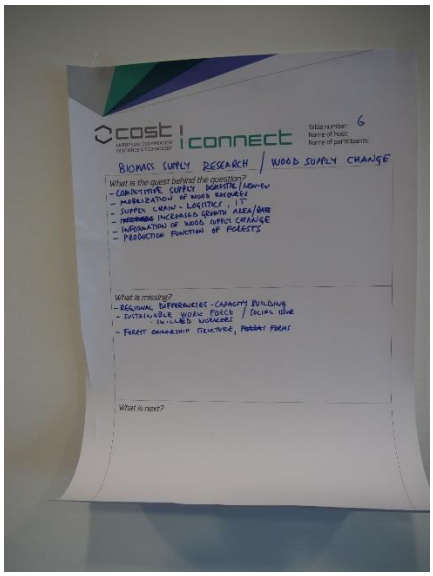
What is the quest behind the question?	• The need of long term solution of a forest network • Overcome lack of information exchange between individual projects (successful and not funded: ERA-NET, H2020, COST, INTERREG, etc.) and secure knowledge • Potential partners: research institutions, researchers, industry • Cluster themes / topics to strengthen networks • Global focus
What is missing?	• Source of funding for network • Tool to support widening countries (ITC) • Information from past (closed) actions • A tool for information exchange from non-funded proposals
What is next?	• Summary of today (Vera) • Proposal letter to COST Association to create bottom-up open call (competitive) → COST Connect • Task force established

Table 5 (Patrick Fonti) – 2100 Forests. What to plant? How to manage? How to adapt the speed of management changes to urgency of responses (adaptation and mitigation) to climate change (given forest inertia) What tree species or species combinations are needed in the future to provide the demanded/emerging products services? What are possible limitations?



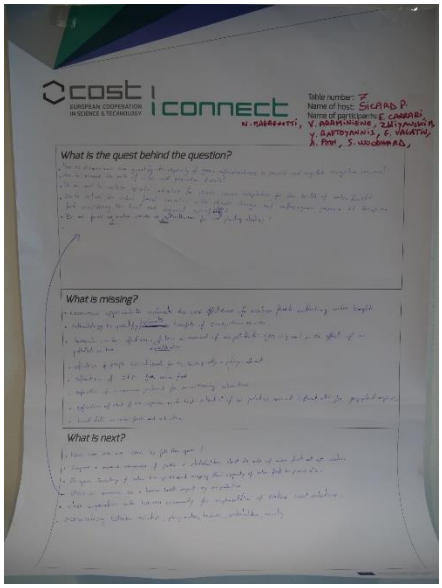
What is the quest behind the question?	Healthy and productive future forests under sustainability constraints: • Diversity option • Mechanistic understanding • Anticipate • Implementing • Communicating
What is missing?	• Awareness and methods to cope with uncertainties • Assessment of options • Integration : - disciplines - scales - social sciences with environmental sciences
What is next?	Reinforce: • Long term ecosystem monitoring • Manipulation experiments (incl. management) • Exploit common garden Supersites + real time Create awareness by providing “digested” data via web? (modelled for future scenarios?)

Table 6 (Taneli Kolström) – How can we integrate forest and wood research to address the challenge of wood supply and mobilisation for high value end products?



What is the quest behind the question?	• Competitive supply domestic/non-EU • Mobilization of Wood resources • Supply Chain-Logistics, IT • Increased growth area/rate • Information of wood supply change • Production Function of forests
What is missing?	• Regional differences – Capacity building • Sustainable work Force – skilled workers/ social issue • Forest ownership structure, forms • Private Contractors
What is next?	

Table 7 (Pierre Sicard) – Urban forests: Cost-effective tool to mitigate air pollution and climate changes. What effects in the cities?



What is the quest behind the question?	• How to demonstrate and quantify the capacity of green infrastructures to provide and regulate ecosystem services? • How to increase the role of urban and periurban forests? • Do we need to include specific indicators for climate change adaptation for the health of urban forest? • How to define the urban forest condition under climate change and anthropogenic pressure at European level considering the local and regional specificities? • Do we focus on non-native species or autochthonous for tree planting strategy? • Stress on economic loss & human health impacts by air pollution
What is missing?	• Common approach to evaluate the cost effectiveness of urban forests including wider benefits • Methodology to quantify/valuate benefits of ecosystems services • Research on the effectiveness & quantification of trees in removal of air pollutants (PM, O3) and on the effects of air pollutants on tress • Definition of proper critical levels for O3, biologically & policy –relevant • Definition of SFM for urban forests • Definition of a common protocol for monitoring urban trees • Definition of a list of tree species with high potential of air pollution removal differentiated for geographical regions • Local data on urban forests and indicators

What is next?	• How can we use COST to fulfil the gaps? • Improve & increase awareness of public & stakeholders about the role of urban forest at different scales • European inventory of urban tree species and mapping their capacity of urban forests to provide ES. • Close cooperation with business community for implementation of Nature-based solutions • Networking between scientists, policy-makers, business, stakeholders, society

Selected COST Actions in the field "Climate Change and Forest Systems"

The following section lists seventeen selected Actions, which were invited to contribute to the discussion on the fundamental science, technological development and broadest applications in the field of climate change and the forestry systems at the COST Connect Event "Climate Change and the Forest Systems".

