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BiodivClim Final Events

10-11 June 2025

Comic Art Museum, Brussels (Belgium) & online

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BiodivClim Funded Projects Final Conference

#BiodivClim

Posting about the BiodivClim Final Events on social media?

Don't forget to tag @BiodiversaPlus

Reminder - Agenda of the afternoon

14:00 – 14:15 BiodivClim call overview

14:15 – 15:20 Funded projects presentations 1 - Climate-biodiversity feedback processes

15:20 – 15:40 Break

15:40 – 17:20 Funded projects presentations 2 - Consequences of climate change on biodiversity and nature's contributions to people

17:20 – 17:30 Presentation of the BiodivClim comics

17:30 – 19:00 Cocktail

14:00 – 17:20 BiodivClim Knowledge Hub impacts and lessons learned workshop *(for KH members only)*

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BiodivClim Call overview

By Sophie Germann, ANR Biodiversa+ operational manager & BiodivClim Call Secretariat
& Estrella Fernandez Garcia, AEI, BiodivClim Follow-Up Team

https://www.biodiversa.eu/2020/10/06/2019-2020-joint-call/

BiodivClim has received funding from the European Union¹s Horizon 2020 research and innovation programme under grant agreement No 869237

BiodivClim ERA-NET COFUND
Biodiversity and Climate Change

Thanks!

- BiodivClim funded research projects

- BiodivClim partners, including the participating funding organisations

https://www.biodiversa.eu/2020/10/06/2019-2020-joint-call/#fundingorganisations

- European Commission

- BiodivClim evaluation committee

https://www.biodiversa.eu/2020/10/06/2019-2020-joint-call/#evaluationcommittee

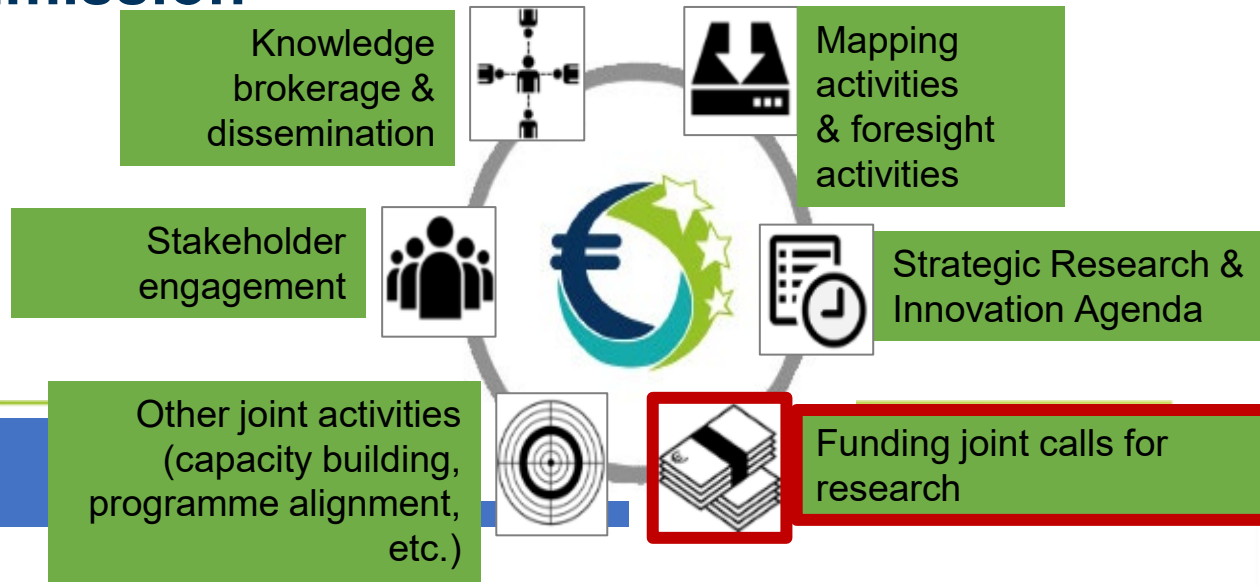
- BiodivClim coordination (BELSPO/FRB), call secretariat (ANR) and follow-up team (AEI)

Context

“Biodiversity and Climate Change”

Call co-funded by the European Commission (BiodivClim COFUND Action)

- **Priority** for the Biodiversa network and its members, as defined in the Biodiversa **Strategic and Research Innovation Agenda** (2017-2020) and **Implementation plan** (2017-2019)
- Relevant topic for the **European Commission**
- **Launched in September 2019**



Timeline – BiodivClim call process l Evaluation process

Clustering workshop with 7 RIA projects
Data management workshop

The BiodivClim co-funded call– a huge participation!

A call to **support transnational research projects at the nexus of biodiversity and climate change** and properly taking into account socio-ecological contexts

231 pre-proposals submitted

82 full proposals submitted

23 funding organisations

19 represented countries

21 funded projects

> 25 Mio€

A wide range of succesful research projects

For more information: https://www.biodiversa.eu/2020/10/06/2019-2020-joint-call/#fundedprojects

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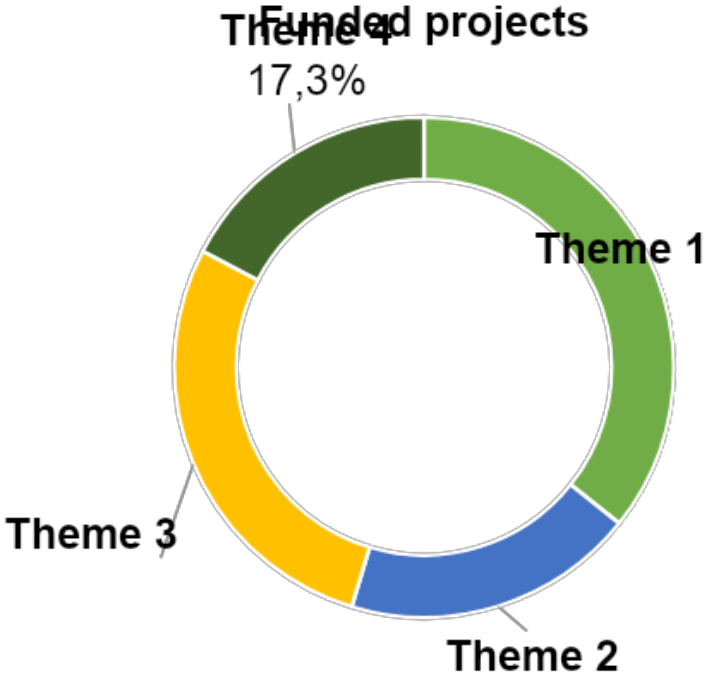
Themes



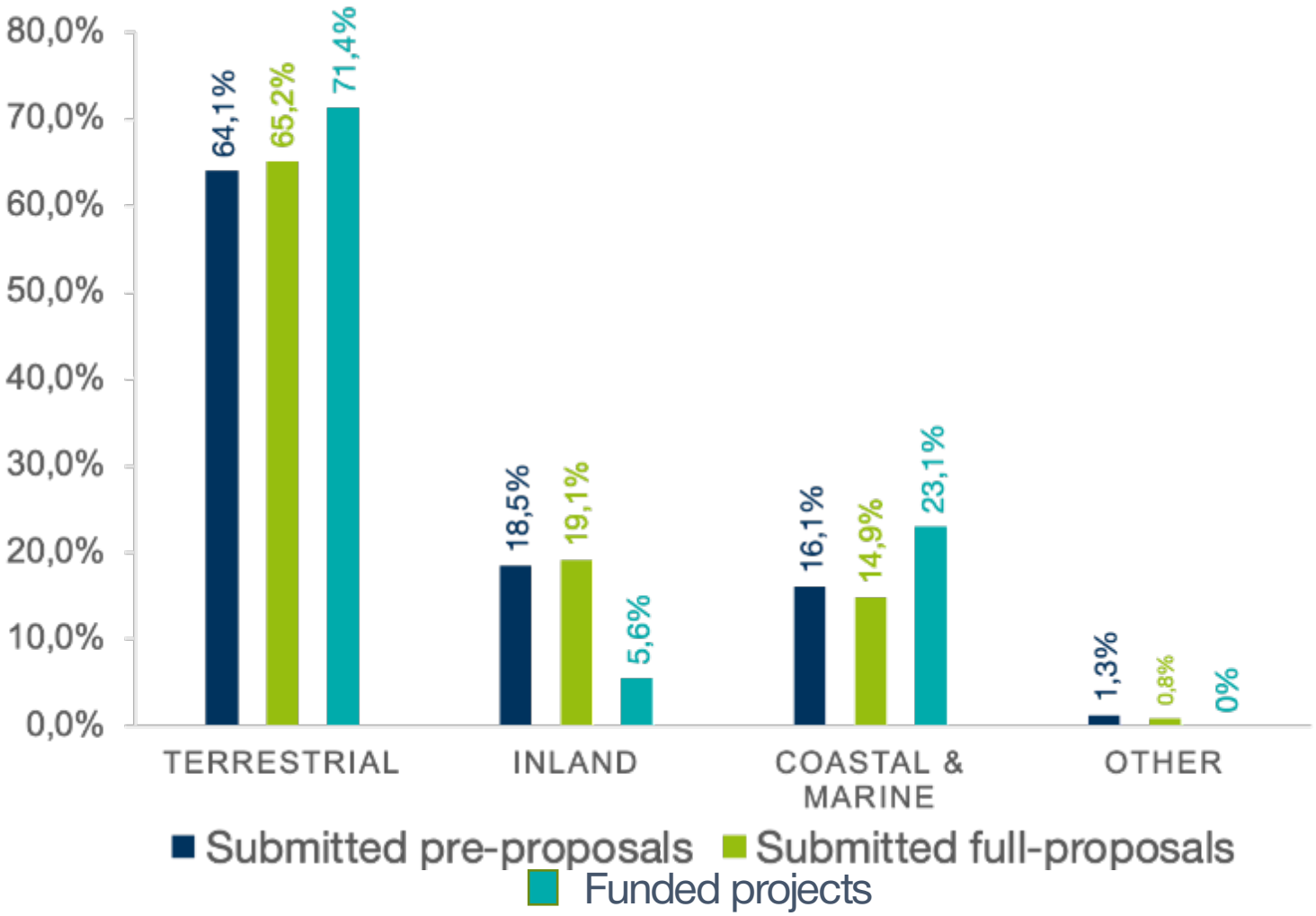
Theme 1: Consequences of climate change on biodiversity and nature's contributions to people.

Theme 3: Potential of nature-based solutions for mitigating and adapting to climate change.

Theme 2: Climate-biodiversity feedback processes

Theme 4: Synergies and trade-offs between policies on biodiversity, climate and other relevant sectors, and the role of agents of change

Studied environments

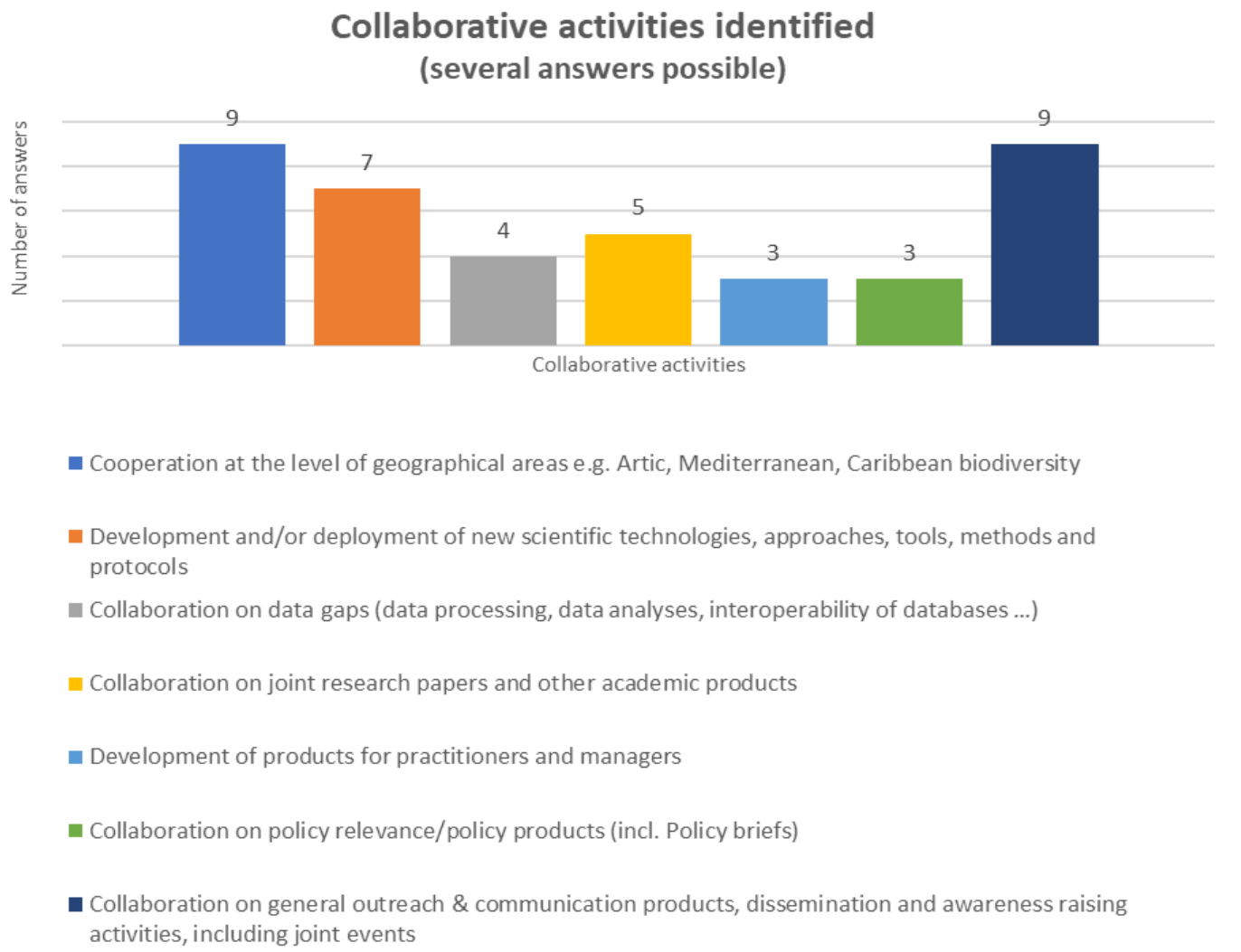


More information in the call brochure & on projects websites

More information on the call process & figures in the 2019-2020 Call brochure

→ You can download it on the Biodiversa website https://www.biodiversa.eu/2020/10/06/2019-2020-joint-call/

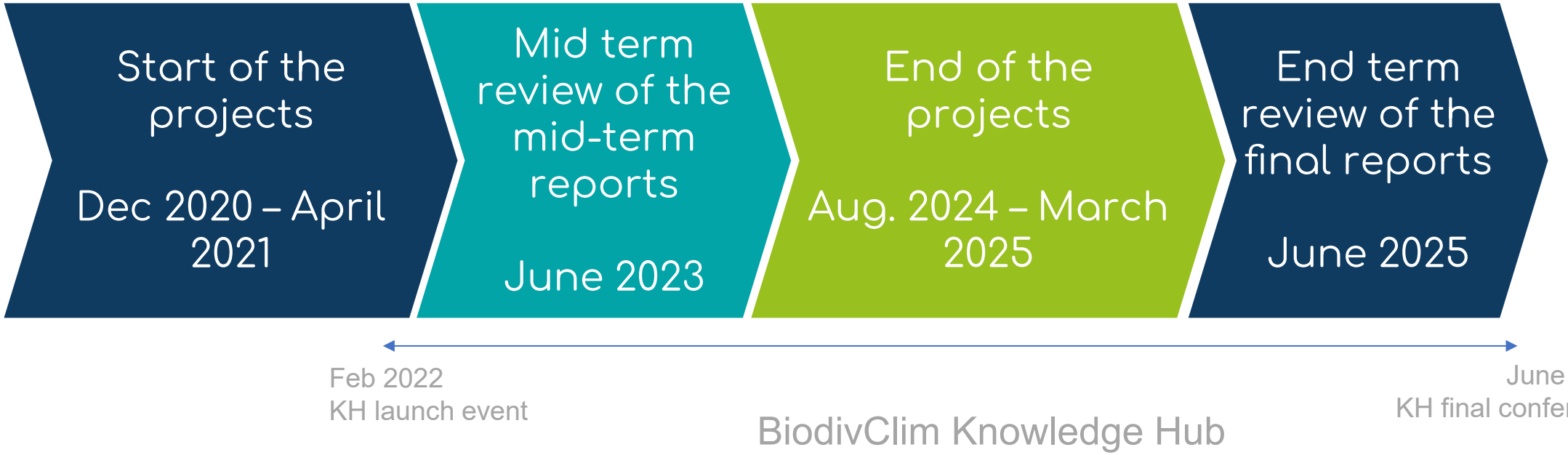
Clustering workshop – a fertile dialogue to identify collaborations



Examples of concrete joint activities at the start of the funded projects :

- Joint meetings (e.g. Arctic Science week)
- Joint field experiments
- Sharing of protocols
- Joining forces in a call proposal
- Organising workshop

Timeline – BiodivClim call process l Follow-up



- Very positive feedback from the funding organisations
- Delays in some projects due to Covid-19 pandemic

-> possibility of a one year cost-neutral extension

Biodiversa+ joint research calls

- **2021 | *Biodiversity protection***
  - ► **36 projects** **>44M€** 38 funders 28 countries
- **2022 | *Biodiversity monitoring***
  - ► **33 projects** **>46M€** 33 funders 23 countries
- **2023 | *Nature-based solutions***
  - ► **34 projects** **>40M€** 41 funders 34 countries
- **2024 | *Societal transformation***
  - ► Launched in Sept. 2024, decision fall 2025, res. budget >40M€
- **2025 | *Restoration of ecosystem functioning, integrity, and connectivit***
  - ► To be pre-announced in June and launched in Sept. 2025, res. budget >40M
- **2026 | *Future Ecosystems***
  - ► Under development – to be launched in Sept. 2026, res. budget >40M€

For more information: https://www.biodiversa.eu/research-funding/
& subscribe to Biodiversa newsletter

Now, let's discover the major research results of the

21 research projects funded under the BiodivClim call!

