

A close-up photograph of a pine branch with vibrant green needles. The needles are arranged in clusters along a dark brown branch. The background is a soft, out-of-focus brown, suggesting a forest setting. A semi-transparent white banner is overlaid across the top half of the image, containing the main title text.

# Adaptation of Forests and Agroforests to Climate Change: A new large-scale, long-term, global international initiative

FORESTIA Seminar

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# International Research Initiatives: large-scale *Top-Down* INRAE programs

- Part of INRAE European and International strategy
- Objective: *“activate and develop large scale international research programs focused on a small set of high priority topics”*
  - Long-term international thematic networks
  - Shared research agendas at the world level
- Six at INRAE:
  - Soil and Climate
  - PREZODE initiative: emerging diseases and agriculture
  - Intestinal microbiote and health
  - Agroecological management of crop protection
  - Ecological transition in the Mediterranean region
  - **Adaptation of forests and agroforests to climate change**

# What happened so far

- **French** INRAE-CIRAD working group (~10 people, 2020-2021)
- **International** WG of ~30 international individual experts (2022-2023)
- A **concept note** to present the **context, scope and objectives** of this international research initiative
  - validated by the French WG in 2021, about to be validated by the new international WG
- Bibliometric analysis to identify the main international actors
- Meeting with six people from USDA in Washington DC, May 29th 2022 (organized with Susan Stein, USDA)
- Meeting with ~12 people from Eastern Canada (Laval university, Forest service...), June 30th 2022 (organized with Claire Depardieu, Laval University)
- Presentation at the annual meeting of the EU research project FORGENIUS (organized with Ivan Scotti, INRAE)
- **First international seminar**, January 10-12th 2023, Antony, France

# International WG

<b>Sally</b>	Aitken	Canada
<b>Silvio</b>	Schueler	Austria
<b>María Elena</b>	Fernández	Argentina
<b>Mercy Afua</b>	Adutwumwaa Derkyi	Ghana
<b>Henrik</b>	Hartmann	Germany
<b>Claire</b>	Depardieu	Canada
<b>Kostya</b>	Krutovsky	Germany
<b>Alexia</b>	Stokes	France
<b>Ivan</b>	Scotti	France
<b>Laurence</b>	Boutinot	France
<b>Georges</b>	Kunstler	France
<b>Philippe</b>	Rozenberg	France
<b>Nils</b>	Ferrand	France
<b>Murielle</b>	Trouillet	France

<b>Bruno</b>	Fady	France
<b>Carole</b>	Kerdelhué	France
<b>Sabas</b>	Barima	Côte d'Ivoire
<b>Suzanne</b>	Prober	Australia
<b>Barbara</b>	Lacor	France

<b>Susan</b>	Stein	USA
<b>Jessica</b>	Halofsky	USA
<b>Donald</b>	Midoko Iponga	Gabon
<b>Arthur</b>	Perrotton	France
<b>Cedric</b>	Gaucherel	France
<b>Eshetu</b>	Yirdaw	Finland
<b>Andreas</b>	Hamann	Canada
<b>Eric</b>	Rigolot	France
<b>Annabel</b>	Porté	France

<b>Oliver</b>	Gailing	Germany
<b>Markus</b>	Müller	Germany



January 10-12th, Antony, France

# Concept note

- Forest and agroforest ecosystems
- Trees foundation species
- Climatic fluctuations
- Forests respond to rapidly changing climate
- Resilience
- Uncertainty
- Adaptation and adaptive management
- Interactions

# Why “International”?

- Species range and climate
- Disturbances
- Biological invasion
- Get access to forest, human and technical resources
- Increase power and significance of experimentations
- Share knowledge and experience in different countries, with different economic and social constraints
- International power struggle

# Some key issues

- Improve the knowledge basis
  - Forest-climate relationships
  - Natural mechanisms of adaptation
- Develop conceptual and operational frameworks and tools
  - Science-based, more collective, more consensual solutions
- Improve forecasting
  - Quantify and manage uncertainty
- Study feedback mechanisms
  - Link between adaptation to CC and biodiversity
- Self-assessment
  - Future of decision-making linked to effectiveness of ecological, social and economic interventions



# Identified projects

- Genetic and epigenetic mechanisms of forest tree resilience in response to climate change
- International monitoring of forest ecosystem response to climate change
- Forests for and with the people
- Tree catalogue for the 22nd century
- Resilience of forest socio-ecosystems functions in the framework of global change
- Models for the future of forests

# Genetic and epigenetic mechanisms of forest tree resilience in response to climate change

- Adaptation at the individual and population levels
- Dendroecological studies of common garden experiments
- New international networks for assisted migration and provenancing studies

# International monitoring of forest ecosystem response to climate change

- Living labs for the observation of forest ecosystem response to climate change
- Nested spatial scales and adapted tools
- Identification of priority scientific issues

# Forests for and with the people

- Improve livelihood and socio-economic benefits
- Scientific and local knowledge
- Non market and market stakeholders
- Representations, discussion, participation
- Conservation, exploitation, adaptive management?
- Case studies and common methodologies
- Toolbox

# Tree catalogue for the 22nd century

- Large scale prediction maps for tree species
- Parametrization, scenarios, uncertainty
- Consensus prediction + large scale communication tools

# Resilience of forest socio-ecosystems functions in the framework of global change

- Resilience
- **Social** ecosystems
- Sensitivities and **tipping** points
- Steps

# Models for the future of forests

- **Modelling**
- **Trends** in the future changes of forest ecosystems
- **Sources of disturbance**
- **Objective:** modelling the functioning of forest ecosystems and their fate, including the potential for forests to entirely disappear

# Financial resources

- So far, seed money by INRAE
- Then, the project should become self-sufficient in mobilizing funding sources



# Next steps:

- **Opinion** paper
- International version of the concept cote
  - **French institutional level** (INRAE and CIRAD)
  - **internationalization** of the initiative
- Linking the initiative with international organizations
- **IUFRO**
  - Subplenary session at the **2024 world meeting** in Stockholm “*Building international initiatives to strengthen forest adaptation strategies in a changing climate*”
  - New **task force** (or associate to an existing one)
- Associate the initiative with other national and international initiatives
  - PEPR Forest in France
- Make of this top-down initiative a **bottom-up** project

# Contribute?

- Spread the news
- Imagine
- Participate: IUFRO meetings
- Come back to us

# Discussion