Climate-Smart Forestry in Mountain Regions - CA15226

Climate-Smart Agriculture (CSA) integrates the three-dimensions of sustainable development (economic, social and environmental), and aims at sustainably increasing agricultural productivity and incomes, adapting and building resilience to climate change (CC), and reducing greenhouse gas emissions. CLIMO wants to translate the CSA concept for a Climate-Smart Forestry (CSF). Three main pillars will be considered: improve livelihood of mountain inhabitants by sustainably increasing forest ecosystem services (ES); enhance the adaptation and resilience to CC of mountain forests; optimise the CC mitigation potential of mountain forests, focusing on the most efficient and cost-effective mitigation options and capitalising on adaptation-mitigation synergies. The main objective is to define CSF in the European context, which will require the identification of key silvicultural characteristics and the harmonisation of CSF in mountain areas to create a common knowledge at European level. The "smartness" of the European forests will be defined according to the sustainability of forest management and mitigation potential. The ""smartness"" will be defined on the basis of measurable criteria and a checklist of parameters of "smartness" for mountain forests will be proposed. Experimental forest sites with available data to quantify the "smartness" of mountain forests will be identified to build a European Smart Forest Network (ESFONET). A feasibility study for the development of a cyber-technology able to quickly transfer data from monitoring sites to stakeholders will be developed. Innovative schemes of payment for ES (PES) will be developed to shift the objective of mountain forest management from the production of timber to the production of ES.

http://www.cost.eu/COST_Actions/ca/CA15226

Runtime: 2016-2020, 27 countries participating

MC Chair	Prof Roberto TOGNETTI (IT)
MC Vice Chair	Dr Melanie SMITH (UK)

Payments for Ecosystem Services (Forests for Water) - CA15206

The EU Water Framework Directive aims to ensure restoration of Europe's water bodies to "good ecological status" by 2027. Many Member States will struggle to meet this target, with around half of EU river catchments currently reporting below standard water quality. Diffuse pollution from agriculture represents a major pressure, affecting over 90% of river basins. Accumulating evidence shows that recent improvements to agricultural practices are benefiting water quality but in many cases will be insufficient to achieve WFD objectives. There is growing support for land use change to help bridge the gap, with a particular focus on targeted tree planting to intercept and reduce the delivery of diffuse pollutants to water. This form of integrated catchment management offers multiple benefits to society but a significant cost to landowners and managers.

New economic instruments, in combination with spatial targeting, need to be developed to ensure cost-effective solutions - including tree planting for water benefits - are realised. Payments for Ecosystem Services (PES) are flexible, incentive-based mechanisms that could play an important role in promoting land use change to deliver water quality targets. The PESFOR-W COST Action will consolidate learning from existing woodlands for water PES schemes in Europe and help standardize approaches to evaluating the environmental effectiveness and cost-effectiveness of woodland measures. It will also create a European network through which PES schemes can be facilitated, extended and improved, for

example by incorporating other ecosystem services linking with aims of the wider forests-carbon policy nexus.

http://www.cost.eu/COST_Actions/ca/CA15206

Runtime: 2016-2020, 31 countries participating

MC Chair	Dr Gregory VALATIN (UK)
MC Vice Chair	Prof Gebhard SCHUELER (DE)

Understanding wood modification through an integrated scientific and environmental impact approach (ModWoodLife) – FP1407

The forest-based sector can become a leader in achieving the European Commission's ambitious target of reducing CO2 emissions with innovative production technologies, reduced energy consumption, increased wood products recycling, and reuse. Apart from these undoubted environmental benefits, the use of forest products in long life products, such as built environment applications, allows for the possibility of extended storage of atmospheric carbon dioxide. Wood modification (chemical, thermal, and impregnation) is an assortment of the innovative processes currently being adopted. Though many aspects of these treatments are known, the fundamental influence of the process on product performance, the environment, and end of life scenarios remain unknown. It is essential to integrate interactive assessment of process parameters, developed product properties, and environmental impacts. To optimize modification processing to minimize environmental impacts, much more information must be gathered about all process related factors affecting the environment (VOC, energy use, end of life use, etc.). This Action will investigate modification processing and products design with emphasis on their environmental impacts. This will require analysis of the whole value chain, from forest through processing, installation, in-service, end of life, second/third life (cascading) and ultimately incineration with energy recovery.

http://www.cost.eu/COST_Actions/fps/FP1407

Runtime: 2015-2019, 29 countries participating

MC Chair	Dr Andreja KUTNAR (SI)
MC Vice Chair	Dr Dennis JONES (SE)

Pine pitch canker: strategies for management of Gibberella Circinata in greenhouses and forests (PINESTRENGTH) – FP1406

Gibberella circinata is a highly virulent pathogen damaging pines, causing damping-off in nurseries and pitch canker in forests. It was first detected in North America, since when the pathogen has spread into Central and South America, South Africa, Asia and, more recently, Europe. *G. circinata* is now considered the most important pathogen affecting *Pinus* seedlings and mature trees in many countries globally; asymptomatic seedlings may be planted out, resulting in very serious losses in forests. Nevertheless, there has been little research on *G. circinata* in Europe to date and little information is available overall on host range in Europe, pathogen spread and disease control. The main aim of this Action is to establish a European-focused network to increase knowledge of the biology, ecology and pathways of spread of *G. circinata*, to examine the potential for the development of effective and environmentally-friendly prevention and mitigation strategies and to deliver these outcomes to stakeholders and policy makers. To that end, a multidisciplinary approach will be taken, including researchers, forest managers and policy makers from (initially) 27 countries focused on the common problem of pitch canker, making PINESTRENGTH highly innovative.

http://www.cost.eu/COST_Actions/fps/FP1406

Runtime: 2015-2019, 29 countries participating

MC Chair	Prof Julio Javier DIEZ CASERO (ES)
MC Vice Chair	Prof Stephen WOODWARD (UK)