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[14:15 - 15:20]

Funded Projects Presentations – Session 1

Climate-biodiversity feedback processes

Moderated by ***Petra Manderscheid***, *Executive Director of the JPI Climate Central Secretariat*

Presented projects - Session 1

- **FeedBaCks**, Feedbacks between Biodiversity and Climate, presented by *Dirk Karger*
- **GenClim**, Biodiversity on the run: evolutionary and socio-economic consequences of shifting distribution ranges in commercially exploited marine fishes, presented by *Romina Henriques*
- **GRADCATCH**, Using natural environmental GRADients to decipher the adaptation of soil microbial Communities to climATe Change, presented by *Aline Frossard*
- **FutureArcticLives**, Future Arctic livelihoods and biodiversity in a changing climate, presented by *Martin Reinhardt Nielsen*

FeedBaCks
Feedbacks between Biodiversity and Climate

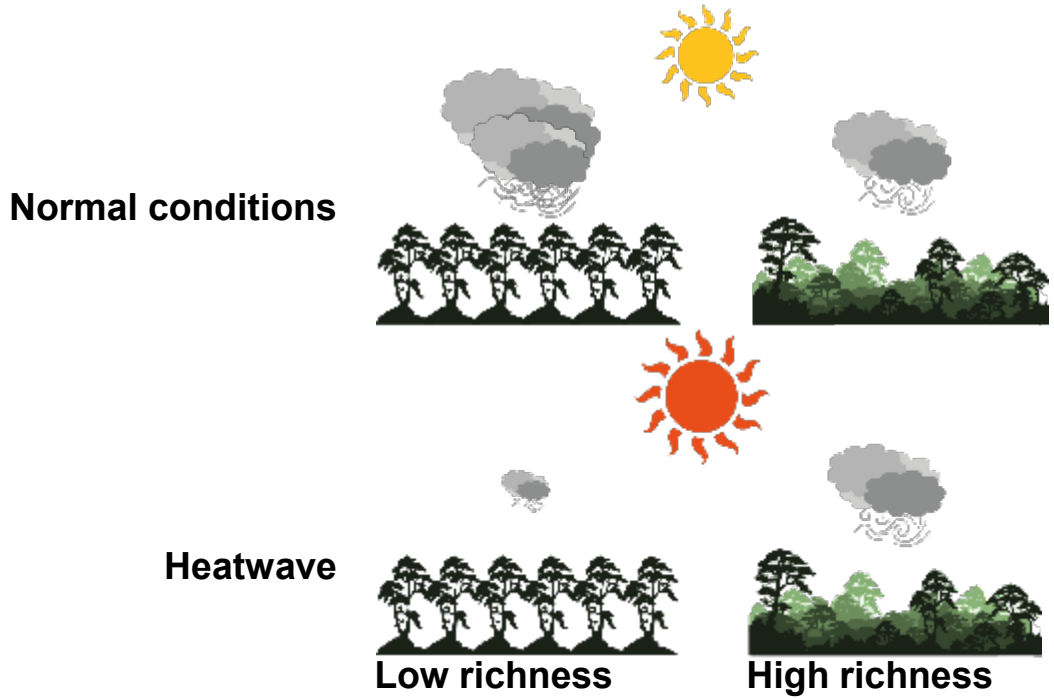
By: Dirk Nikolaus Karger (Swiss Federal Research Institute WSL)

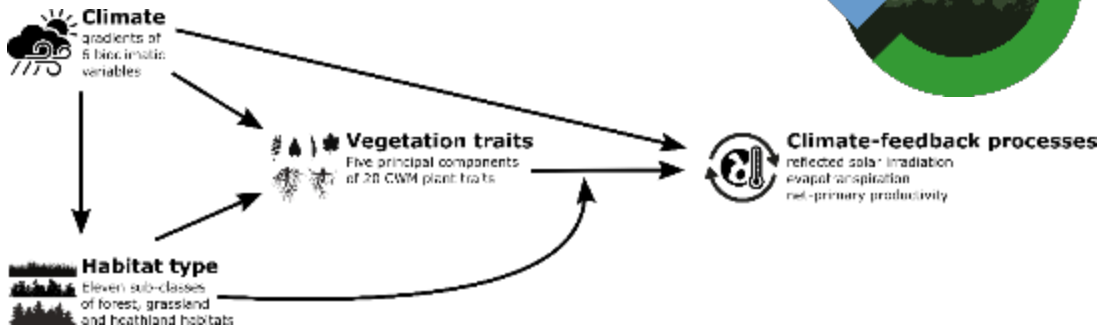
Niklaus E. Zimmermann, WSL, Swiss Federal Research Institute WSL, Wilfried Thuiller (CNRS, Univ. Grenoble), Thomas Hickler (Senkenberg), Sonia Seneviratne (ETH Zurich), Helge Bruelheide (Martin Luther Univ.) , Milan Chytry (Masaryk Univ.), Cibele Queiroz (Stockholm Resilience Center)

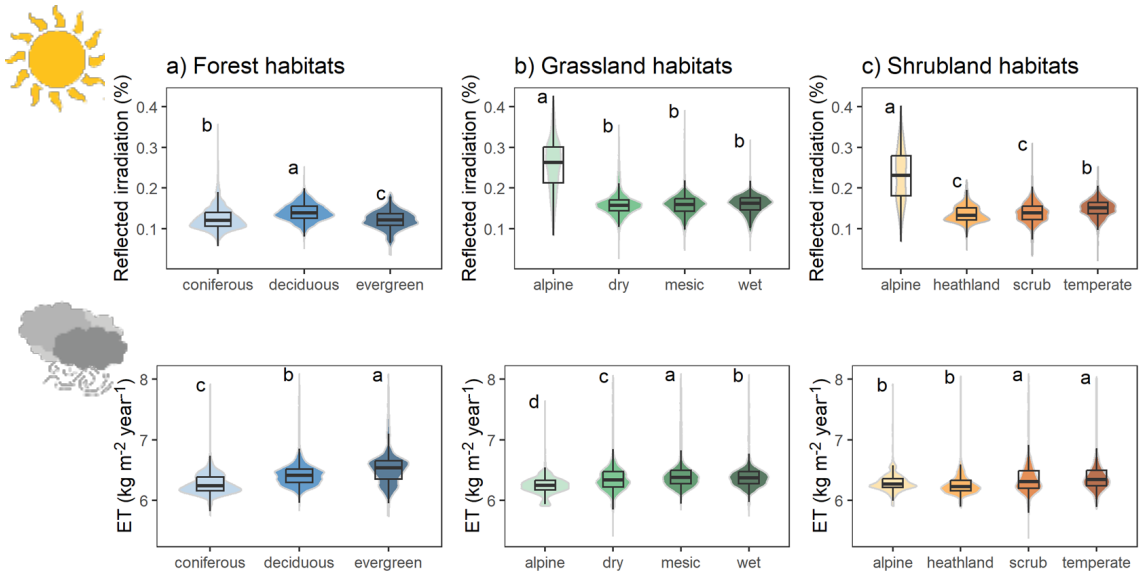
+ Partners logo of the project

Scientific results

- Climate regulating traits matter (reflectance, evopotranspiration)
- Climate regulating plant traits differ mainly between habitats





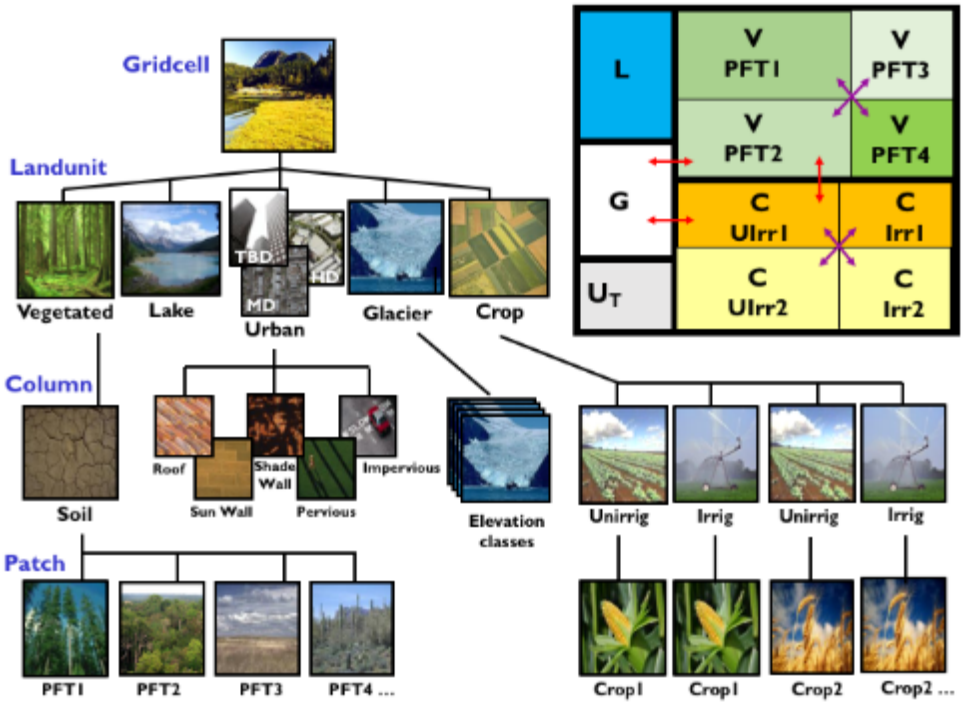


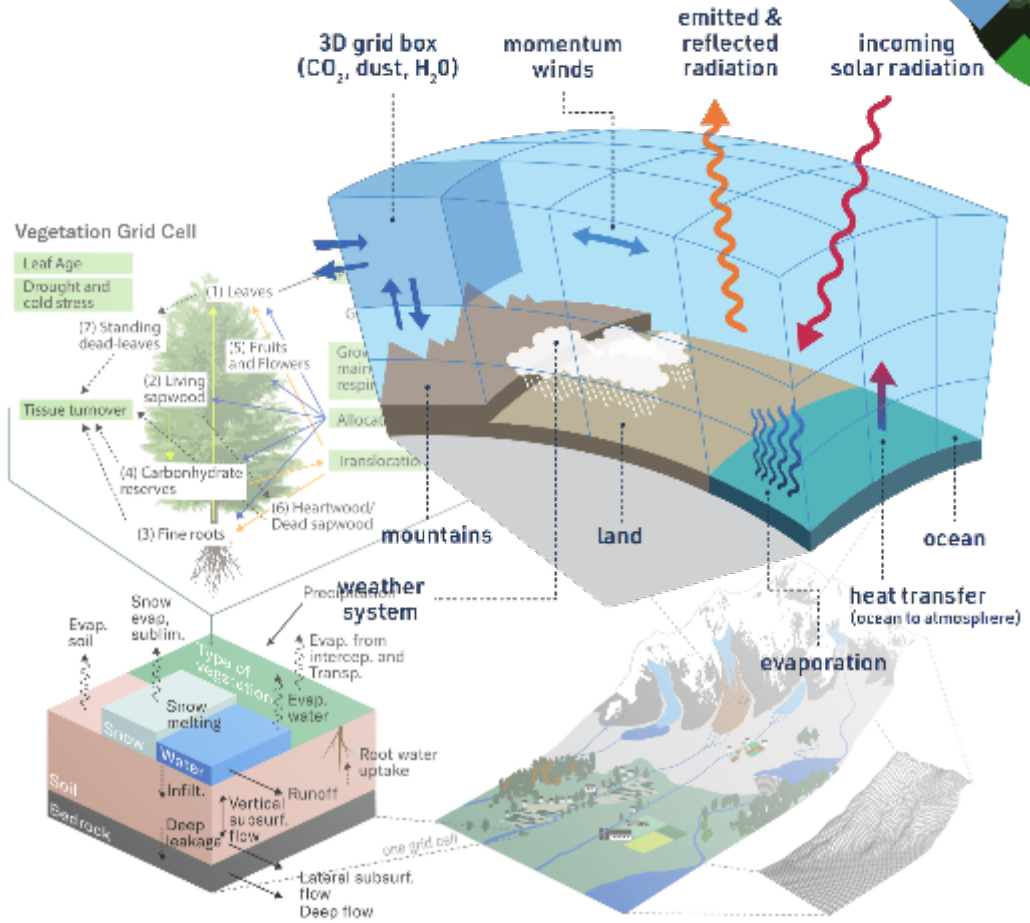
Karger et al. (2023) The risks of leaving biodiversity behind: Seven points to consider for climate change mitigation. ***Policy Brief*** – Stockholm Resilience Center

Kambach et al. (2024) Climate regulation processes are linked to the functional composition of the plant community in European forests, shrublands and grasslands. ***Global Change Biology***

Scientific results

- Earth system model do not understand «species» yet, they only know plant functional traits





Scientific results

Unified workflow

Land use & management → **Habitat distribution** → **Biodiversity** → **Plant functional types** → **Climate feedback**

Results from Belmont Forum and BiodivERsA joint call “BiodivScen” – Project “FutureWeb” Dou et al. (2023)

UGA Université Grenoble Alpes

WSL

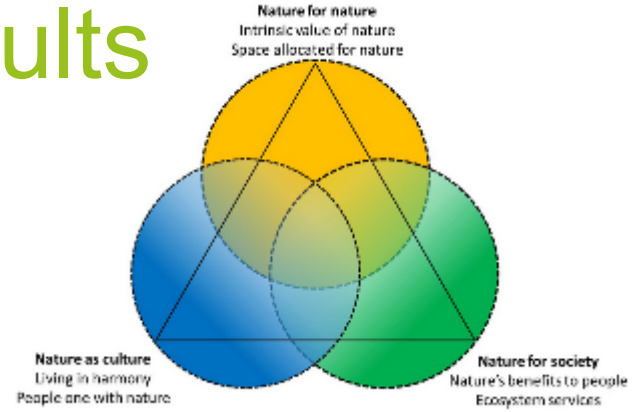
MUNI

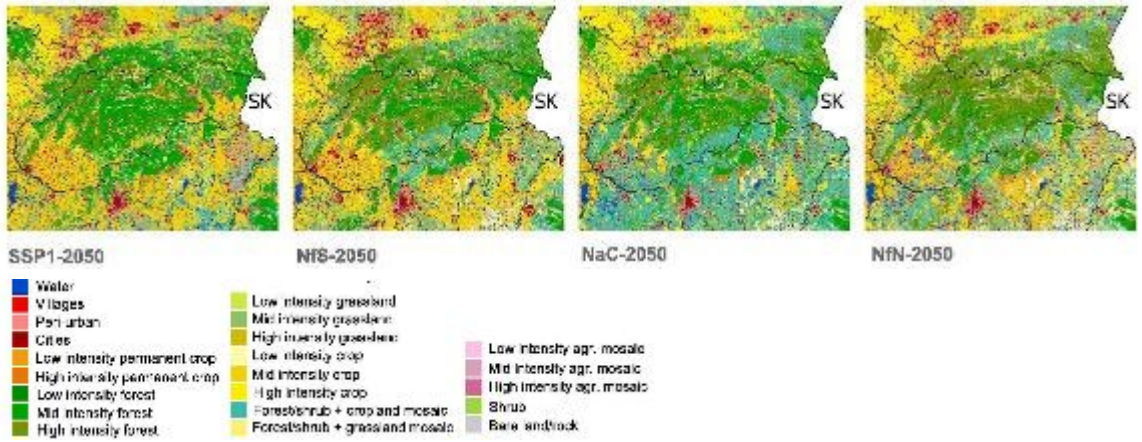
ETH zürich

SENCKENBERG world of biodiversity

Scientific results

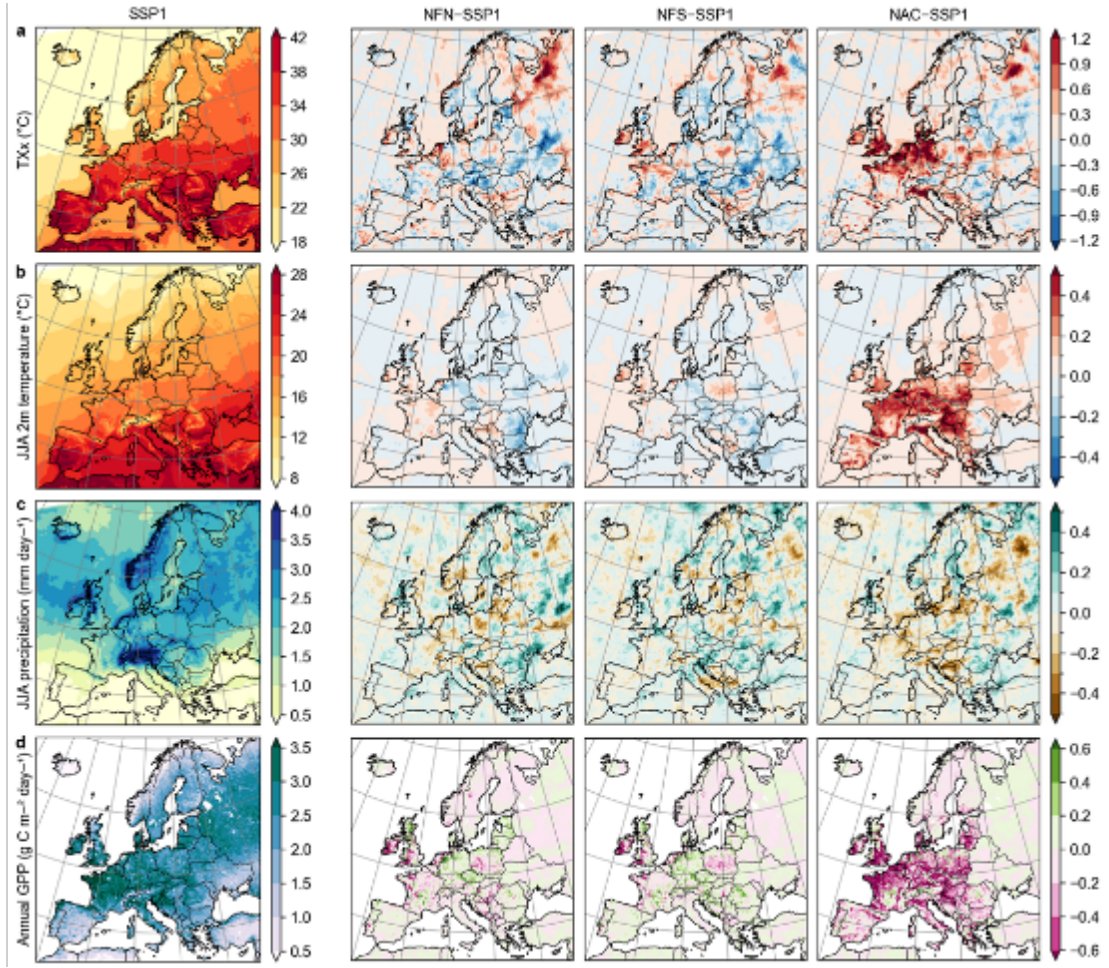
- Using IPBES Nature Future Framework in COSMO-CLM²





- Up to +/- 0.5° mean annual air-temperature difference between NFF scenarios
- Future pathway for biodiversity matters for climate change

Effect of NNF scenarios on regional climate



Sieber et al. (major revision) Climate response to Nature Future scenarios in a regional Earth System Model. ***Nature Communications***

Policy and societal impacts / results

Stockholm Resilience Centre | Stockholm University

RESILIENCE HUB

BRIEF

DECEMBER 2023

The risks of leaving biodiversity behind: Seven points to consider for climate change mitigation

Karger et al. (2023) The risks of leaving biodiversity behind: Seven points to consider for climate change mitigation. ***Policy Brief*** – Stockholm Resilience Center

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Acknowledgements

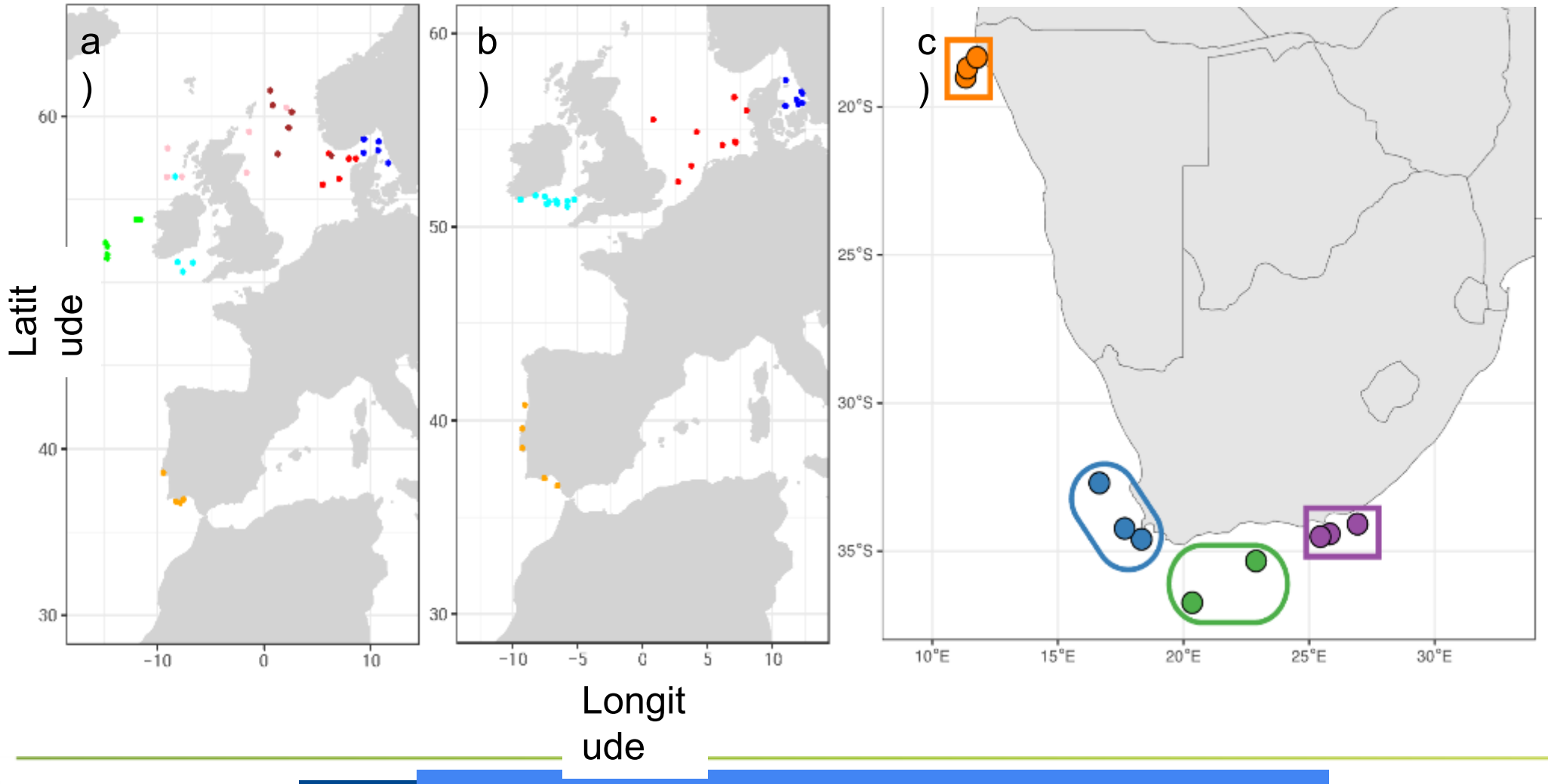
GenClim

Evolutionary and socioeconomic consequences of shifting distribution ranges in commercially exploited marine fishes

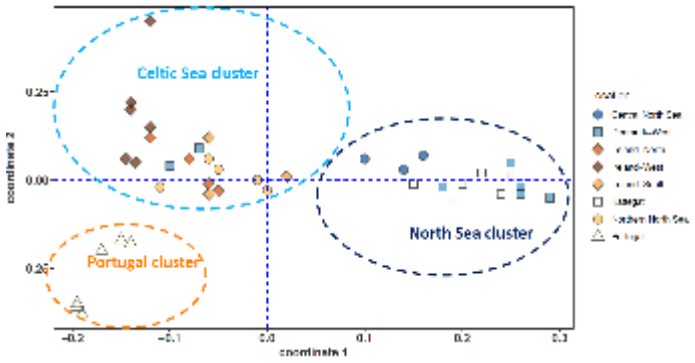
By Romina Henriques

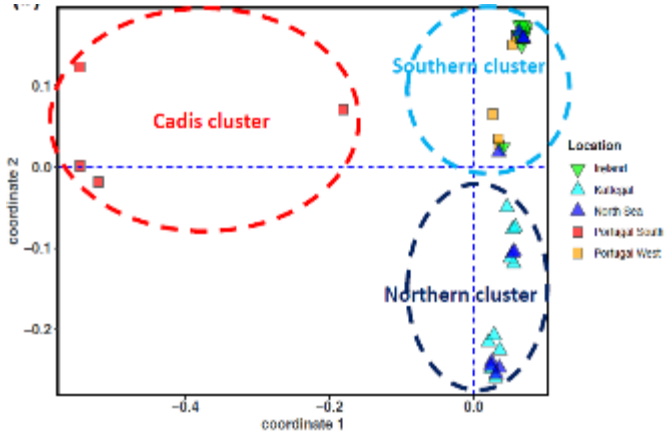
Einar Eg Nielsen, Martin Lindegren, Marti Pujolar, Marcel Montanyes-Sole, Courtney Gardiner, Sophie von der Heyden, Rita Castilho, Regina Cunha, Marie-Catherine Riekhof, Rudi Voss, Robin Fleet, Caroline Grünhagen, Joana Robalo

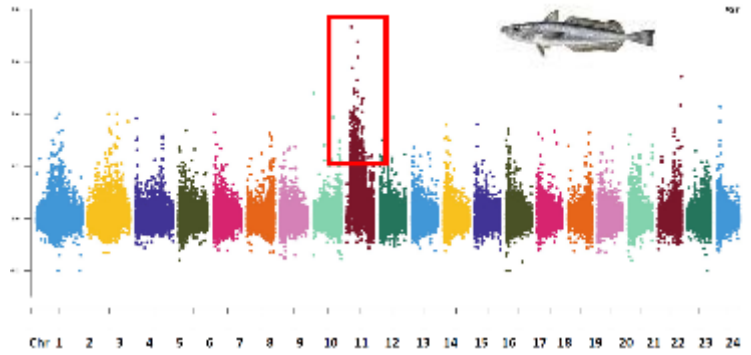
Scientific results

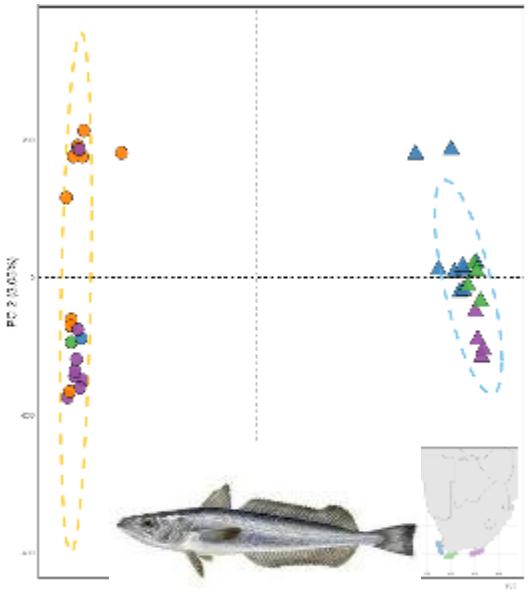


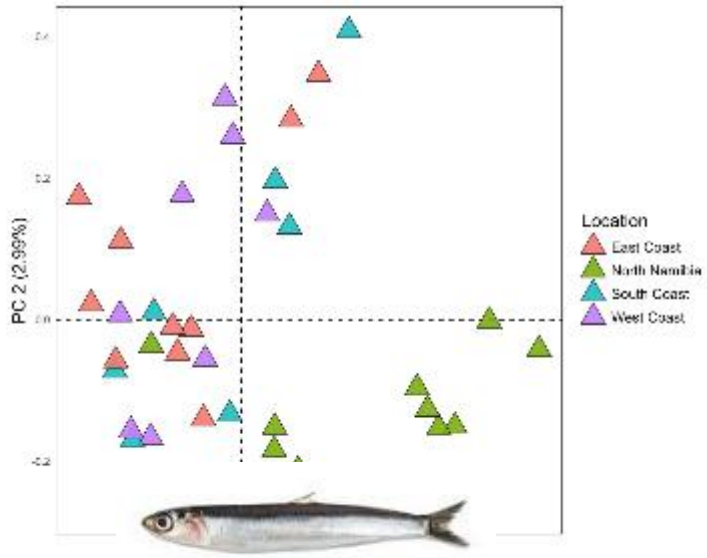
Scientific results

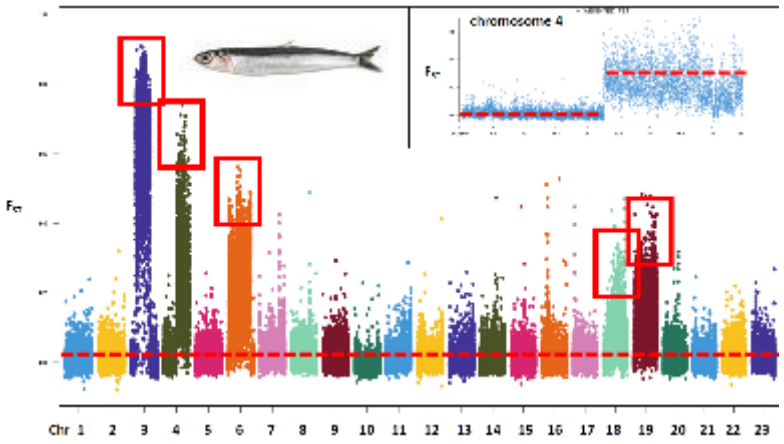




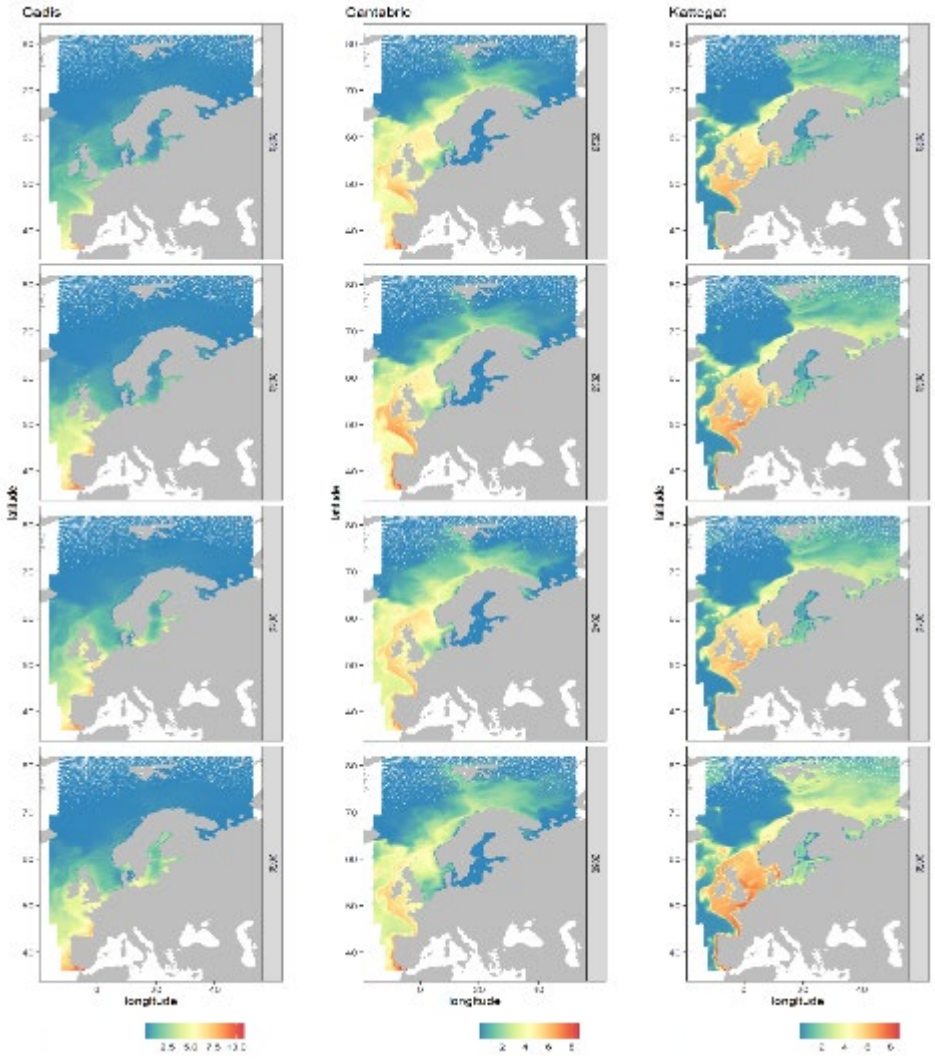


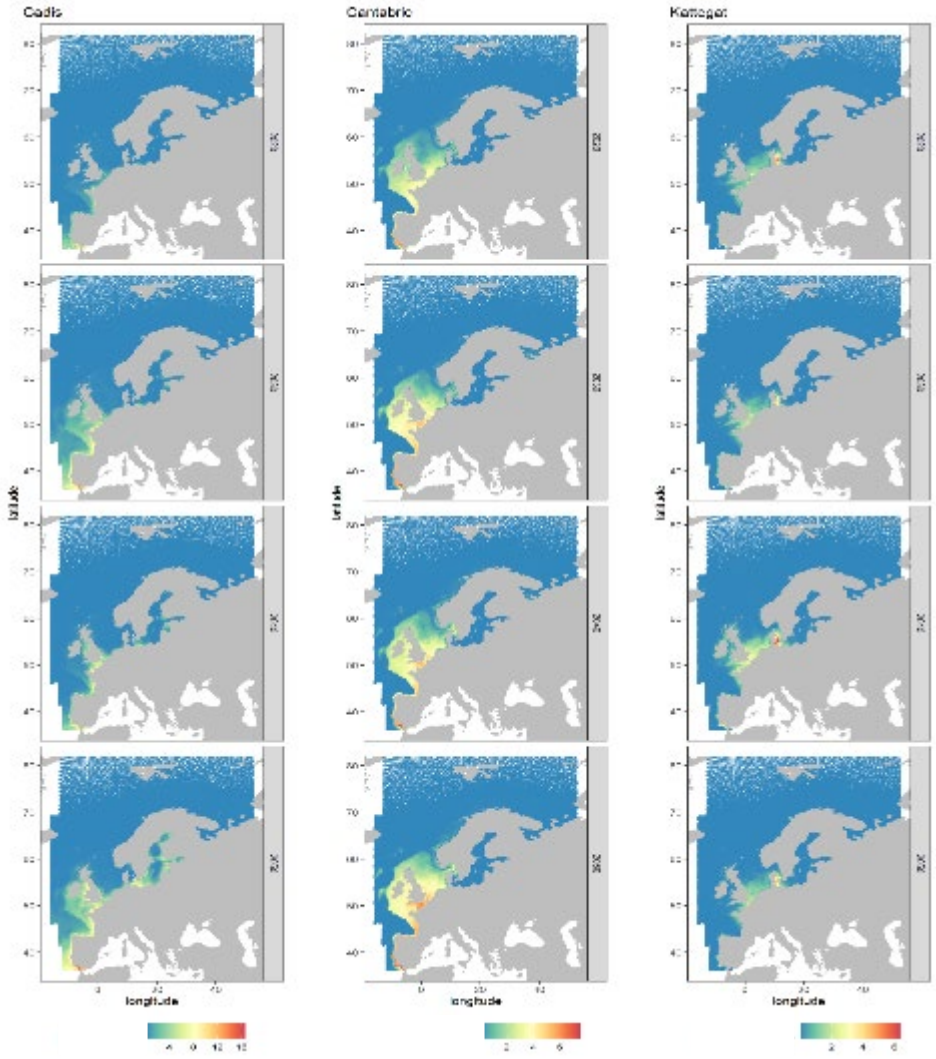






Scientific results





Policy and societal impacts / results

Population structure across the Eastern Atlantic

Mediated by local adaptation

Differences in resilience to climate change, differences in distribution shifts

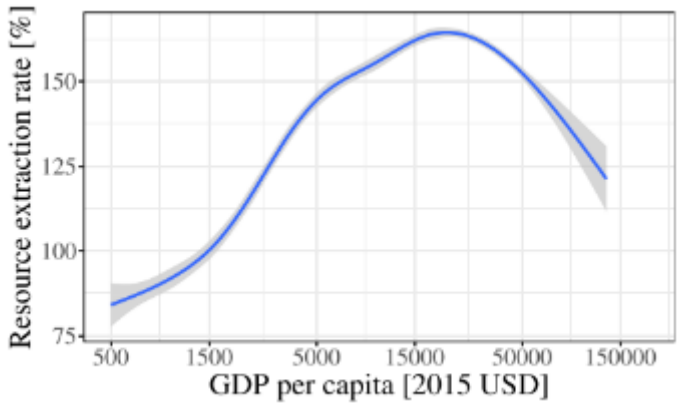
Impact on fisheries policy and stock managements

Socio-economic modelling showed it is easy to over-or-underestimate future changes in biomass, particularly when not including population data

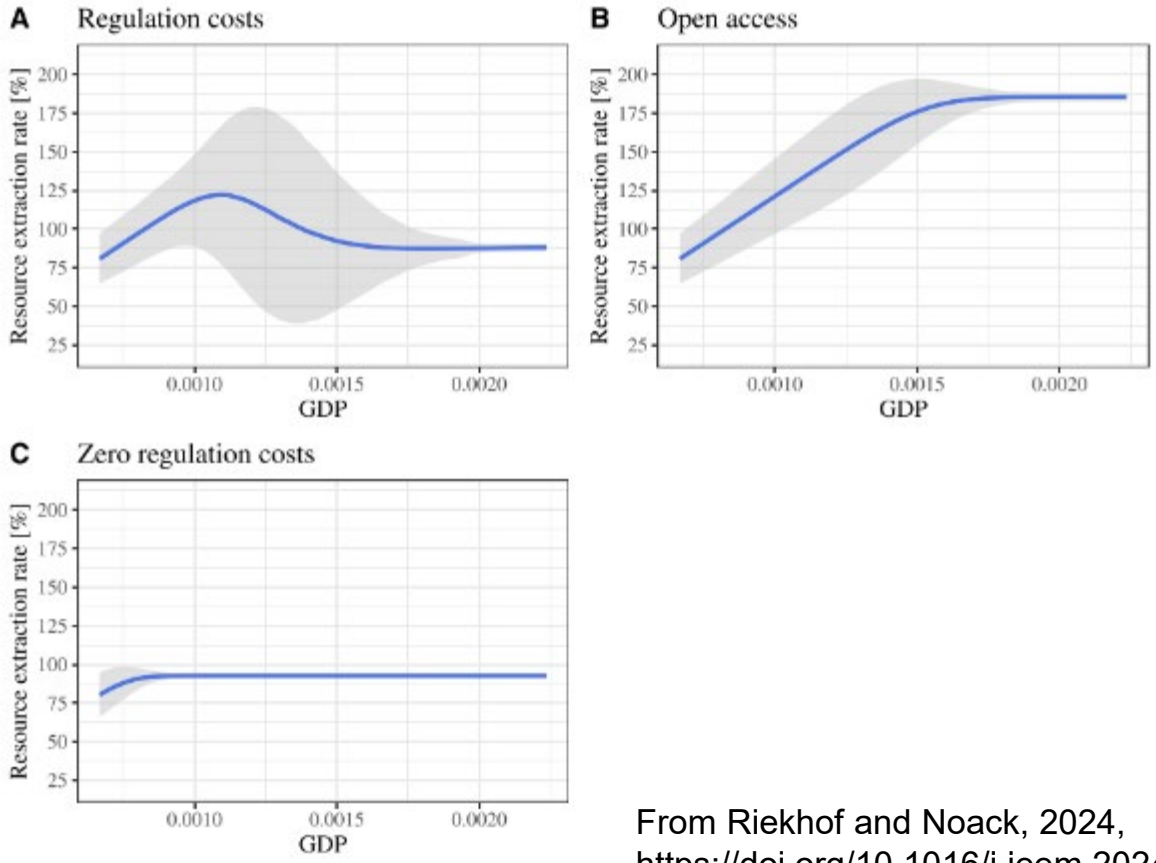
Bringing down regulation (and information) costs cruicial for sustainable resource use

Policy and societal impacts / results

Data based on over 6000 fish stocks



Model simulations (mean and confidence interval)



From Riekhof and Noack, 2024,
https://doi.org/10.1016/j.jeem.2024.102947

Policy and societal impacts / results

- 2 papers published
- 9 papers in prep
- 15 communications
- 4 PhD students
- 37 stakeholders
- 2 project spin-offs

Acknowledgements

DANMARKS FRIE FORSKNINGSFOND
INDEPENDENT RESEARCH FUND DENMARK

Innovation Fund Denmark

FCT
Fundação para a Ciência e a Tecnologia
MINISTÉRIO DA CIÊNCIA, TECNOLOGIA E ENSINO SUPERIOR

DFG Deutsche Forschungsgemeinschaft
German Research Foundation

science & technology
Department:
Science and Technology
REPUBLIC OF SOUTH AFRICA

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GRADCATCH

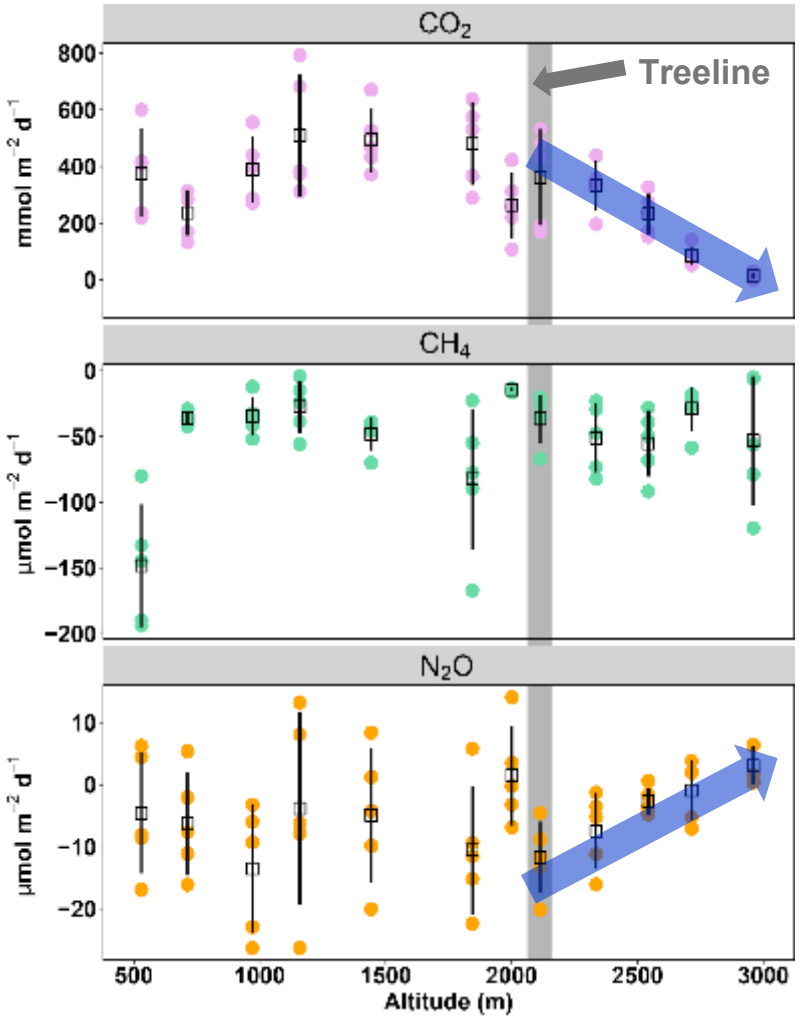
Using natural environmental GRADients to decipher the adaptation of soil microbial Communities to climATe CHange