Non-native tree species for European forests - experiences, risks and opportunities (NNEXT) – FP1403

The management of tree species non-native to European geographical regions has a long tradition within forestry management practice. Their introduction to Europe (initially focussed on growing tree species) dates back to the 18th century when enormous demands were being made on natural resources to sustain the on-going industrialization of Europe. Today issues of biomass production and C sequestration as well as the question of whether these species could increase the adaptive capacity of forests to long-term climate change patterns have fuelled a growing interest in non-native tree species in Europe. In order to determine their fullest potential (and associated management options, but also assess associated risks and challenges) the need for a communication platform - allowing for discussions with stakeholder groups from within and beyond European borders; is argued.

http://www.cost.eu/COST_Actions/fps/FP1403

Runtime: 2014-2018, 34 countries participating

MC Chair	Dr Elisabeth PÖTZELSBERGER (AT)
MC Vice Chair	Mr Heinrich SPIECKER (DE)

Innovations in Climate Governance: Sources, Patterns and Effects (INOGOV) – IS1309

Set against scientific predictions, the current governance responses to climate change are widely perceived to be inadequate. There is a growing perception that climate governance is becoming more polycentric, but far less agreement on how it will be coordinated and where the necessary leadership will originate. This is deeply problematic, because in theory innovative and cost effective policies should prevent losses arising from climate change and better capture any benefits. To address this gap, this Action will help build the capacity for innovating in climate governance by: identifying effective ways of stimulating and diffusing policy and governance innovations; building a stronger evaluation capacity to assess such innovations; and spreading usable knowledge in innovative ways such as via open access course materials. To do all this, it will create a new network of scholars and practitioners that have operated in a fragmented way thus far, specifically those that have focused on the sources of policy innovation, those that know about their diffusion patterns, and those who are able to evaluate their ultimate effects. A COST Action is the perfect vehicle to defragment knowledge of these topics by extracting greater value from and better integrating across previous research investments.

http://www.cost.eu/COST_Actions/isch/IS1309

Runtime: 2014-2018, 28 countries participating

MC Chair	Prof Andrew JORDAN (UK)
MC Vice Chair	Prof Dave HUITEMA (NL)

Linking belowground biodiversity and ecosystem function in European forests (BioLink) – FP1305

European forests are of immense importance to both society and the environment, providing a range of products and ecosystem services many of which are threatened by climate change. Our understanding of forest diversity, especially belowground, is currently limited and spread over distinct trophic levels. Little is known about the redundancy and functional diversity in forest soils. Numerous factors threaten existing belowground biodiversity, the simplification of forest ecosystems in pursuit of higher productivity

being one of the prominent ones. There is an urgent need to link up existing scientific expertise at different levels to fully explain the connection between diversity, stability and function. Concurrently, forest modelling lacks coordinated activity aimed at bringing biodiversity into the fold - current emphasis is on yield and forest gap models. Elsewhere, food web models and ecosystem network models are well developed, but their application to forests is limited. This COST Action will provide a forum where current understanding of functional belowground biodiversity in European forests will be synthesised and its role communicated in a form suitable for modellers, policy makers and end-users.

http://www.cost.eu/COST_Actions/fps/FP1305

Runtime: 2014-2018, 33 countries participating

MC Chair	Dr Martin LUKAC (UK)
MC Vice Chair	Dr Ivika OSTONEN-MÄRTIN (EE)

Towards robust projections of European forests under climate change (PROFOUND) – FP1304

Changes in climate, environment and management are altering the world's ecosystems. Forests are of particular importance in this context due to the significant economic, ecological and cultural services they provide. Projecting changes of these services for the next decades is crucial for a concerted European response to environmental change.

There are a number of challenges to meet. Mechanistic forest models that can be extrapolated to new environmental conditions are still associated with considerable predictive uncertainty. The reasons are the lack of harmonized datasets at larger scales and the difficulty to obtain robust methods for parameterisation, evaluation and model comparison that make optimal use of the range of available data types and sources.

PROFOUND addresses these problems by: 1) suggesting ways to harmonize and integrate European forest data for model projections 2) comparing forest modelling approaches in terms of scale, processes captured, data requirements and predictive uncertainty 3) developing standards for (Bayesian) model parameterisation, calibration, evaluation and comparison, and 4) facilitating probabilistic multi-model projections under climatic change.

As a result, PROFOUND will strengthen the integration of forest modellers and data-providing experts across Europe and provide more reliable information about the uncertainty of model predictions to decision makers.

http://www.cost.eu/COST_Actions/fps/FP1304

Runtime: 2014-2018, 29 countries participating

MC Chair	Dr Christopher REYER (DE)
MC Vice Chair	Prof Kristina BLENNOW (SE)

Innovative management and multifunctional utilization of traditional coppice forests - an answer to future ecological, economic and social challenges in the European forestry sector (EuroCoppice) – FP1301

Coppicing is a very traditional way of forest management. It benefits from the natural (vegetative) regeneration of mostly broadleaf species and their fast growth in the first decades. In most cases situated close to settlements this silvicultural regime provided among others firewood, bark, fruits and grazing and by this supported the livelihood of the rural population. Until the middle of the 20th century, coppice forests were very common in most parts of Europe.