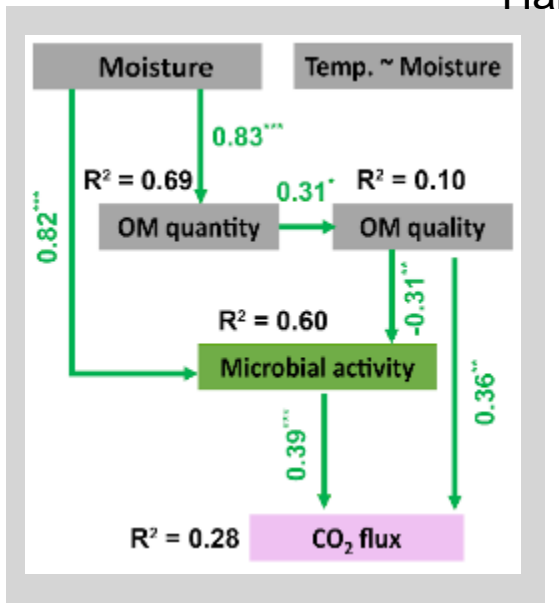
By **Aline Frossard**, Swiss Federal Institute WSL (consortium member)
Coordinator: **Anders Priemé**, University of Copenhagen
Consortium members: **Anna M. Romaní**, University of Girona
Jean-Baptiste Ramond, University of Pretoria

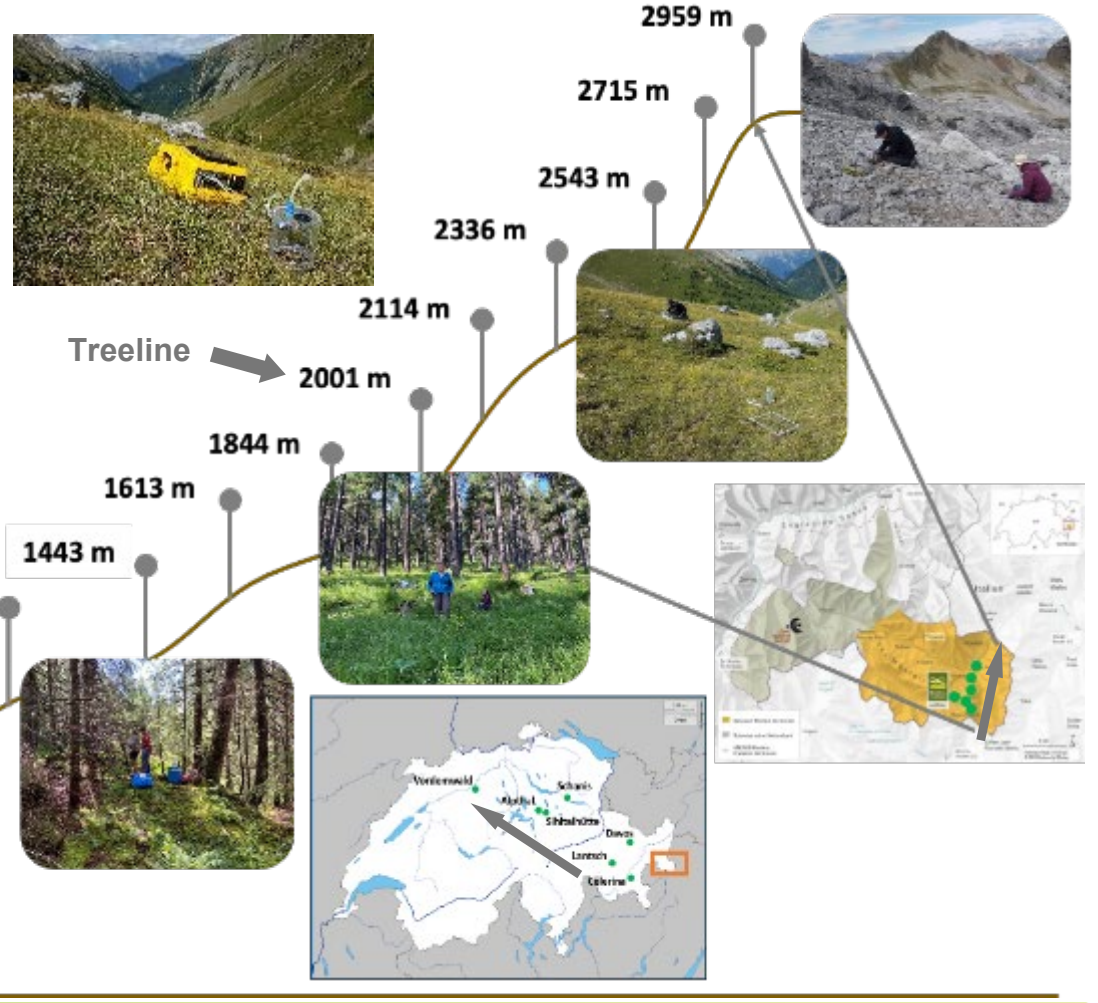
Scientific results

Soil organic matter quantity and composition drive microbial enzyme activities and greenhouse gas fluxes along an elevational gradient

Han *et al.*, 2024, Geoderma



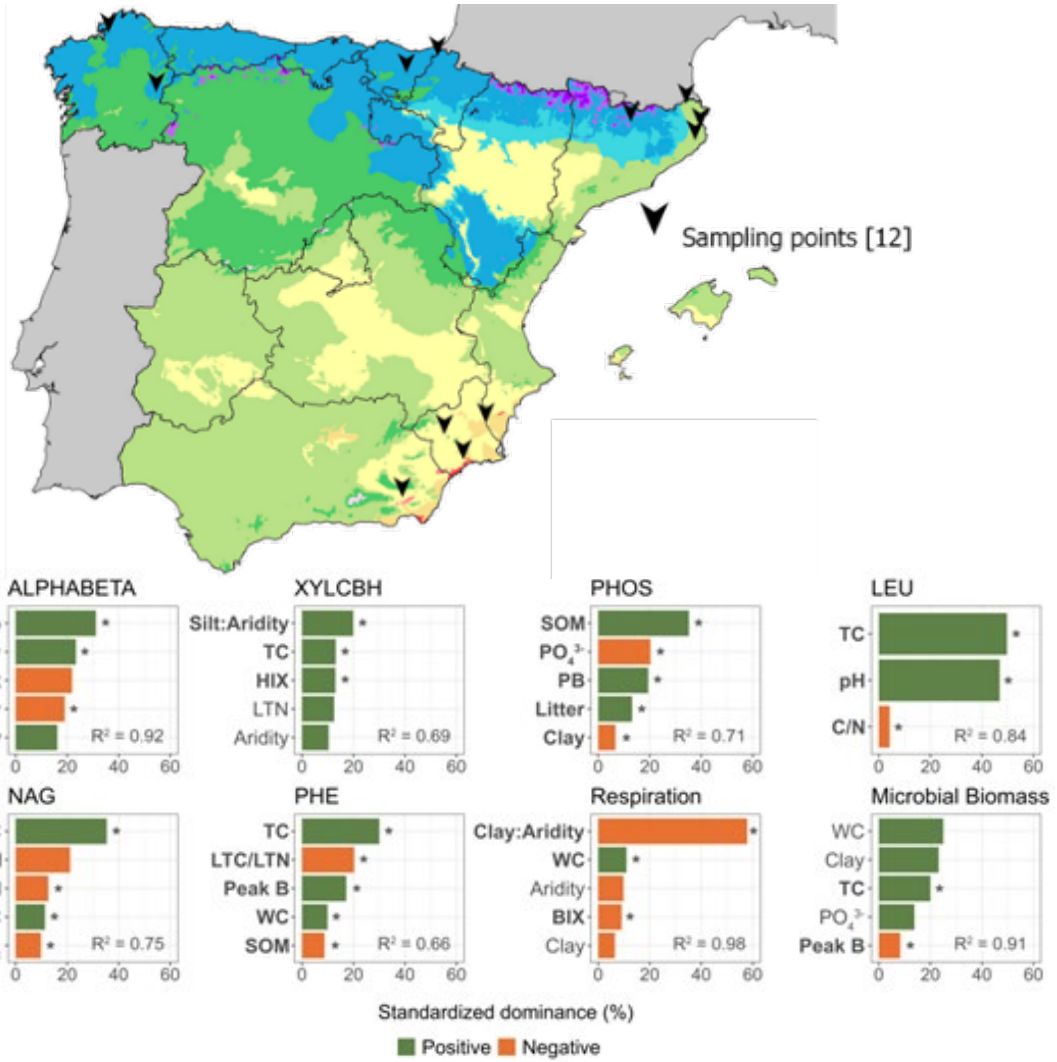


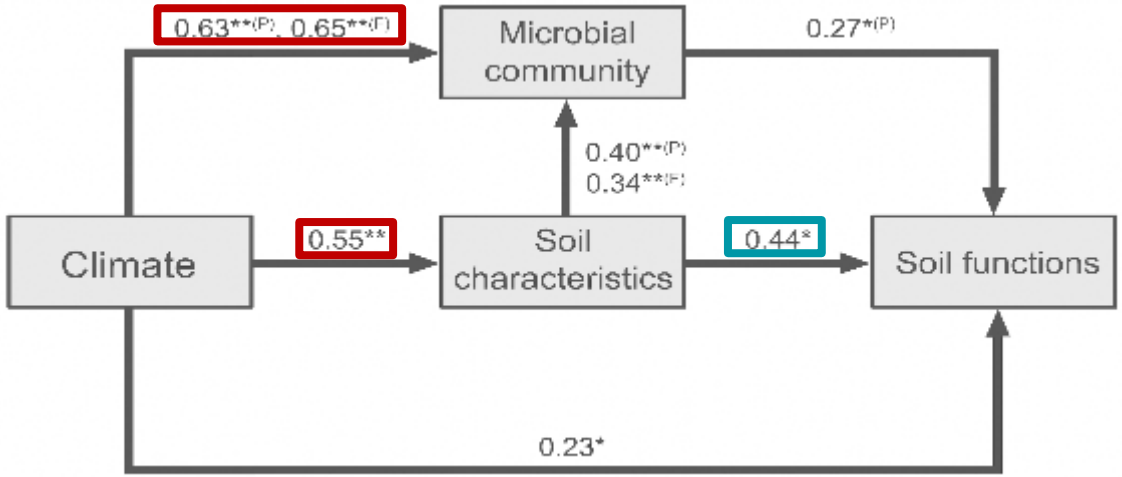


Scientific results

Soil functions are shaped by aridity through soil properties and the microbial community structure

Domenech *et al*., 2025, Geoderma under review





Aridity directly shapes microbial community composition and soil characteristics

Soil functions are primally affected by soil characteristics

Indirect effect of aridity soil functions

Climate policies must be site-specific to protect soil functioning and terrestrial ecosystem health

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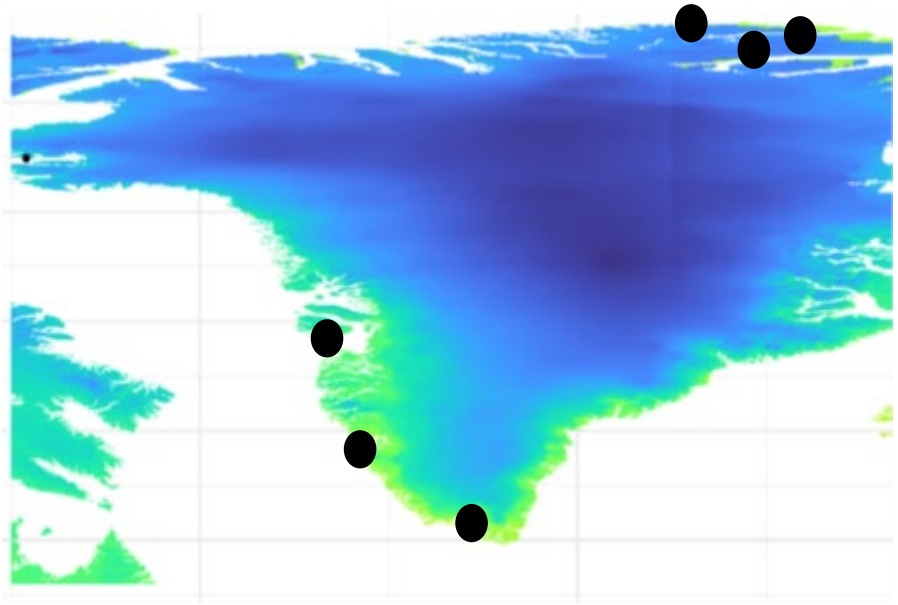
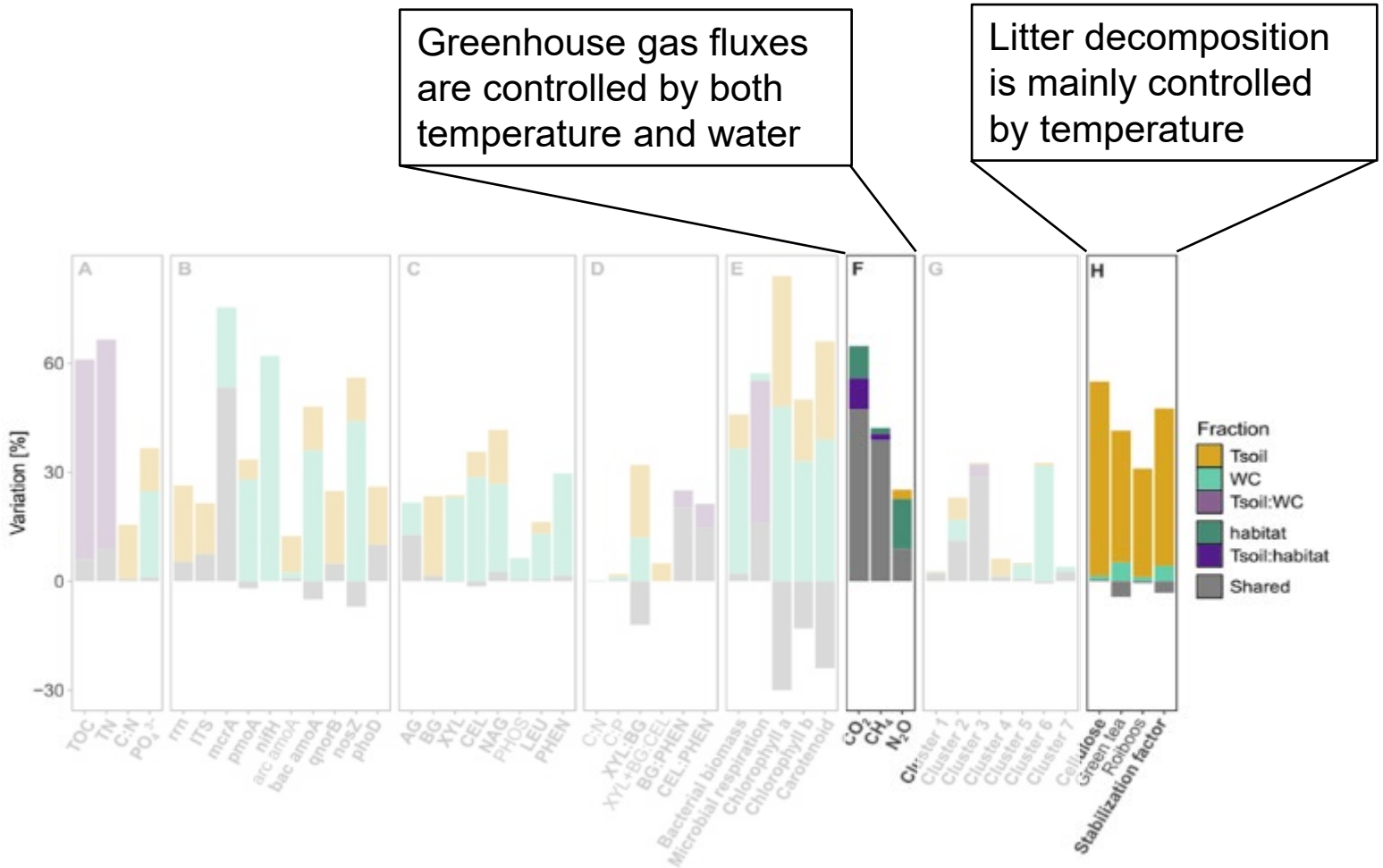
Scientific results

Disentangling the climate change components temperature and water availability

Donhauser *et al.*, in prep.



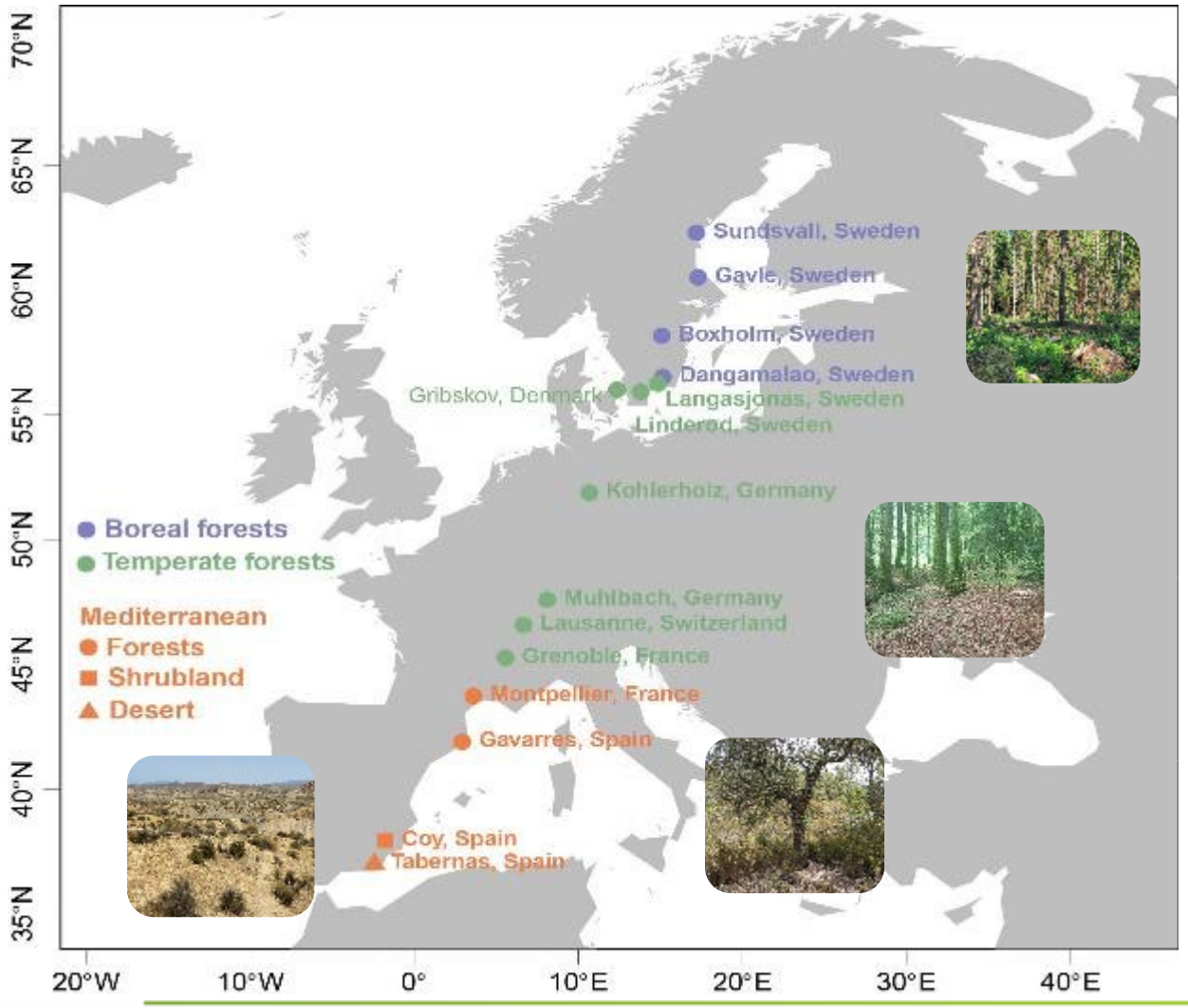
Contributions of temperature and water to microbial and soil functions