With increase in use of non-renewable raw materials, coppice lost importance and was neglected or converted. Only recently coppice has been re-discovered because of its adaptive ecology, its stability

and multiple benefits, notably its protection function, contribution to biodiversity and as a source of renewable bioenergy. Traditional coppice management is often combined with special ownership and user rights regimes (e. g. commons) and this governance regime may be also an interesting alternative for small scale forestry and/or “modern” short rotation coppice (SRC) which is established on former agriculture land. The Action aims to bring together European scientists, experts and young scholars to exchange knowledge about coppice forestry and to start developing innovative management and utilization concepts/techniques for future modern multifunctional coppice management systems.

http://www.cost.eu/COST_Actions/fps/FP1301

Runtime: 2013-2017, 32 countries participating

MC Chair	Prof Gero BECKER (DE)
MC Vice Chair	Dr Raffaele SPINELLI (IT)

Orchestrating forest-related policy analysis in Europe (ORCHESTRA) – FP1207

When preparing forest-related policies, the multilevel and multi-stakeholder governance make it challenging to foresee their economic, social and environmental impacts. To coordinate and streamline the development and implementation of forest-related policy targets and measures at different levels and sectors, new means for policy analyses should be developed. Based on the recent advances in sociology, policy science, economics, and quantitative modelling this Action aims: i) to analyse how different forest-related targets have been and could be implemented at supranational, national and sub-national level; ii) to enhance the use of models for integrated policy analysis; and iii) to develop new methodologies and related good practices for the orchestration of policy modelling and analyses. COST will facilitate multinational, transdisciplinary collaboration between sociologists, policy scientists, economists and modellers as well as active interaction with various stakeholders. Especially in the context of Europe 2020, post-2013 Rural Development Policy and other relevant policies, the Action will support the coherence of policy targets and efficiency of policy measures. The generated new knowledge can be used by European policy and decision makers to adjust forest-related policies and their implementation to the requirements of multilevel and multi-stakeholder governance.

http://www.cost.eu/COST_Actions/fps/FP1207

Runtime: 2013-2017, 28 countries participating

MC Chair	Prof Tuula PACKALEN (FI)
MC Vice Chair	Dr Jean-Luc PEYRON (FR)

European mixed forests - Integrating Scientific Knowledge in Sustainable Forest Management (EuMIXFOR) – FP1206

Structure, dynamics and functioning of admixtures of tree species is a research topic of increasing relevance across Europe. The reason is that it is frequently suggested that mixed forests present (i) more resistance and resilience to human or non-human disturbances, (ii) higher biodiversity levels (iii) higher carbon storage capacity and thus higher potential for mitigation strategies, (iv) better adaptation strategies to global change, and (v) higher productivity and support for ecosystem services. To date, these features have been studied separately for different mixtures of species, management practices and specific growing conditions. Consequently, the knowledge gained is local and a common and lasting European perspective on mixed forest sustainable management has yet to be developed. EuMIXFOR aims at creating a European research network on mixed forests, which can contribute to the increase of knowledge of adaptive forestry, the sustainability of management and the conservation and improvement of mixed forests to support rural development. The accomplishment of the objectives and

the development and innovation activities involved in this Action will result in the definition of silvicultural recommendations that will help decision makers to promote the social, economic and environmental functions of European mixed forests.

http://www.cost.eu/COST_Actions/fps/FP1206

Runtime: 2013-2017, 31 countries participating

MC Chair	Dr Andres BRAVO-OVIEDO (ES)
MC Vice Chair	Prof Hans PRETZSCH (DE)

Green Infrastructure approach: linking environmental with social aspects in studying and managing urban forests – FP1204

Green Infrastructure (GI) has recently gained prominence as a planning tool at regional and local levels. GI provides a range of ecosystem services, and new initiatives can build on state-of-the-art research and on delivery mechanisms such as urban forestry (UF). However, greater attention is needed on integrating the environmental and social benefits produced, particularly in the context of climate change adaptation and mitigation. The COST Action aims to: 1) increase the understanding of the role of UF in the context of GI from a scientific and a socio-economic perspective, in terms of the ecosystem services provided to people and to the urban environment; 2) to identify priorities and challenges for future research in the field; 3) to provide indicators and/or thresholds to be included by policy makers in local, national or international regulations about GI and UF; 4) to develop guidelines for GI planners and managers on how to implement GI approaches with an emphasis on linking the environmental and social services of UF.

Undertaking a COST Action on this topic is crucial because of the diversity of GI and UF approaches at European level and because of the need to create a structured interaction among scientists, citizens, policy makers and managers.

http://www.cost.eu/COST_Actions/fps/FP1204

Runtime: 2013-2017, 35 countries participating

MC Chair	Dr Carlo CALFAPIETRA (IT)
MC Vice Chair	Prof David PEARLMUTTER (IL)

Strengthening conservation: a key issue for adaptation of marginal/peripheral populations of forest trees to climate change in Europe (MaP-FGR) – FP1202

Marginal/peripheral (MaP) forest populations are at the edges of species ranges and contain an original genetic diversity due to unsuitable conditions for survival. Studying adaptive processes in MaP populations is crucial and of mutual interest for European and non-European countries for understanding the future of forest ecosystems. Developing conservation and management strategies for Forest Genetic Resources (FGR) of MaP populations is needed to adapt European forests to Global Change. Because of their millennia-long history of adaptation to environmental changes, FGR growing in southern Europe may prove invaluable for adapting the European forestry sector. However southern MaP populations are not only threatened by ongoing climate change but also by other disturbances arising from human activities. Southern Europe represents an ideal model where the effects of climate change on FGR will be stronger and more rapid than in the rest of Europe. This proposal, with its broad research spectrum and partnership, addresses the conservation and management of MaP FGR by: (i) compiling information on climate change impacts on MaP populations, (ii) making information available for preparing national and pan-European forest plans and strategies for adaptation and mitigation , (iii) developing criteria for monitoring and conserving FGR and (iv) sharing results with forest managers.

http://www.cost.eu/COST_Actions/fps/FP1202

Runtime: 2012-2016, 31 countries participating

MC Chair	Dr Fulvio DUCCI (IT)
MC Vice Chair	Dr Kevin DONNELLY (UK)

Forest Land Ownership Changes in Europe: Significance for Management And Policy (FACESMAP) – FP1201

Forest ownership is changing across Europe. In some areas a growing number of so-called “new” forest owners hold only small parcels, have no agricultural or forestry knowledge and no capacities or interest to manage their forests, while in others new community and private owners are bringing fresh interest and new objectives to woodland management. This diversity and change creates implementation problems for forest-related policies including biodiversity conservation, timber and renewable energy supply, climate change mitigation, or recreation. The objectives of the proposed Action are:

(1) To analyse attitudes and constraints of different forest owner types in Europe and the ongoing changes (outputs: literature survey, meta-analyses and maps).
(2) To explore innovative management approaches for new forest owner types (outputs: case studies, critical assessment).
(3) To study effective policy instruments with a comparative analysis approach (outputs: literature survey, case studies, and policy analyses).
(4) To draw conclusions and recommendations for forest-related policies, forest management practice, further education and future research.

The interdisciplinary work will be done in close cooperation with relevant public and private stakeholders. A COST Action is suited for the strongly needed but still lacking comprehensive European overview and analyses.

http://www.cost.eu/COST_Actions/fps/FP1201

Runtime: 2012-2016, 30 countries participating

MC Chair	Dr Gerhard WEISS (AT)
MC Vice Chair	Prof Anna LAWRENCE (UK)

Studying Tree Responses to extreme Events: a SynthesiS (STReESS) – FP1106

Climate change and subsequent increase in frequency and intensity of extreme climatic events will affect vitality, production and wood quality of European trees.

STREeSS is based on the enormous potential of dendro-sciences (including Dendrochronology, Wood anatomy and Ecophysiology) to study effects of extreme events such as drought, heat waves, late frost and flooding on tree performance and wood formation. Within these disciplines impacts on tree growth are currently assessed in a range of field studies and experiments among European countries, in both field and laboratory conditions. Research focus differs from cell to landscape with a temporal scale from minutes to millennia and sites ranging from extreme hot and dry to cold and wet environments. At the current stage it is crucial to integrate knowledge conducted in the different disciplines to generate a basic understanding of short to long-term physiological responses of tree species and provenances to extreme climate conditions.

By linking scientific expertise and facilitate data exchange and organisation as well as harmonization of methodologies STREeSS will form a platform for pushing frontiers between the disciplines forward. This will strengthen the scientific basis for a sound species and provenance selection as well as for a sustainable management of European forests.

http://www.cost.eu/COST_Actions/fps/FP1106

Runtime: 2012-2016, 31 countries participating

MC Chair	Dr Ute SASS-KLAASSEN (NL)
MC Vice Chair	Dr Paolo CHERUBINI (CH)

Climate Change and Forest Mitigation and Adaptation in a Polluted Environment – FP0903

The main objective is to increase understanding of state and potential of forest mitigation and adaptation to climate change in a polluted environment, and to reconcile process-oriented research, long-term monitoring and applied modelling at comprehensive forest research sites. Forests are expected to face significant pressures from climate change and air pollution. The COST Strategic Workshop “Forest Ecosystems in a Changing Environment: Identifying Future Monitoring and Research Needs”, held in Istanbul in 2008, recommended more integration between approaches and themes in order to assess the risks for European forests. This Action creates a platform of experts from different fields, with the following main objectives: 1) to increase understanding of state and potential of forest mitigation and adaptation to climate change in a polluted environment; and 2) to reconcile process-oriented research, long-term monitoring and applied modelling at comprehensive forest research sites (Supersites III). Present forest monitoring in Europe is carried out at Level I and II plots by the ICP Forests programme on behalf of the Convention on Long-range Transboundary Air Pollution. Supersites of Level III were proposed in Istanbul, with the main aim of integrating soil, plant and atmospheric sciences and monitoring, and providing policy-oriented modelling with scientifically sound indicators of pollution and climate-related risks.

http://www.cost.eu/COST_Actions/fps/FP0903

Runtime: 2009-2013, 29 countries participating

MC Chair	Dr Elena PAOLETTI (IT)
MC Vice Chair	Mr Juha-Pekka TUOVINEN (FI)

Expected climate change and options for European silviculture (ECHOES) – FP0703

Climate change is a major concern for forestry. Many scientific activities have been initiated in that field but did not lead yet to clear and tested strategies for action. They are either much more global than European forestry or too limited in their scopes to actually contribute to sustainable forest management. ECHOES aims at helping European decision makers and forest managers in their definition of strategies toward a reduction of forest losses, an increase of forest gains, and an adoption of mitigation and adaptation measures. It also aims at suggesting improvements of monitoring systems and identifying research priorities. In order to reach these goals, it has to focus on climate change and forests in Europe and to integrate different but tightly interrelated issues: impacts on forests with adaptation to and mitigation of climate change; climatic trends with extreme events; natural sciences with social sciences; research with actual policy and management; ecosystems with products and services; the main components of forest multifunctionality. Regional analyses, case studies and compared alternatives instead of a general consensus allow to combine a rather large scope with concrete and useful views.

http://www.cost.eu/COST_Actions/fps/FP0703

Runtime: 2008-2012, 29 countries participating

MC Chair	Dr Jean-Luc PEYRON (FR)
MC Vice Chair	Prof. Klaus Theo SEELAND (CH)

Post-Fire Forest Management in Southern Europe – FP0701

Every year about 45000 forest fires occur in Europe, burning half a million hectares of land. Post-fire forest management deals with the restoration of burned areas and with the opportunity for establishing more resilient forests and landscapes.