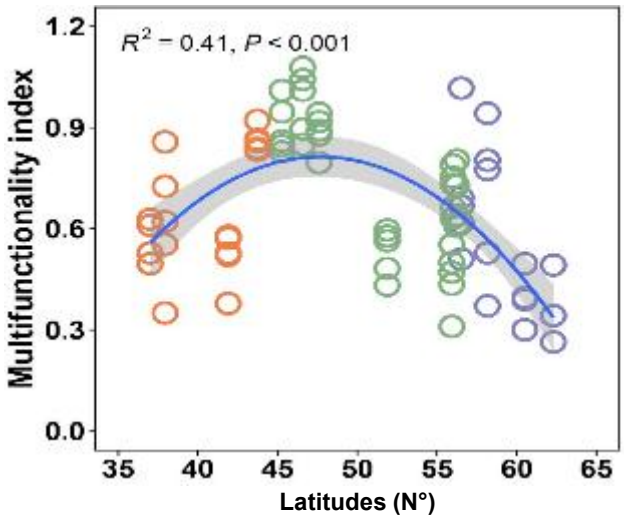


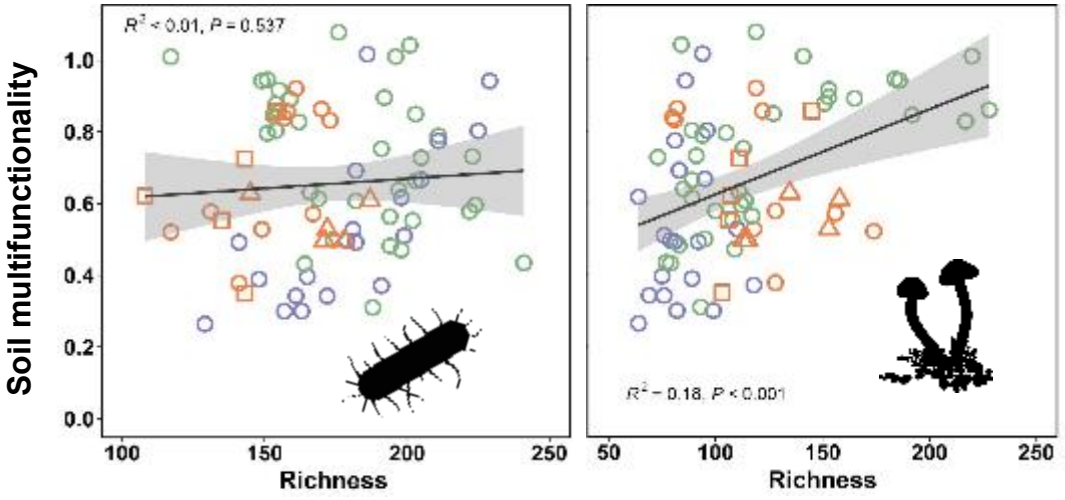
Scientific results

Fungal diversity sustained soil multifunctionality across European biomes

Han *et al*., 2025, under review







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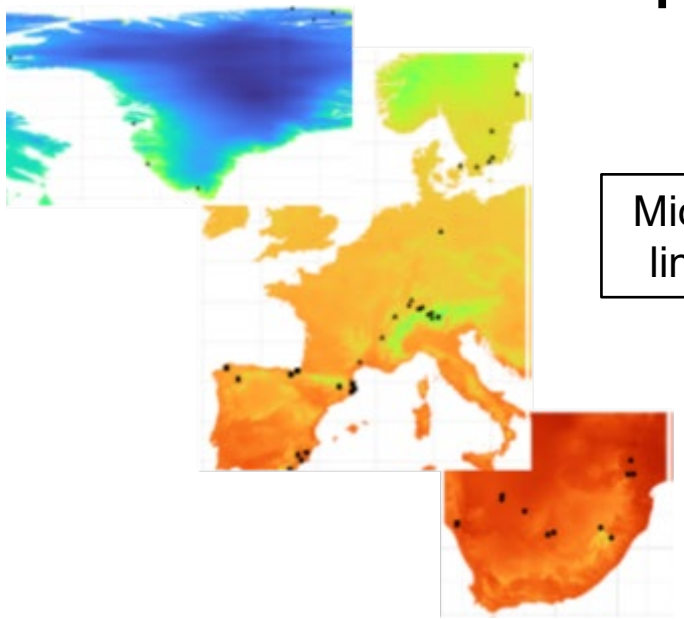
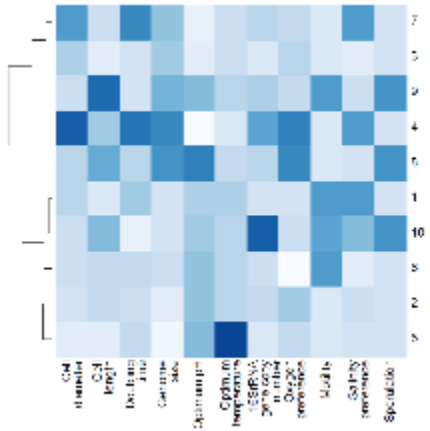
Scientific results

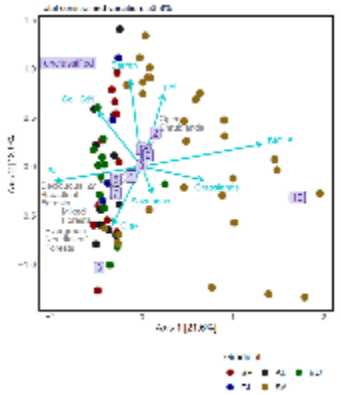
Modelling soil prokaryotic traits across environments with the trait sequence database *ampliconTraits* and the R package *MicEnvMod*

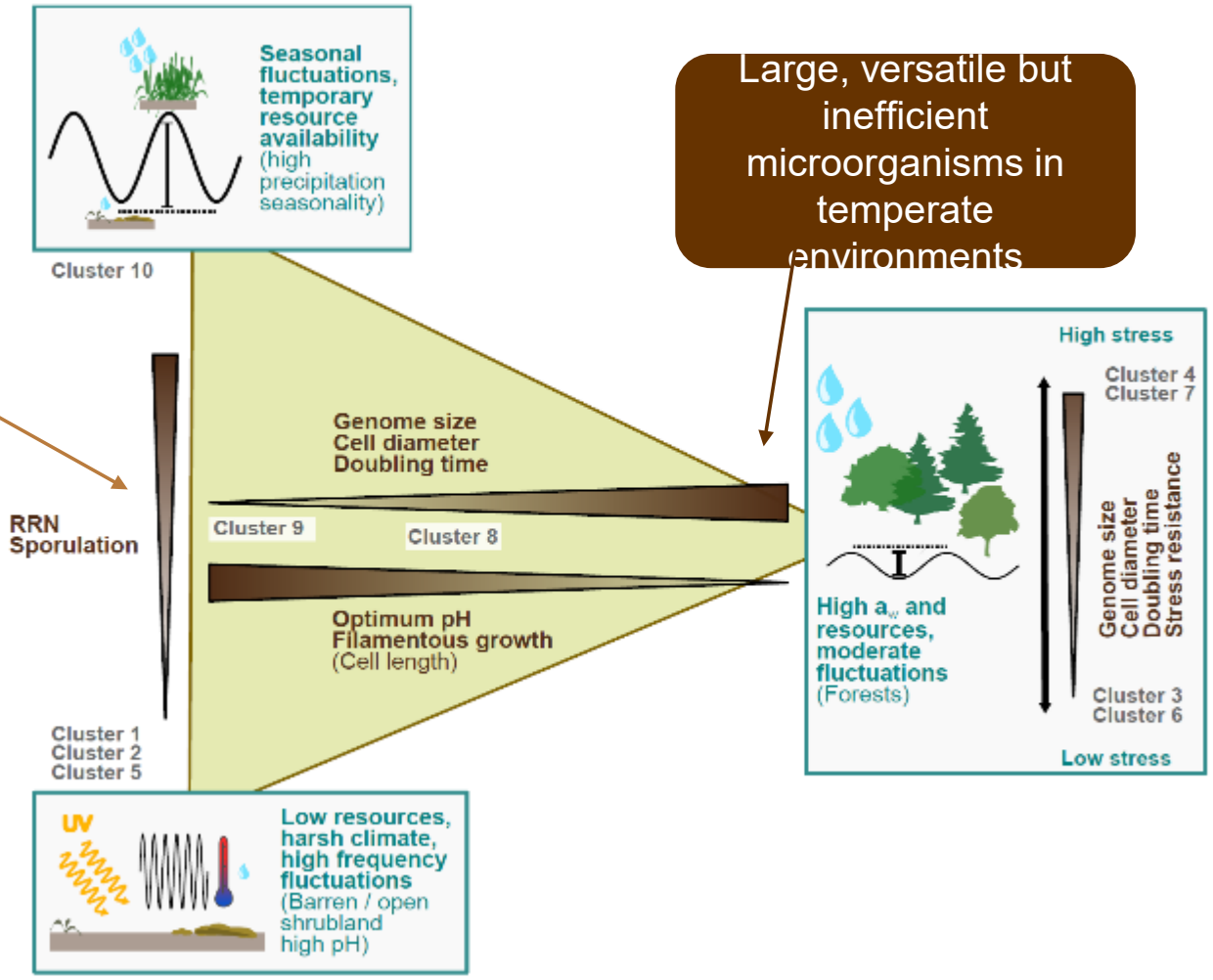
Donhauser *et al.*, 2025, Ecological Informatics and Donhauser et al., under review



Microbial trait strategies linked to soil functions







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Policy and societal impacts

- “Core” science project, limited direct policy and societal impacts.
- Mainly interactions with local stakeholders
- Involvements with national organisations and NGOs (sharing information, datasets, monitoring schemes)
- Divulgation documents with information on key roles of soil biodiversity and functions to the environment and their sensibility to climate change.

Acknowledgements

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science, technology & innovation
Department:
Science, Technology and Innovation
REPUBLIC OF SOUTH AFRICA

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FutureArcticLives

Future Arctic livelihoods and biodiversity in a changing climate

By Martin Reinhardt Nielsen

Göran Bosted, Camilla Bratland, Carina Keskitalo, Birger Poppel, Anne Borge Johannesen, Kåre Hendriksen, Birgitte Hoffman, Maria Petterson, Stine Rybråten, Henrik Meilby, Bente Sundsvold, Arne Eide, Irmelin Slettemoen Helgesen and Mona Estrella Bachmann

Panel discussion - Session 1

Moderated by ***Petra Manderscheid**, Executive Director of the JPI Climate Central Secretariat*

- ➔ What do we mean by 'feedback processes' in the context of climate change and biodiversity?
- ➔ How can we keep stakeholders engaged when results take time? What can we do to avoid stakeholder fatigue and deal with the limits of engagement?
- ➔ How can we better communicate the complexity of climate-biodiversity feedbacks (or in general) to non-scientific audiences, especially when findings are uncertain or context-dependent?

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[15:40 - 17:20]

Funded Projects Presentations – Session 2

Consequences of climate change on biodiversity and nature's contributions to people

Moderated by ***Jasmin Godbold,*** *Professor in Marine Ecology at the University of Southampton*

Presented projects - Session 2

- **ACORN**, Identifying seed sources for highly adaptable oak forests in a changing climate, presented by *Simon Jansen*
- **BIOFAIR**, BIOdiversity of soils and FArming Innovations for improved Resilience in European wheat agrosystems, presented by *Pierre Delaplace*
- **CLAMBIO**, Assessing the effects of past and future climate change on Amazonian biodiversity, presented by *Hanna Tuomisto*
- **MICROSERVICES**, Predicting climate change impacts on the crop microbiome and cascading effects on ecosystem services delivery in agroecosystems, presented by *Salvador Lado*
- **PlantCline**, Adapting Plant genetic diversity to Climate change along a continental latitudinal gradient, presented by *Johan A. Stenberg*
- **RangeX**, Mechanisms underlying the success and impacts on biodiversity and ecosystem functioning of range-expanding species under climate change, presented by *Paul Kardol*

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ACORN
Identifying seed sources for highly adaptable oak forests in a changing climate

Presented by: Dr. Simon Jansen

Project consortium:

BOKU University, Vienna [AT]

Aristotle University of Thessaloniki AUTh [GR]

Swiss Federal Research Institute WSL [CH]

Forest Research Institute Baden-Württemberg [DE]

National Botanical Garden of Turkey [TR]

Middle East Technical University, Ankara [TR]

Austrian Institute of Technology [AT]

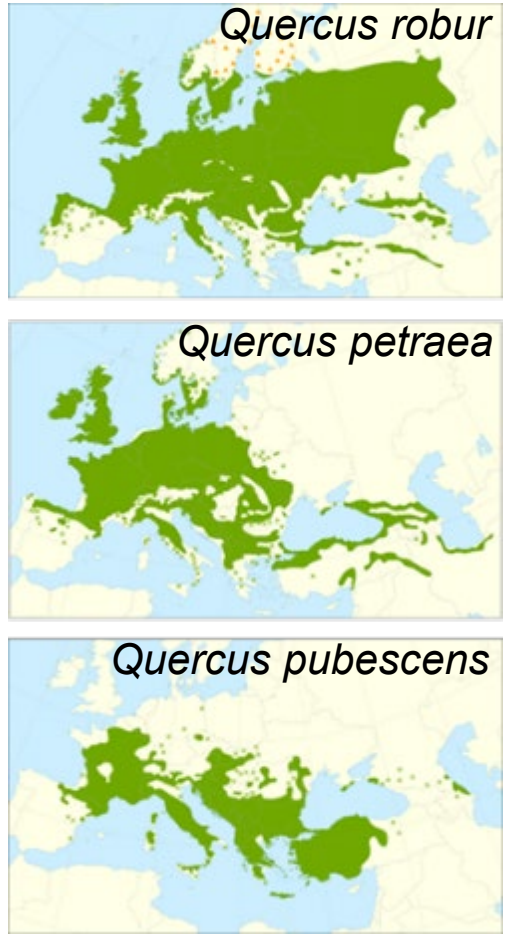
Context and Aims

Climate change

Oaks = Winner

Local adaptation

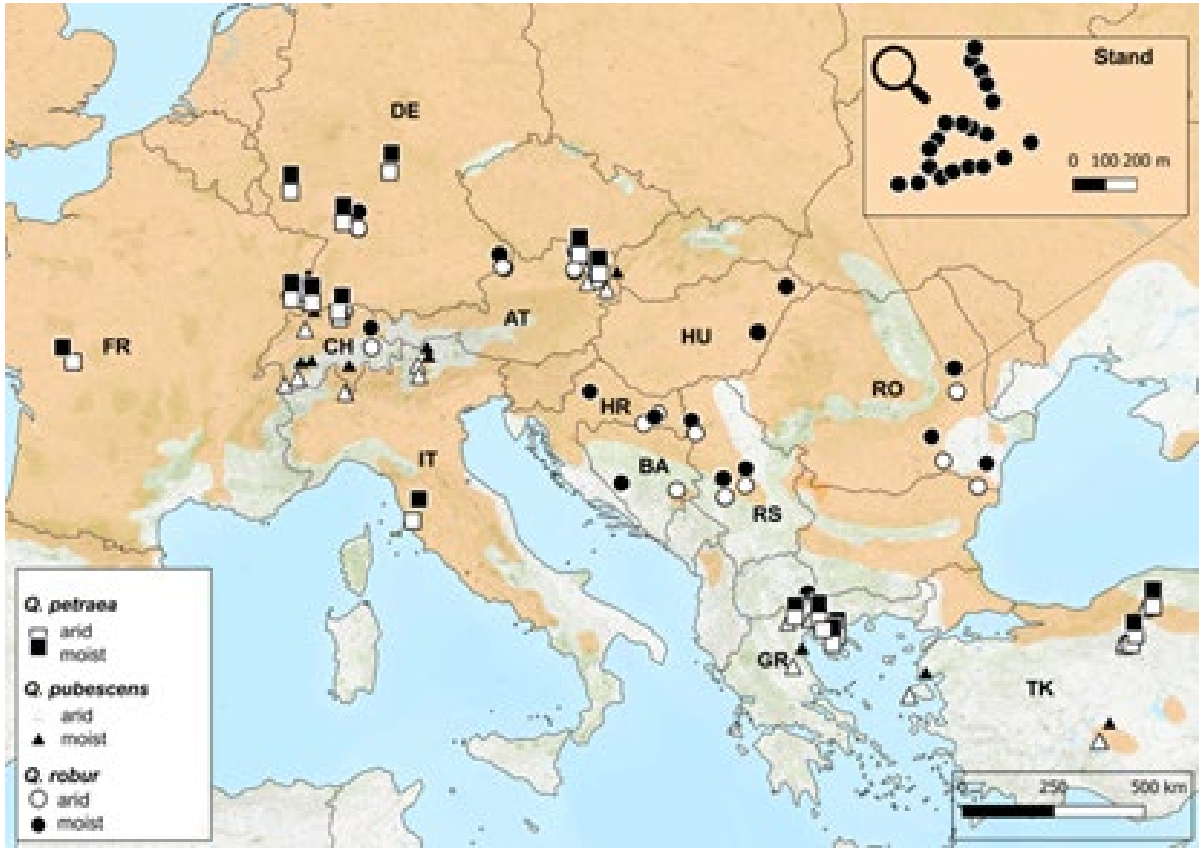
⇨ **Inform seed transfer guidelines**



Source: EUFORGEN

Methodological Approach

The big picture…



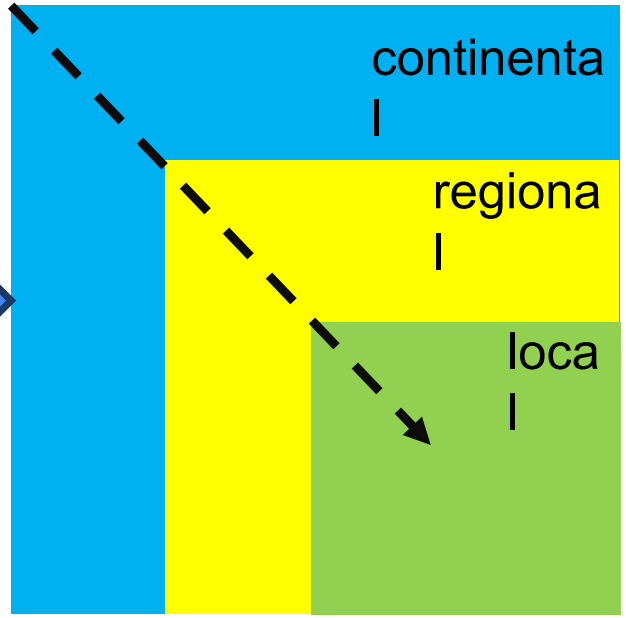
- Species complex
- Demographic history
- Spatial genetic structure

Methodological Approach

The small picture…

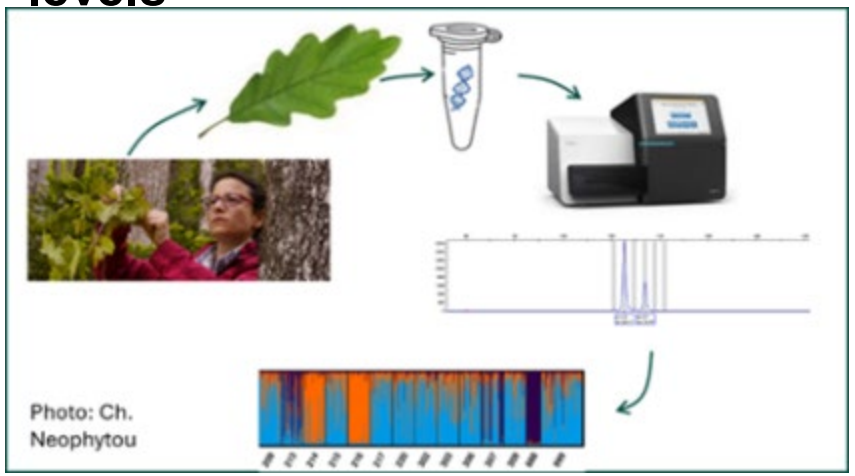
Neighboring stands of Q.petraea on contrasting sites in SW Germany

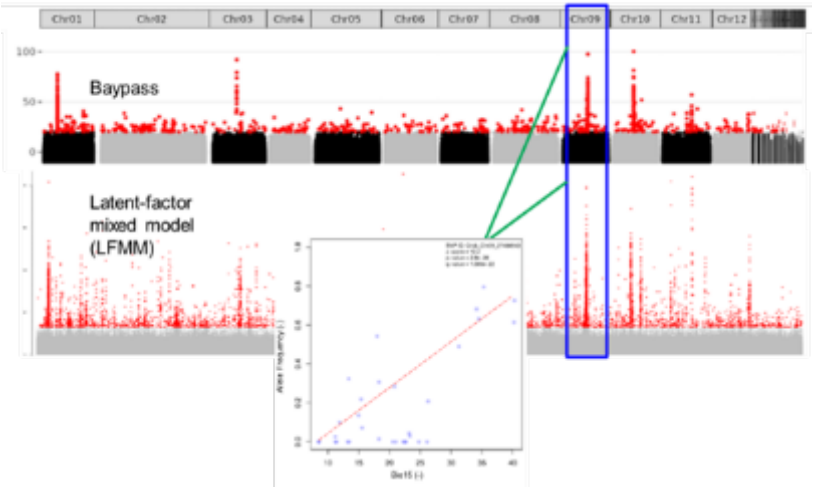
Adaptation?