The main objective of this Action is the development and dissemination of scientifically based decision criteria for post-fire forest management, from stand to landscape level planning, by gathering and evaluating the results of previous and ongoing research. Secondly, it aims at transferring this scientific knowledge into management practices. Thirdly, it aims at making the connection between scientists and stakeholders by communicating these practices to the end-users. The main outcomes will be: i) a book gathering the state-of-the-art of scientific knowledge on post-fire management, ii) an electronic handbook on post-fire restoration, iii) a major conference, and iv) the organization of three Training Schools for knowledge transfer. Although focused on Southern Europe, the outcomes of this Action will be crucial for central and northern European countries as well, as climate change and an increased area of forests are already increasing fire hazard in these regions.

http://www.cost.eu/COST_Actions/fps/FP0701

Runtime: 2009-2012, 19 countries participating

MC Chair	Dr Francisco MOREIRA (PT)
MC Vice Chair	Prof Margarita ARIANOUTSOU-FARANGITAKI (EL)

Stakeholders in the field of Climate Change and Forest systems participating in the event

As mentioned above, the European support provided is a web with different initiatives that complement each other. COST aims to bring together representatives of these initiatives together with researchers who represent COST Actions. This section provides information about selected stakeholders which contributed to the discussion.

SCAR FOREST

SCAR Standing Committee on Agricultural Research	SCAR FOREST is the Strategic Working Group on Forests and Forestry Research and Innovation. SCAR FOREST mission is to be a source of advice on European forest-based research and innovation (R&I), thus contributing to the development of a coherent and ambitious forest-based research area. Under current mandate (2016-2019), the main objective is to promote and strengthen transnational research and cooperation to meet the challenges of adaptation to and mitigation of climate changes, and of increasing sustainability and competitiveness of the EU's forest-based sector, by sustainably providing biomass and products for a growing bio-based economy, and other ecosystem services for societal wellbeing. Specific objectives of SCAR FOREST include: • promote forest-based systems and value-chain approaches with due considerations of synergies and interrelations with other sectors; • provide strategic intelligence by mapping national forest R&I capacities, policies, strategies; • engage in knowledge-based input to public debates on forest-related EU policy areas and global issues (climate change, water, bioenergy, biodiversity, plant health, trade, etc.); • advise on R&I support to the implementation of national forestry policies and the EU Forest Strategy.
Relevant links	https://scar-europe.org/ Latest publications

JPI FACCE

	The Joint Programming Initiative on Agriculture, Food Security and Climate Change (FACCE-JPI) brings together 22 countries who are committed to building an integrated European Research Area addressing the interconnected challenges of sustainable agriculture, food security and impacts of climate change. FACCE-JPI provides and steers research to support sustainable agricultural production and economic growth, to contribute to a European bio-based economy, while maintaining and restoring ecosystem services under current and future climate change. It aims to do so with a strong transdisciplinary research base, encompassing economic and social aspects in addition to scientific ones, and with a creative approach towards the alignment of national programmes and the input of multiple actors and stakeholders. The integrated FACCE-JPI strategic research agenda defines 5 core research themes: • Sustainable food security under climate change, based on an integrated food systems perspective: modelling, benchmarking and policy research perspective • Environmentally sustainable growth and intensification of agricultural systems under current and future climate and resource availability • Assessing and reducing trade-offs between food production, biodiversity and ecosystem services • Adaptation to climate change throughout the whole food chain, including market repercussions • Greenhouse gas mitigation: nitrous oxide and methane mitigation in the agriculture and forestry sector, carbon sequestration, fossil fuel substitution and mitigating GHG emissions induced by indirect land use change.
Relevant Links	https://www.faccejpi.com/ The JPI FACCE Strategic Research Agenda The JPI FACCE Implementation Plan

International Society of Wood Science and Technology

SWST – International Society of Wood Science and Technology	The International Society of Wood Science and Technology was founded in 1960, and has its headquarters in Monona, Wisconsin (USA). Its mission is to provide service to SWST members, to develop, maintain, and promulgate the educational, scientific, and ethical standards that define the profession; and to advocate the socially responsible production and use of wood and lignocellulosic materials. It has the aim to • Develop and maintain the unique body of knowledge distinctive to the science and technology of wood and other lignocellulosic materials. • Encourage the communication and use of this knowledge. • Promote policies and procedures which assure the wise and responsible use of wood and other lignocellulosic materials. • Assure high standards for professional performance of wood scientists and technologists. • Foster educational programs at all levels of wood science, other lignocellulosic materials and their technologies, and further the quality of such programs. • Represent the wood science and technology profession in public policy development.
Relevant links	http://www.swst.org/wp/ Wood and Fiber Science publications

CEI-Bois – European Confederation of wood-working industries

	Founded in 1952, CEI-Bois is the European Confederation of the Woodworking Industries; it is a non-profit-making Organisation, legally registered as an AISBL under the Belgian law. The Umbrella Confederation is based in Brussels and numbers 18 National Organisations, 3 European Sector Federations as well as 1 commercial public establishment. The primary goal of CEI-Bois is to promote the interests of the European wood sector and to this end to contribute to the EU policy-making process. It is the main body representing the European Woodworking Industries at European and International level. CEI-Bois mission is to: • Promote the Sector and the use of wood in its numerous forms and applications • Represent and safeguard the European Woodworking Industries interests • Highlight the natural sustainability of wood and wood-based products CEI-Bois activities comply with a Member's Common Agenda divided in 6 Topical Areas: Sustainability, Construction, Social Affairs, Trade, Innovation, Wood Availability and Mobilization.
Relevant links	https://www.cei-bois.org/ Latest publication and events