Methodological Approach

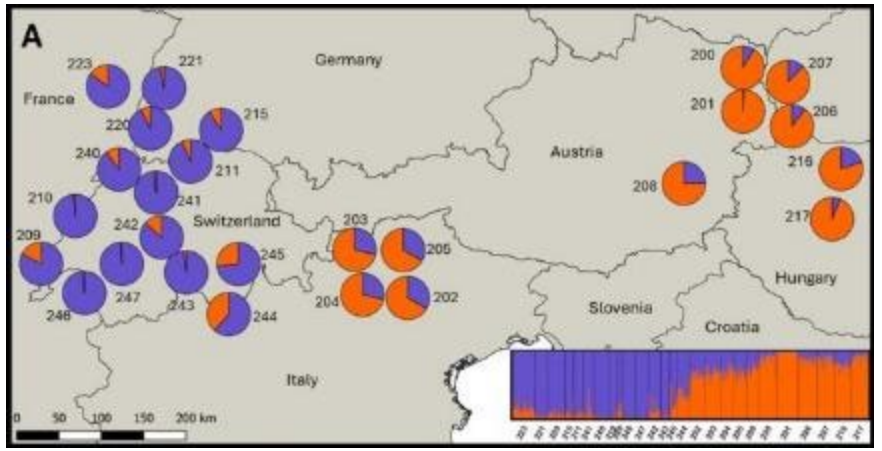
Genetic and genomic studies on different levels



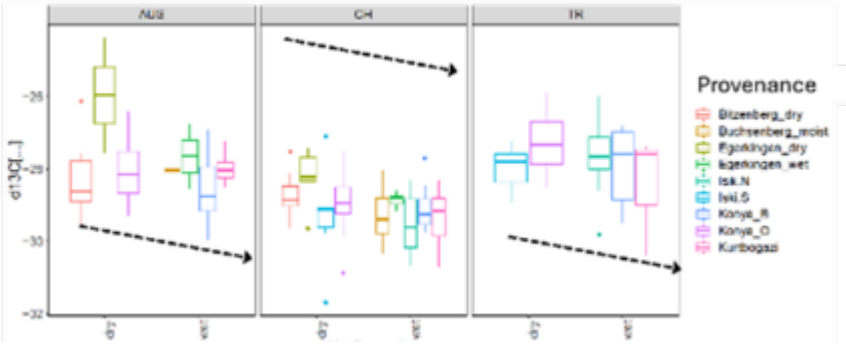


Scientific Results

- **Genetic differentiation between species**
- **Regional genetic differentiation within species**
- **Certain alleles correlate with precipitation (Large-Scale)**
- **Small scale differences in water use efficiency ($\partial^{13}C$)**

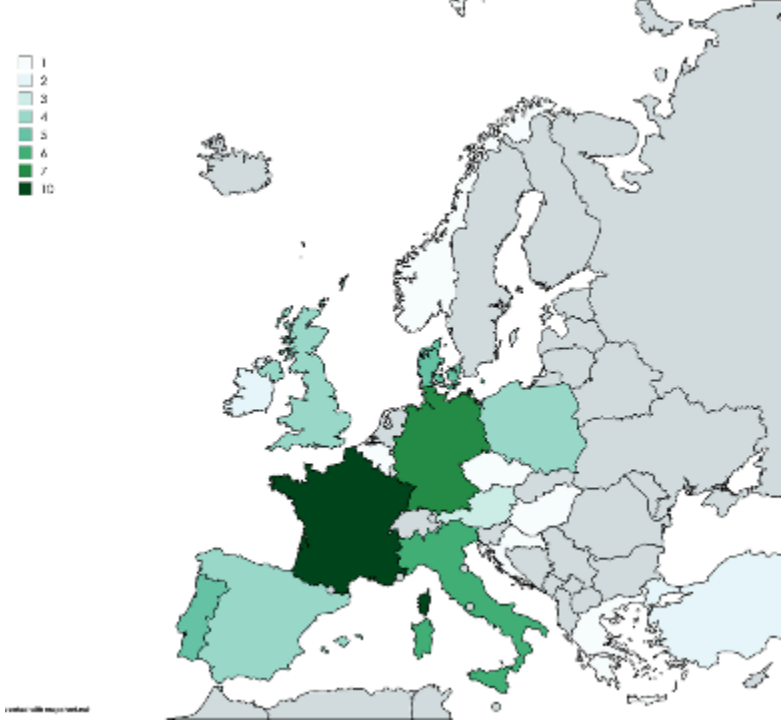


Pütz et al. (2024) Annals of Botany

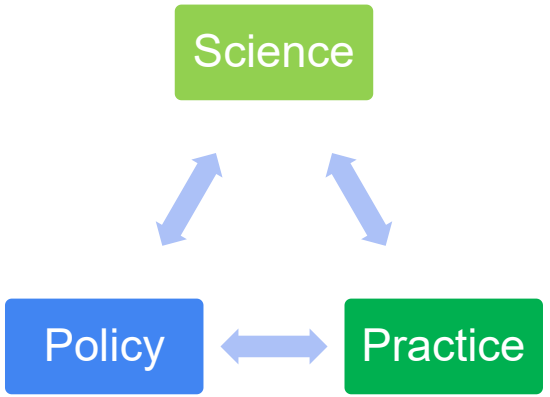


Adaptation takes place across geographical scales !

Policy and Societal Impacts / Results



- **Genetic information (neutral and adaptive) should be used for evaluating adequate seed sources**
- **Assisted geneflow is a promising tool to maintain sustainable forest management in climate change**
- **Ecologically marginal sites often neglected, but may have great potential**
- **Forest reproductive material regulations are mostly focused on local seed sources**
- **Knowledge gaps and transferability**



Acknowledgements

Thanks to all who contributed to the presented research:
In the lab, in the field, in the office.

Thanks to the funding bodies for the support!

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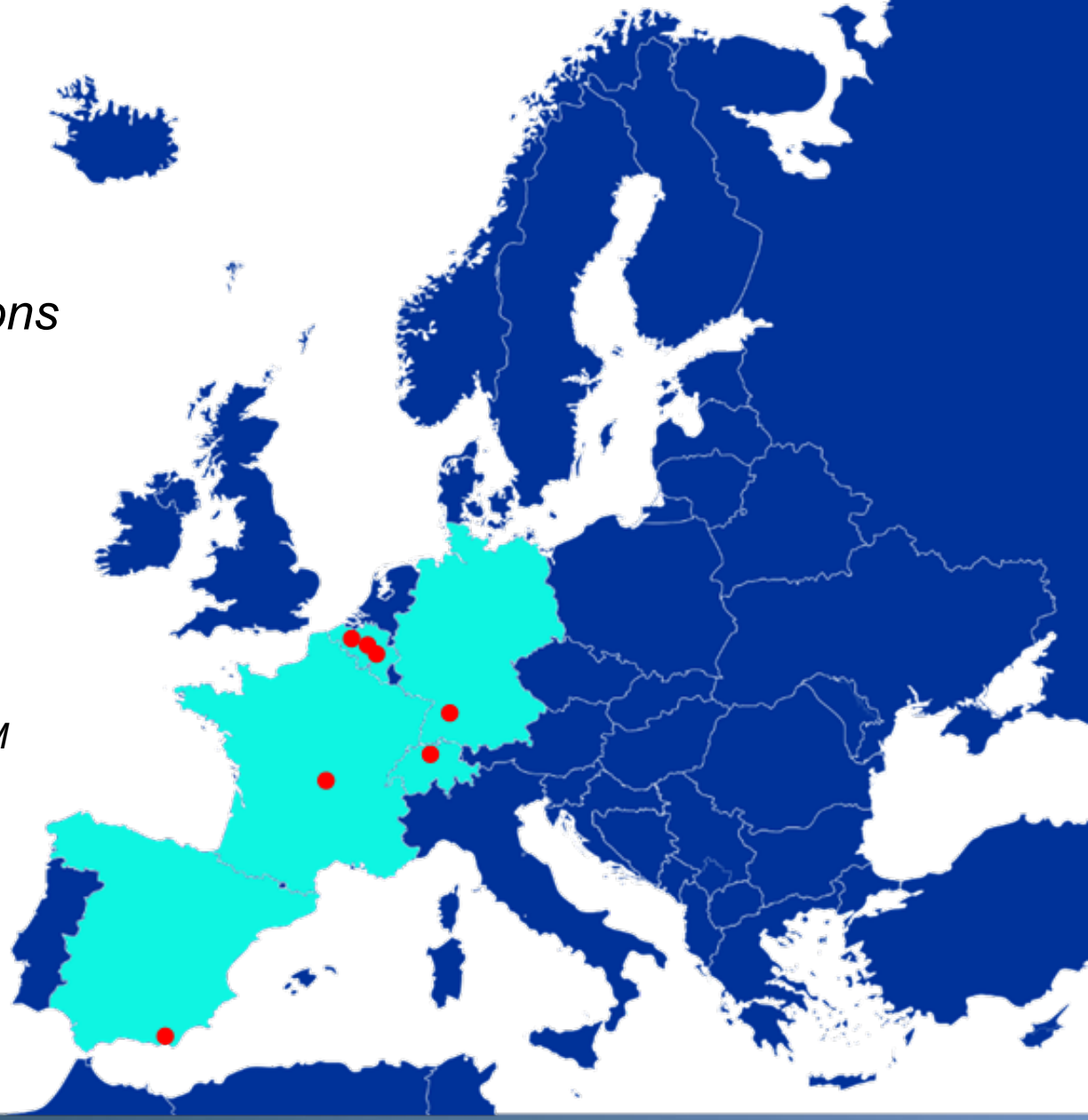
BIOdiversity of soils and FArming Innovations for improved Resilience in European wheat agrosystems

BIOFAIR



Coordinated by
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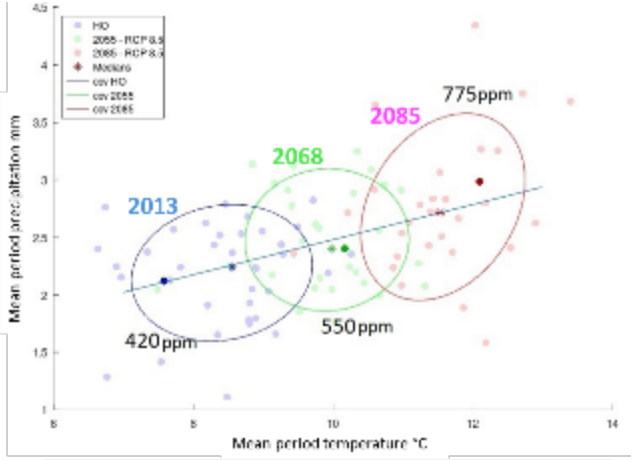
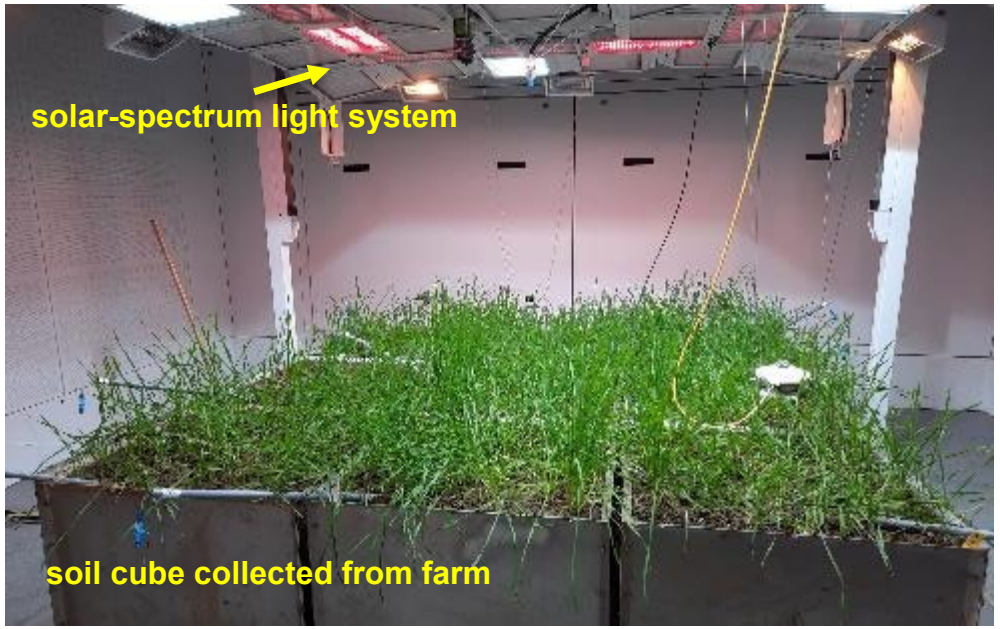
FiBL Switzerland – Frick – SWITZERLAND
FiBL Europe – Brussels – BELGIUM
Hohenheim University - Stuttgart – GERMANY
Ghent University – Ghent – BELGIUM
CSIC – Almería – SPAIN
INRAE – Clermont-Ferrand - FRANCE

Project goals and methodology

- Assessing the impacts of **climate change** and **innovative farming practices** on plant productivity, nutritional quality and fitness.
- Studying the **soil functioning** and the related soil microbiome as well as micro- and meso-fauna **biodiversity**.
- Understanding the reported changes in **productivity**, **quality** value of the cereal grains and the **suppressiveness capacity** of such soils against **(a)biotic stresses**.



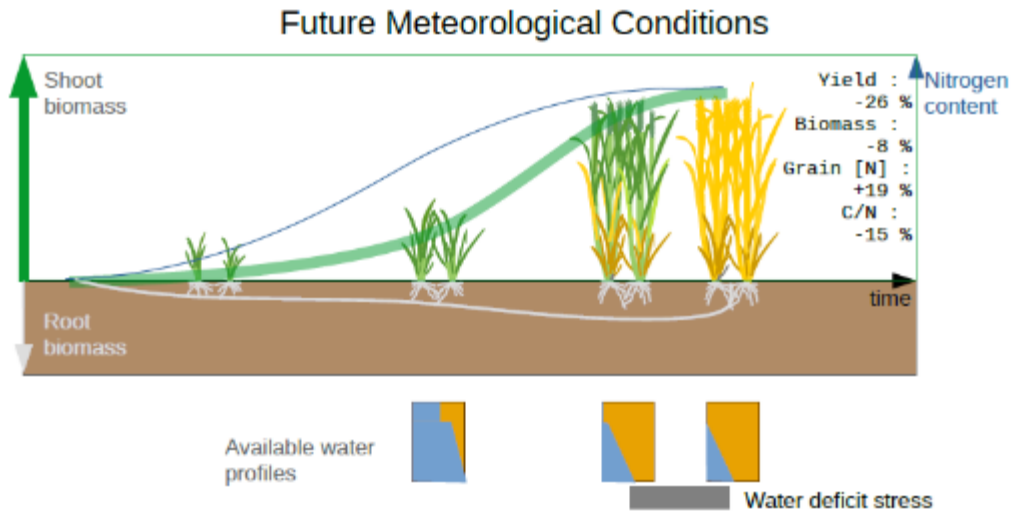
Harvest year	Mean temperature (°C)	Mean precipitation (mm)	Hydro-thermal Index (HI)
2013	7.59	2.12	3.98
2068	10.17	2.40	4.48
2085	12.10	2.98	4.74

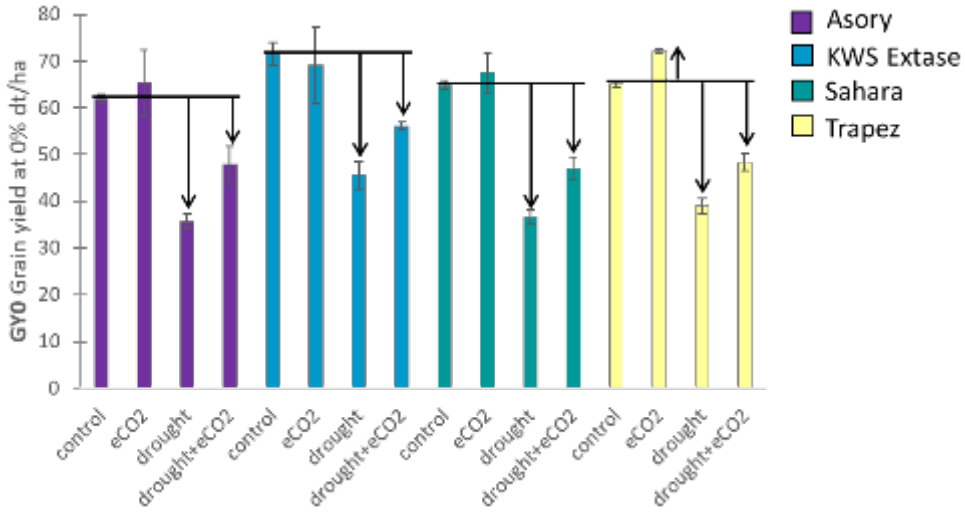


Scientific results

Impact of Climate Change (CC) on Wheat:

- Higher winter temperatures boosted biomass but reduced tillering, root development and yield.
- Elevated CO_2 (+4.1%) had minor yield benefit; impaired protein and baking quality.
- Drought significantly reduced yield (-40.4%); only partially offset by elevated CO_2.
- Climate treatments decreased gluten protein quality, altering dough strength.
- Root systems remain critical to cope with water stress.
- <u>Recommendation</u>: Breeding should target short-term climate scenarios and root traits.

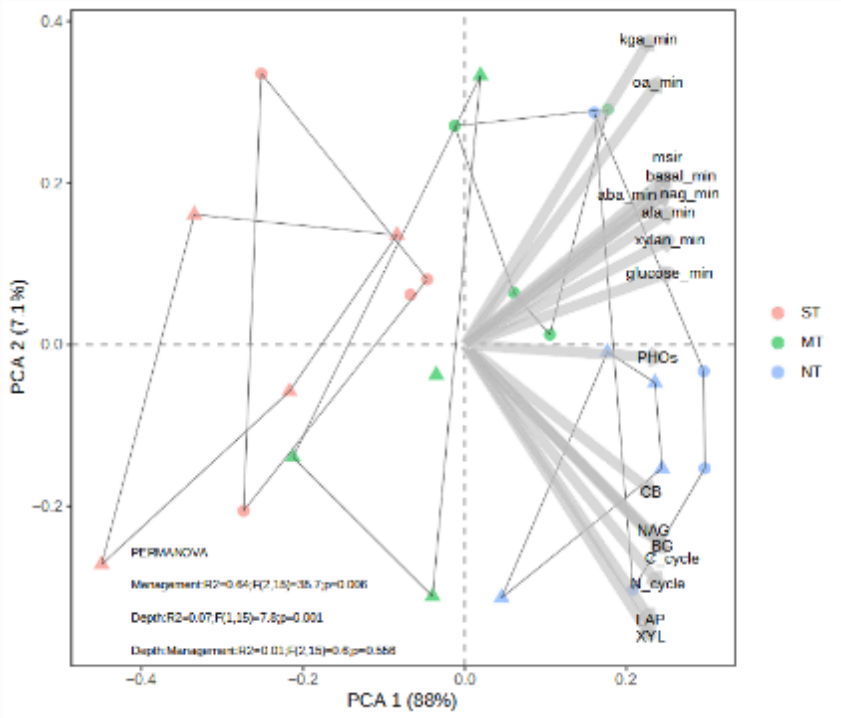


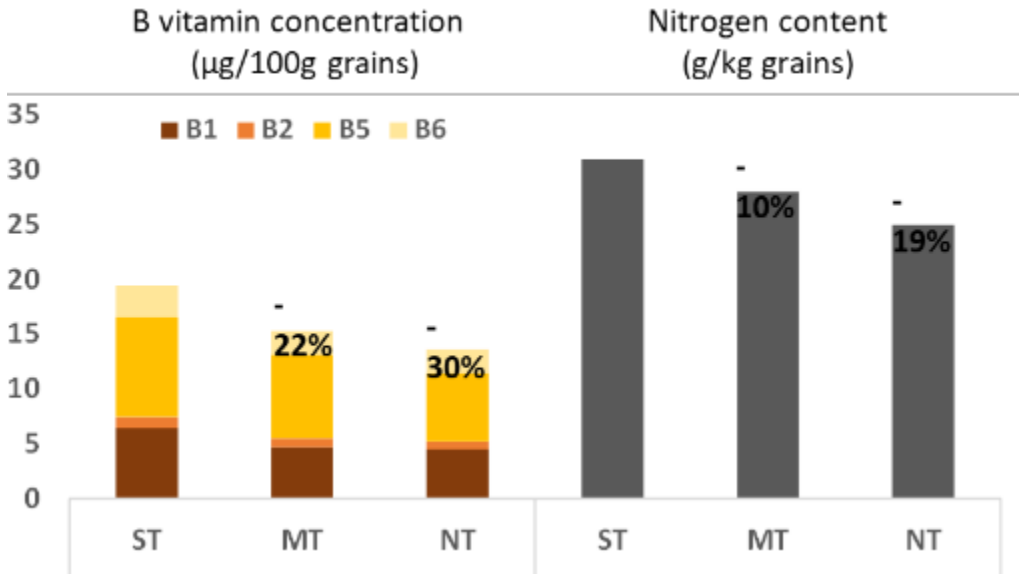


Scientific results

👩‍🌾 Farming Practices and Soil Biodiversity & Wheat:

- Tillage intensity (NT<MT<ST) shaped soil microbial and mesofauna communities.
- Reduced tillage increased microbial activity and soil functionality.
- Reduced tillage impaired wheat quality and changed technological grain properties.

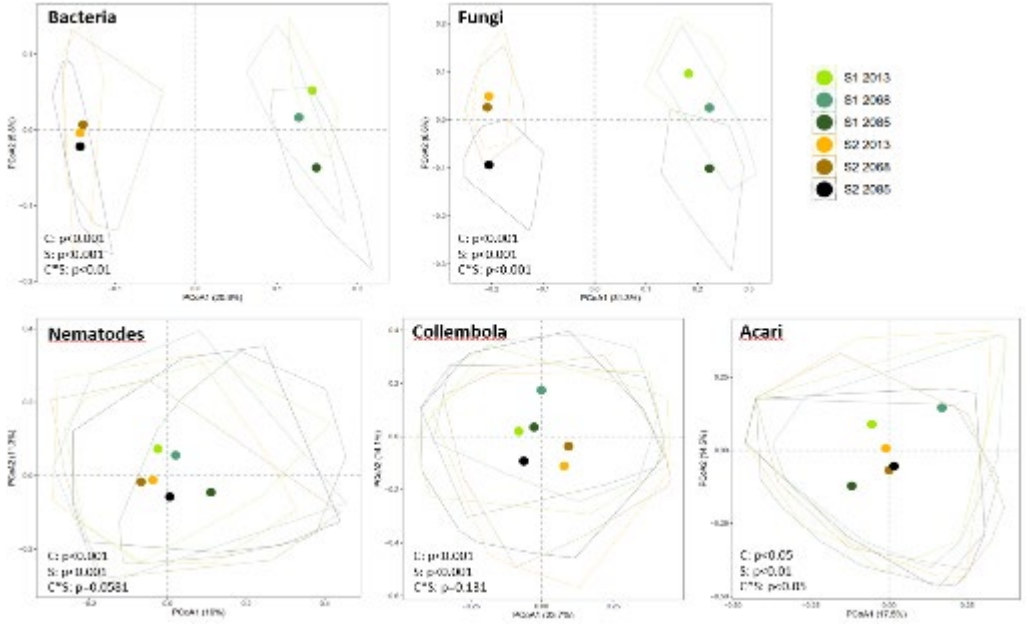


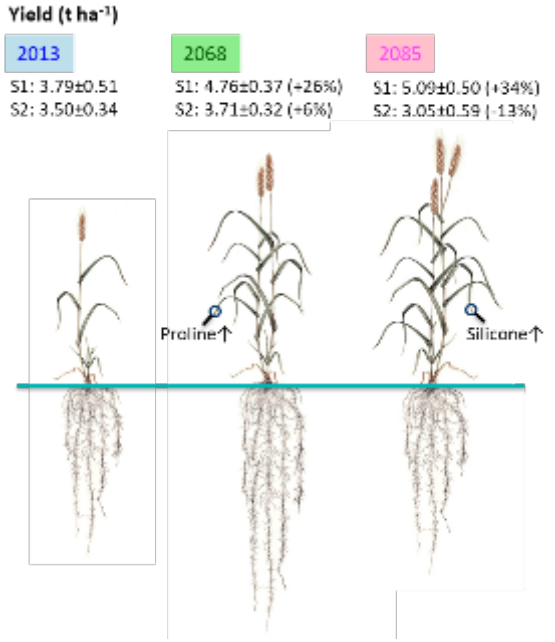


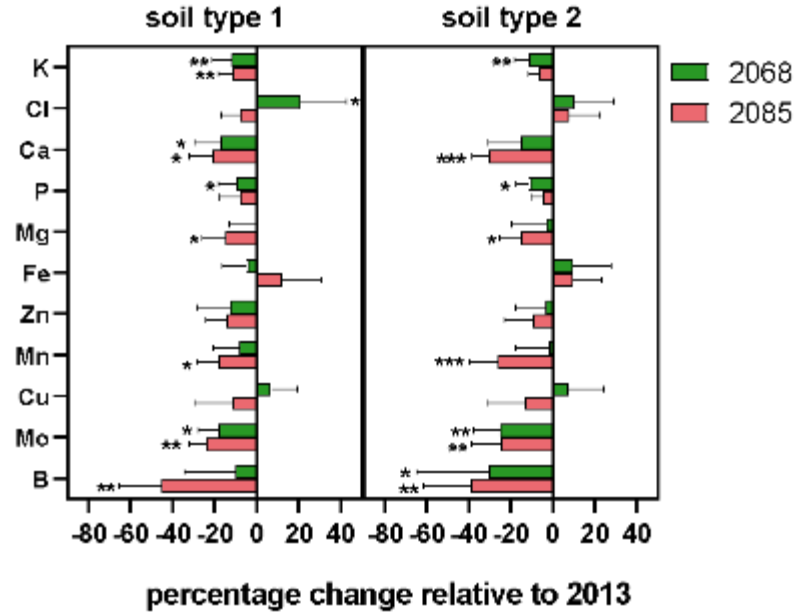
Scientific results

Resilience & Environmental Impact:

- Organic-rich soils (S2) buffered climate effects better than conventional soils (S1) - higher soil health indicators.
- This implies more stable microbial communities and improved nutrient cycling.
- The yield difference between both soils increased over time.
- Climate change negatively affects the nutritional quality of grains produced in both soil conditions.
- Recommendation: Combine biofortification, root-focused breeding, and integrated strategies.







Policy and societal impacts / results

🌡️ Climate Adaptation:

- Adapt breeding programs to short-term (20-year) climate projections.
- Include extreme weather events in scenarios and policy planning.
- Adjust vernalization and sowing schedules to match future conditions.

🌾 Sustainable Agriculture:

- Reduced tillage supports soil health and biodiversity.
- Practices impact GHG emissions and nitrate leaching, important for regulation.

🍞 Nutritional Security:

- Climate change reduces grain nutrient concentration (protein, vitamins, minerals).
- Policy focus should expand to include grain quality and public health.

🔎 Research Recommendations:

- Support speed breeding and integrated modelling.
- Link biodiversity to function using 'who does what and when' approaches.
- Promote systemic approaches considering crop performance and ecosystem services.

Acknowledgements

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- *FWO Research Foundation (Flanders)*
- *F.R.S. – FNRS (Wallonia)*
- *SNSF (Switzerland)*
- *ANR (France)*
- *AEI (Spain)*
- *DLR-PT (Germany)*

CLAMBIO
Assessing the effects of past and future climate change on Amazonian biodiversity

Coordinated by:

University of Turku, Finland (Hanna Tuomisto)

Consortium members:

Karlsruhe Institute of Technology, Germany (Florian Wittmann)

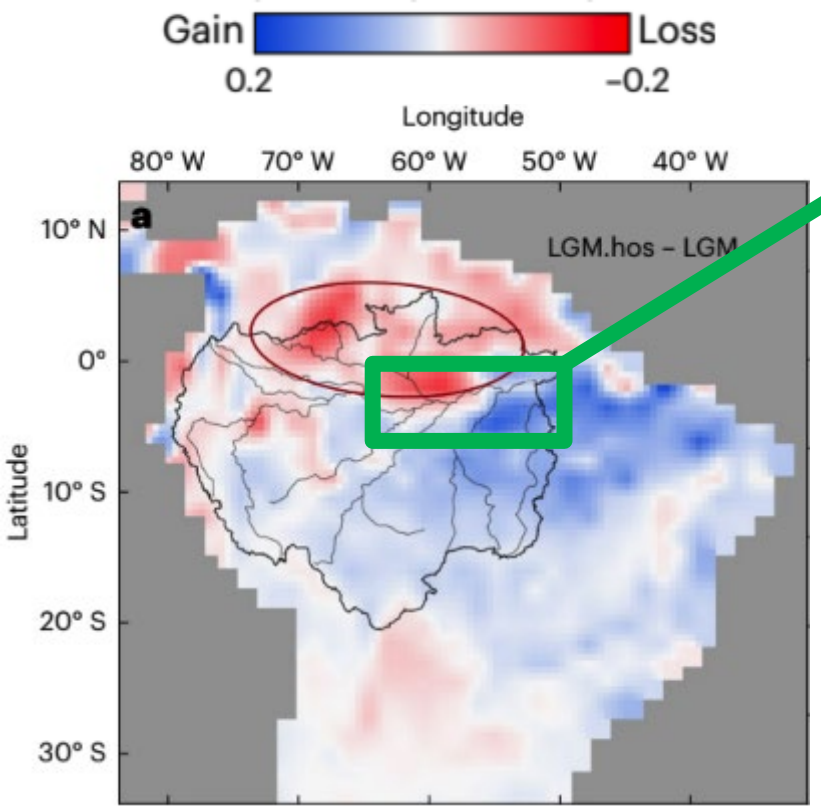
National Institute of Amazonian Research, Brazil (Camila Ribas)

University of São Paulo, Brazil (Cristiano Chiessi)

University of East Anglia, UK (Carlos Peres)

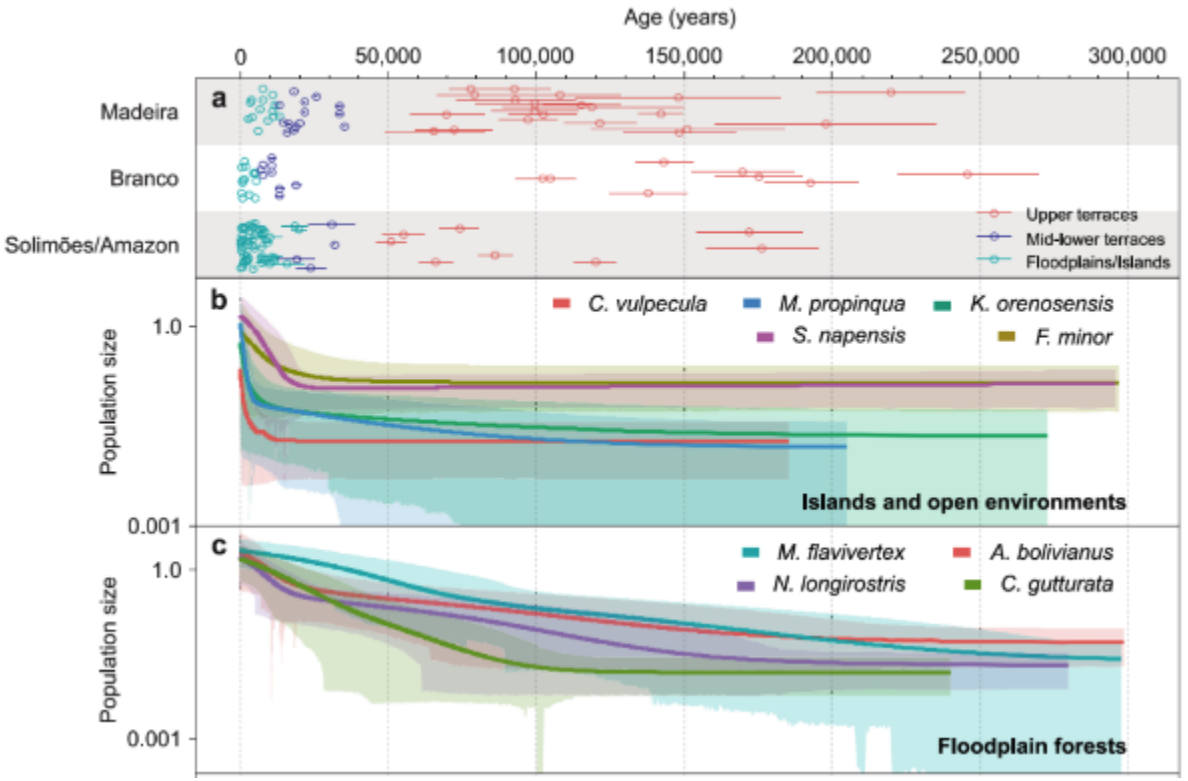
Scientific results

Change in climate suitability for tropical moist forest



https://doi.org/10.1038/s41561-024-01578-z

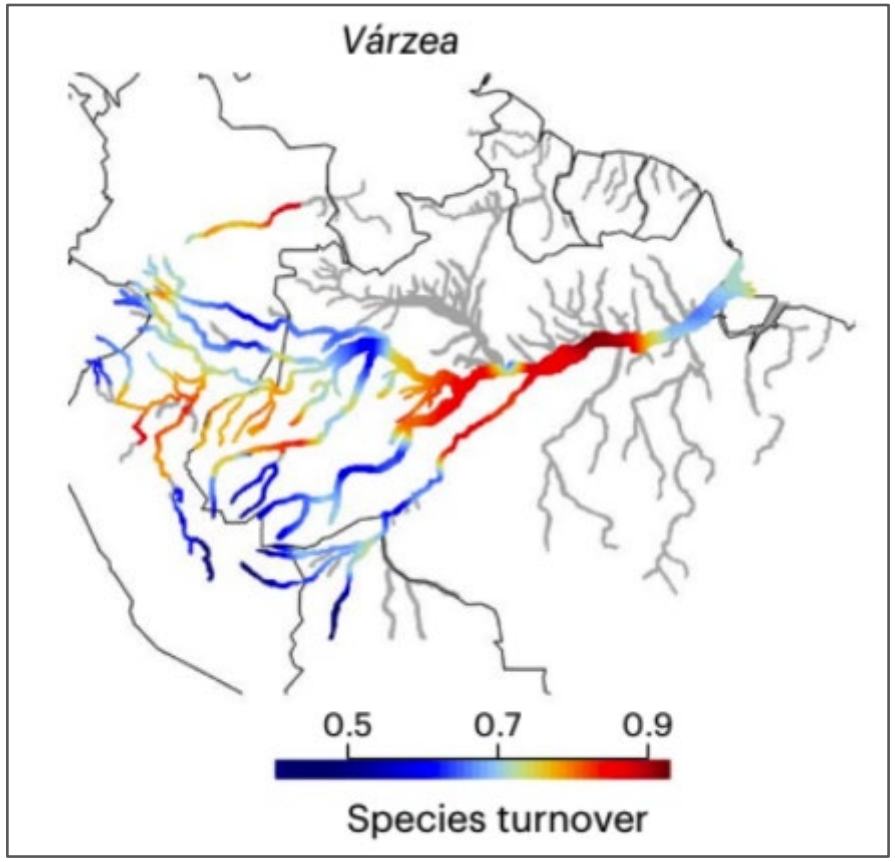
Sea level changes and floodplain dynamics affect bird genomics and population sizes



https://doi.org/10.1038/s41467-022-32561-0

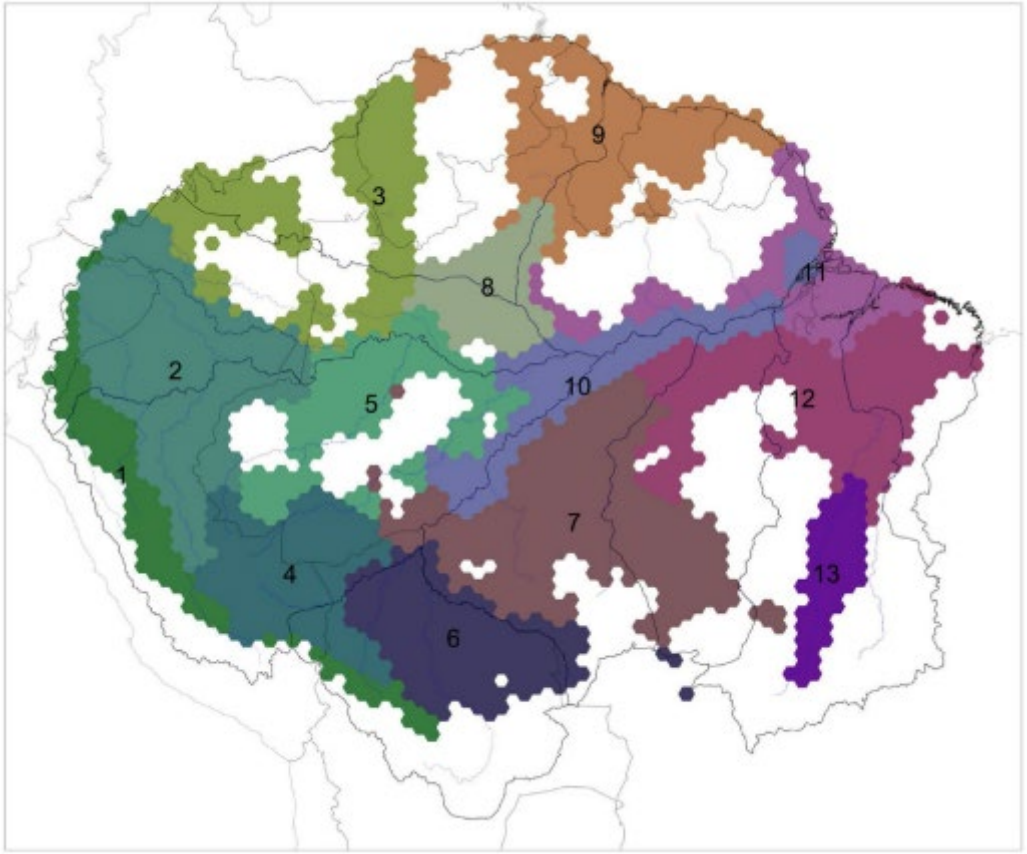
Scientific results

Floodplains have many specialised tree species, and the contrast with surrounding forests increases with flooding depth



https://doi.org/10.1038/s41559-024-02364-1

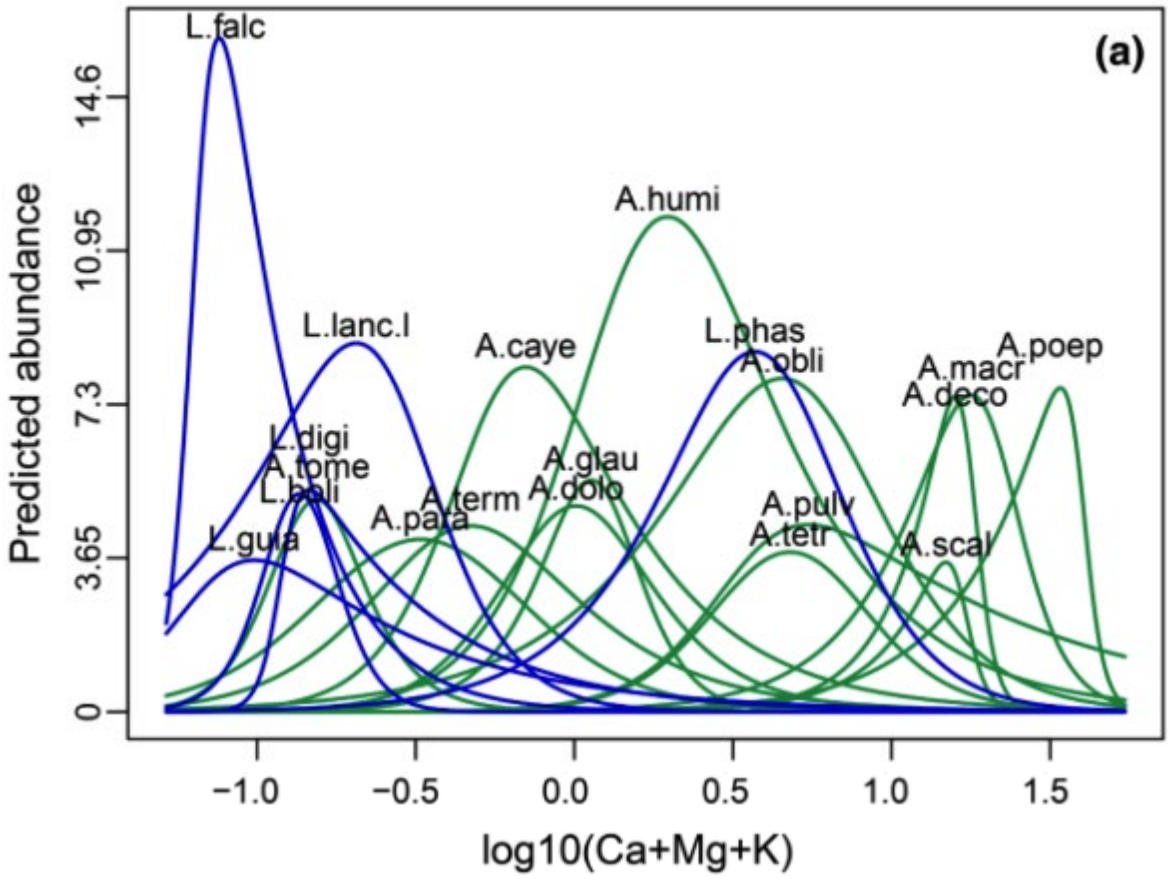
Biogeographical regionalisation fo Amazonia based on floodplain birds