IUFRO – International Union of Forest Research Organizations

IUFRO	The International Union of Forest Research Organizations (IUFRO) is the leading global network for forest science cooperation. It is the only worldwide international organization devoted to forest research and related sciences. Our unique membership brings together research organizations, universities and individual scientists, as well as decision-making authorities and other stakeholders with an interest in and focus on forests and trees. IUFRO's mission is to advance research excellence and knowledge sharing, and to foster the development of science-based solutions to forest-related challenges for the benefit of forests and people worldwide. With the Strategy 2015-2019, IUFRO addresses five research themes and associated emphasis areas, and three institutional goals. The following five themes aim to guide the science collaboration within IUFRO's global network in the forthcoming period: • Forests for People • Forests and Climate Change • Forests and Forest-based Products for a Greener Future • Biodiversity, Ecosystem Services and Biological Invasions • Forest, Soil and Water Interactions
Relevant links	https://www.iufro.org/ Latest publications Latest events

GIP ECOFOR

ECOFOR ECOSYSTEMES FORESTIERS	Created in 1993, Ecofor's mission is to develop, gather and structure knowledge to inform public policies and sustainable forest management practices in biomes ranging from temperate to tropical. It generates the necessary means to conduct and promote research and expertise on the functioning and management of ecosystems.
Relevant links	http://www.gip-ecofor.org/ Latest publications

InnovaWood

	InnovaWood is an umbrella organisation that integrates four European networks in the Forest, Wood-based and Furniture industries into a more effective mechanism to support innovation in these sectors. With more than 50 members from 26 countries it is one of the leading networks of excellence in Forest-Wood based sector. Members are active in the areas of Research, Education & Training and Technology Transfer. The overall aim of InnovaWood is to bring business benefit to the forestry, wood and furniture chain by providing a forum for our member organisations to contribute more effectively to the development of the FWC. In particular, InnovaWood supports the use of innovation, research, training and education as tools for increasing the competitiveness of European industries in line with the general policies of the European Union. InnovaWood offers the range of different products and services related to education, research and innovation projects of its members and contributors: From development of new partnerships and collaborations, consultancy and technical support services, seminars, conferences and workshops to the promotion of members capabilities, facilities, products and services and a co-coordinated, representative voice on behalf of members to key decision makers in the EU and forest-based industries.
Relevant links	http://www.innovawood.com/ Strategic Priorities

EUSTAFOR - European State Forest Association

	The European State Forest Association (EUSTAFOR) represents state forest companies, enterprises and agencies that have sustainable forest management and sustainable wood production as major concerns. The Association currently has 33 members in 22 European countries. European State Forest Management Organisations (SFMOs) are dynamic and capably managed entities, charged by European governments to effectively manage forest ecosystems − one of Europe's greatest natural resources − for the benefit of society at large. As those who are actually responsible for making sustainable forest management (SFM) happen, SFMOs maintain an interface with the resource owners (states/governments), the citizens of Europe, the forest-based industries and all other stakeholders affected by forest management. European SFMOs face a wide variety of challenges of a political, institutional and − very often − financial nature. It is therefore important that all opportunities, challenges, limitations and restrictions faced by state forestry are taken into account when further designing policies relevant to forests. Doing this not only at EU level, but also at national and international levels, will result in even further benefits for all Europeans.
Relevant links	https://www.eustafor.eu/ News and Library

Agroscope

Schweizerische Eidgenossenschaft Confédération suisse Confederazione Svizzera Confederaziun svizra	Agroscope is the Swiss centre of excellence for agricultural research, and is affiliated with the Federal Office for Agriculture (FOAG). Agroscope makes an important contribution to a sustainable agriculture and food sector as well as to an intact environment, thereby contributing to an improved quality of life. Agroscope researches along the entire value chain of the agriculture and the food sector. Its goals are a competitive and multifunctional agricultural sector, high-quality food for a healthy diet, and an intact environment. In pursuing these aims, the research institute gears itself to the needs of its service recipients. Agroscope is responsible for the following tasks: Research and Development in the spheres of agriculture, nutrition and the environment; Provision of Decision-Making Bases for public-authority legislation; Legal Tasks as part of the statutory requirements in the service of agriculture and the general public; Knowledge Exchange and Technology Transfer with practitioners, the advisory sector, industry, science, the teaching sector and the public. Agroscope is characterised by its combination of research, policy advice, enforcement, knowledge exchange and technology transfer, as well as by its coupling of application-oriented basic research and practical relevance. Agroscope deals with issues in the following spheres: Plant Breeding, Plant Production, Plant Protection and Plant Products; Livestock, Feed and Products of Animal Origin; Food and Nutrition; Cropping Systems, Protection of Natural Resources, Agricultural Economics and Agricultural Engineering.
Relevant links	https://www.agroscope.admin.ch/agroscope/en/home.html

CASA CSA

	The overall objective of CASA is a consolidated common agricultural and wider bioeconomy research agenda within the European Research Area. The common research agenda will be jointly shared by Member States of the European Union and Associated Countries. It will improve the alignment and interoperability of the respective national research programme(s). This will be achieved through enhanced cooperation, coordination and information exchange between the Member States, Associated Countries and the European Commission. This includes increasing the opportunities for Member States and Associated Countries to engage in the aforementioned activities. The conduit for this will be the Standing Committee of Agricultural Research (SCAR) and the various SCAR working groups, through which all Member States and Associated Countries are brought together with a view to fostering cooperation, coordination and information exchange, as well as streamlining research policy, in the Bioeconomy and closely related fields. The overarching aim of CASA will be achieved through the accomplishment of the following four specific objectives: • Increased and broadened participation, interaction and collaboration of Member States and Associated Countries; • Improved quality of outputs and outcomes of the Standing Committee of Agricultural Research creating added value for greater impact; • Strengthening the production of more strategic policy advice by the Standing Committee of Agricultural Research based on the increased, deepened and broadened participation facilitated by CASA; • Improve overall organization, communication and dissemination of SCAR activities, outputs and outcomes for greater impact.
Relevant links	https://scar-europe.org/index.php/home-scar/support-activities-to-scar Publications

National Institute for Agricultural and Food Research and Technology (INIA)

	The National Institute for Agricultural and Food Research and Technology (INIA) is an autonomous Public Research Organisation (OPI) of the State Secretariat of Research, Development and Innovation of the Ministry of Economy and Competitiveness. It's the only public research organisation of the National State Administration exclusively dedicated to agrifood and forestry research. INIA's mission, in coordination with the equivalent institutions of the Autonomous Regions is to contribute to continuous and sustainable progress through development of environmentally friendly technologies. Its priority objectives are to satisfy the new research demands on agricultural, livestock and forestry production, mitigate the effects of global change and contribute to food safety and the fight against hunger in line with the Objectives of the Millennium.
Relevant links	http://www.inia.es/IniaPortal/goUrlDinamica.action?url=http://wwwsp.inia.es/en-us/Inia Latest publications

Czech University of Life Sciences Prague – Faculty of Forestry and Wood Sciences

	The Faculty of Forestry and Wood Sciences of the Czech University of Life Sciences Prague provide a comprehensive forestry education system to encourage and support rational forest management and sustainable utilization of its huge natural resources. The faculty has become a respected international research centre. Students learn both in-depth theory and practice to be well-prepared for future challenges in forestry, wood processing industry and research. Forests provide us with a precious renewable resource – wood. An environment-friendly material, wood is used for fuel as well as a construction material. We use it to make paper, furniture etc. Forest, though, means a lot more to us than being just a place where we take our wood from. It responds to a number of our needs, including recreation and education. We are obliged to take good care of forests, manage them responsibly and provide all necessary technical and personal services. Our students of forestry, wood processing, game management, taxidermy, economics and administration services, and other study programmes become experts who can accommodate and harmonize interests of the forest and human demands. Students learn to use the latest technology available, work in well-equipped laboratories, learn from best experts and conduct research projects with them. Much of the research undertaken by the Faculty is applied, published in academic journals, presented at conferences, congresses and in educational programmes in the public media as well. We boast a long tradition of international relations and our students can spend a part of their studies abroad, at our partner institutions. Broadening their horizons helps the students develop their vision and mission statements and define their success.

Relevant links	https://www.fld.czu.cz/en/

Forest Research Institute – Greece

	In its more than 80 years of operation, the Institute has produced excellent research always focusing on the research needs of the practicing foresters of the Forest Service. **The Institute comprises seven laboratories each covering an area of forestry research:** • Forest management and forest economics • Silviculture and forest genetics • Forest soils and biogeochemistry • Forest protection and forest fires • Landscape architecture • Forest ecology and hydrology • Science and technology of wood The Institute maintains close ties with operational organizations (Forest Service, Fire Service, General Secretariat for Civil Protection, local authorities) and with the private sector (forest industries, private citizens, etc.), and has contributed significantly in many aspects of forest management in Greece. It puts emphasis on solving practical problems and on transferring new scientific knowledge and technology to the operational world.
Relevant links	http://www.fria.gr/EngPage/institouto.html

Lithuanian Research Centre for Agriculture and Forestry

LITHUANIAN RESEARCH CENTRE FOR AGRICULTURE AND FORESTRY	The Lithuanian Research Centre for Agriculture and Forestry operates in the following research fields: 1. Physical, chemical, biological soil properties and plant nutrition 2. Forest plant breeding, genetics and biotechnology; breeding for new varieties and research on forest plant genetic resources in Lithuania 3. Forest plants biology and modelling of silviculture systems for wood quality and stand productivity 4. Microbiology and plant pathology, toxicology of forest products and materials 5. Optimization and modelling of forest plant processing and product storage 6. Sustainability of forest ecosystems and climate change 7. Forestry systems; the social and economic problems of forestry, forest policy.
Relevant links	https://www.lammc.lt/en/institute-of-forestry/research-departments/2015

Federal Ministry for Sustainability and Tourism - Austria

BUNDESMINISTERIUM FÜR NACHHALTIGKEIT UND TOURISMUS	OUR FORESTS ARE VERSATILE Humans benefit from forests in numerous ways: Due to the high demand for wood around the world, forests safeguard a large number of green jobs through harvesting either timber or other forest-based products, thereby making a key contribution to the economy. Further, forests protect us against natural hazards, provide us with an energy supply, aid in mitigating the effects of climate change, and offer animals and plants a habitat and humans a place for recreation. Forests respond rather slowly to changes in their environment. In the context of climate change this makes them vulnerable to damage and diseases. Climate models predict wetter winters and drier summers. Forestry is particularly seriously affected by climate change, as forests planted today will probably be subjected to considerable change until they are felled.
Relevant links	https://www.bmnt.gv.at/english/forestry.html

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