https://doi.org/10.1016/j.pecon.2024.08.001

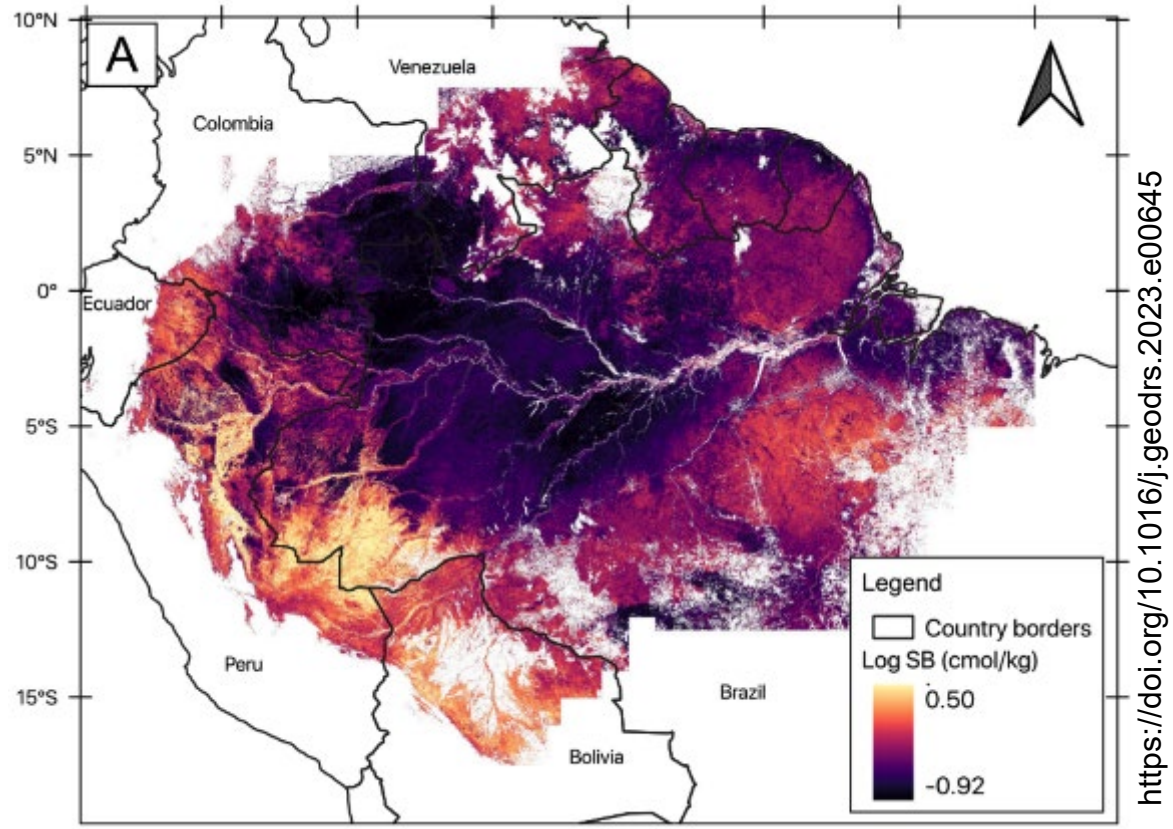
Scientific results

Amazonian plant species (here ferns) have well-defined soil niches



https://doi.org/10.1111/jvs.13307

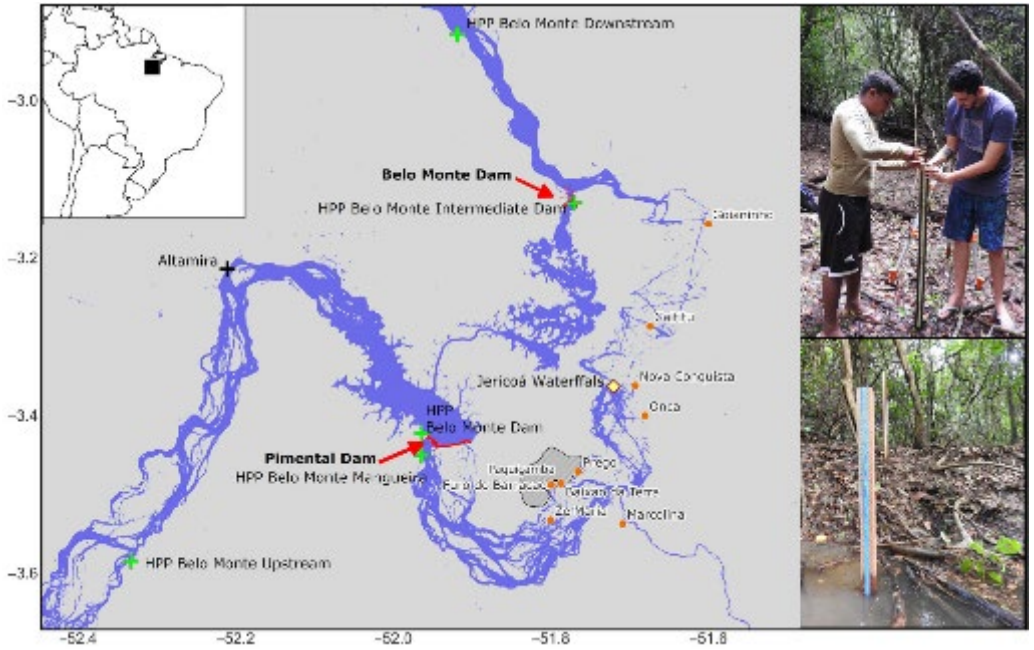
Soil properties modelled using soil samples, information on fern niches and ancillary information (e.g. satellite imagery)



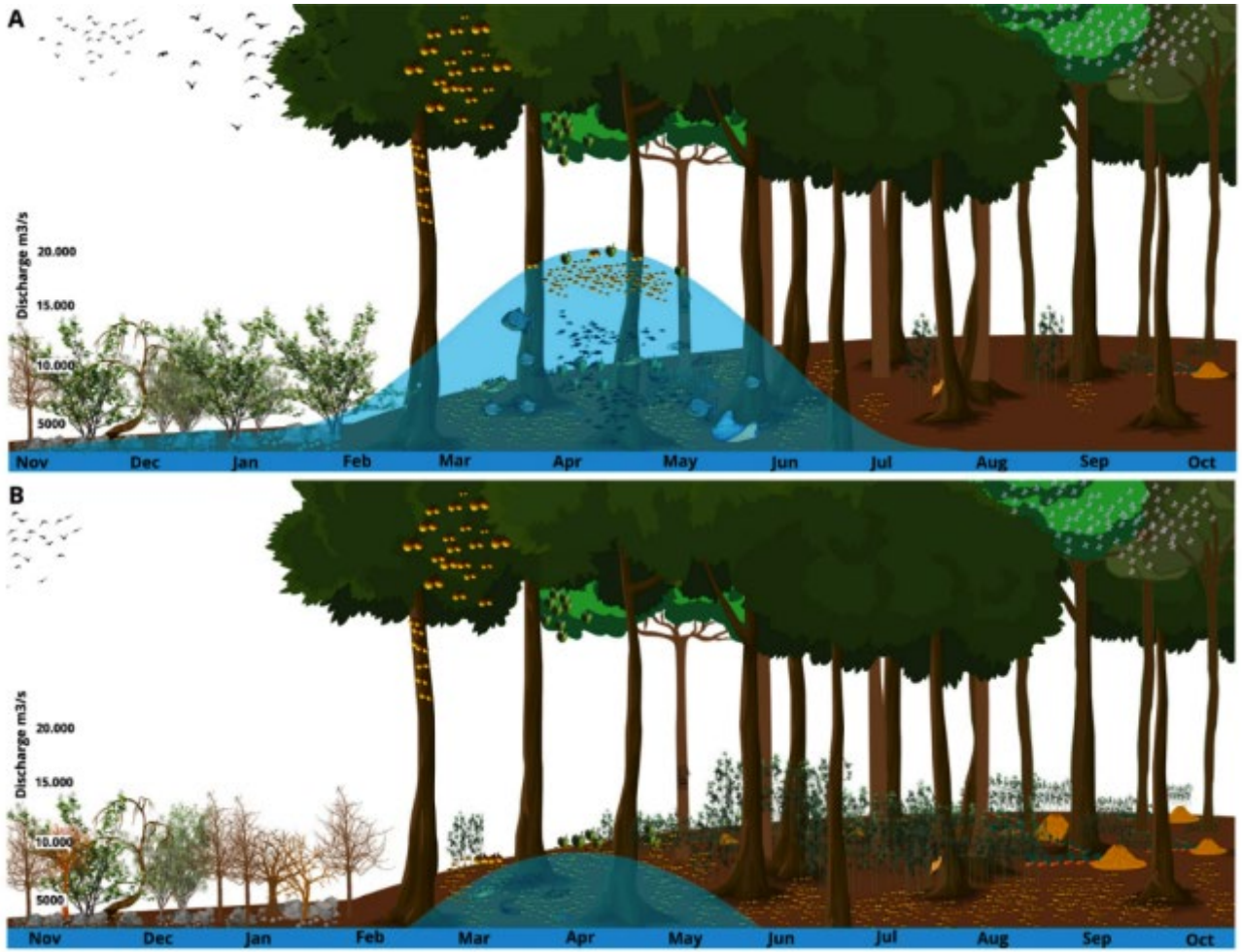
https://doi.org/10.1016/j.geodrs.2023.e00645

Policy and societal impacts / results

Hydroelectric dams have larger impact that companies claim on floodplain ecosystems and local livelihoods



https://doi.org/10.1111/cobi.70043



https://doi.org/10.1016/j.pecon.2025.02.001

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DFG Deutsche Forschungsgemeinschaft

FAPESP
SÃO PAULO RESEARCH FOUNDATION

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MICROSERVICES

Predicting climate change impacts on the crop microbiome and cascading effects on ecosystem services delivery in agroecosystems

By Salvador Llado (University of Barcelona, formerly LEITAT)

Martin Hartmann (ETH Zürich), Jochen Mayer (Agroscope), Gabriele Sacchettini (European Landowners' Organization), Laurent Philippot (INRAE), Charalampos Kontoes (National Observatory of Athens), Rainer Jörgensen (University of Kassel)

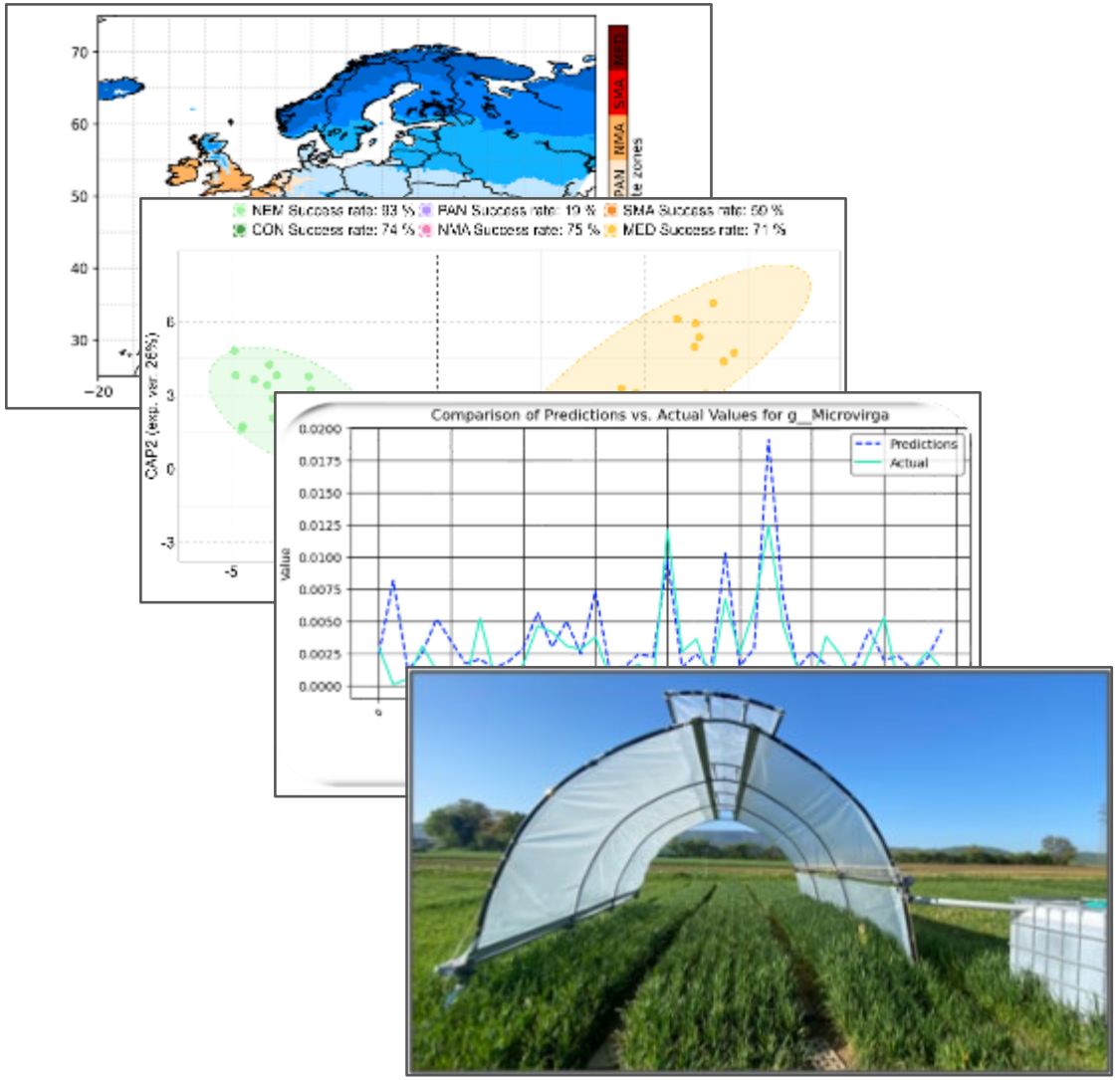
Objectives

1. Predict future shifts in agro-climate zones across Europe using high-resolution regional climate models

2. Characterize shifts in soil biodiversity along agro-climate zones using LUCAS Soil Data

3. Develop AI-based prediction models to forecast soil biodiversity and ecosystem functions under future climates scenarios

4. To evaluate the capacity of organic cropping systems to buffer against climate stress using on-field simulation in a long-term field trial



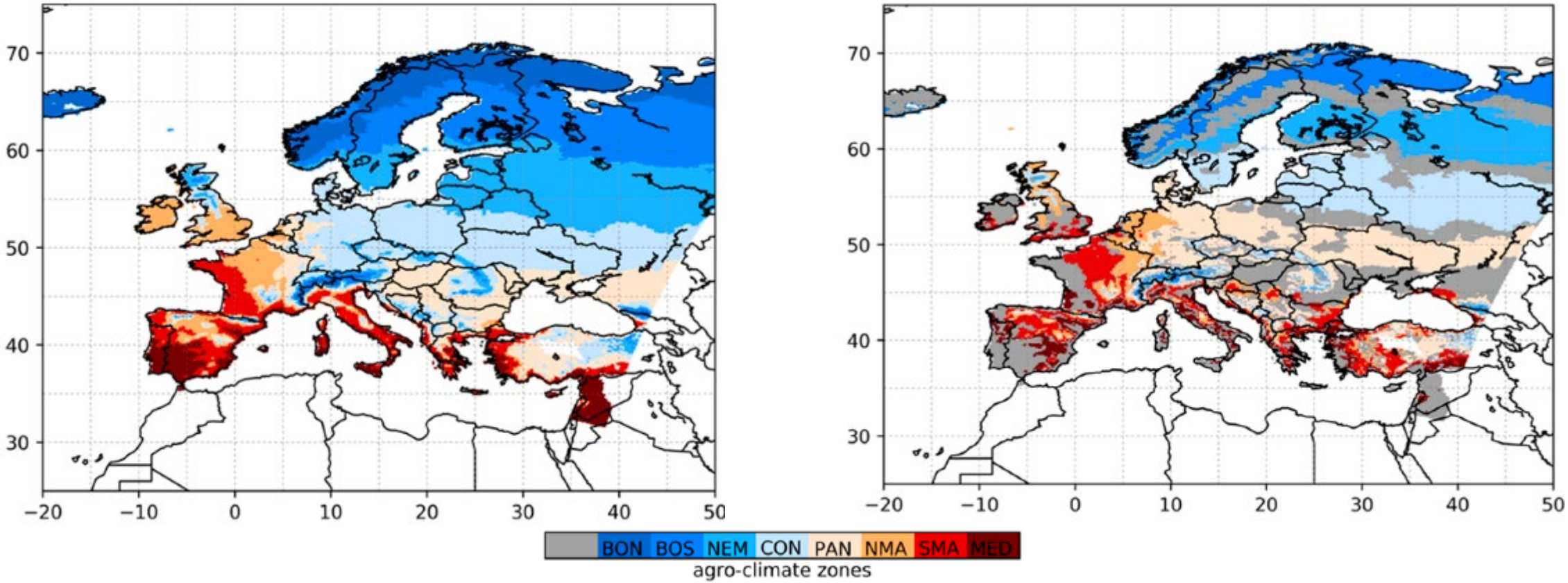
Scientific results

Current Agro-climate zones

Future changes in Agro-climate zones

Historical reference period (1981-2010)

Emission scenario RCP4.5 (2071-2100)



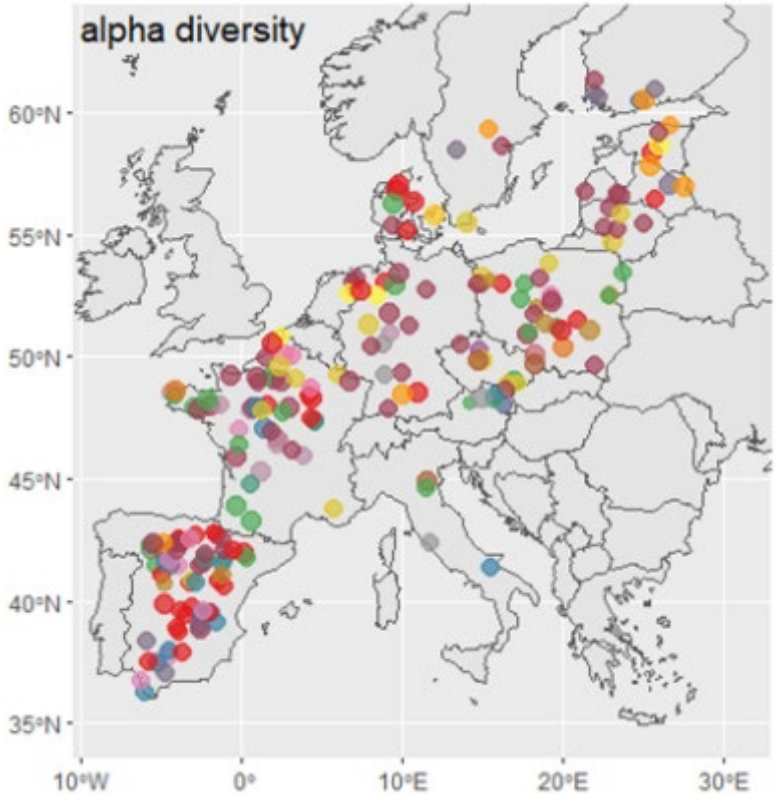
Agro-climate zones: regions characterized by specific climate conditions relevant to agriculture (Ceglar et al., 2019)

Scientific results

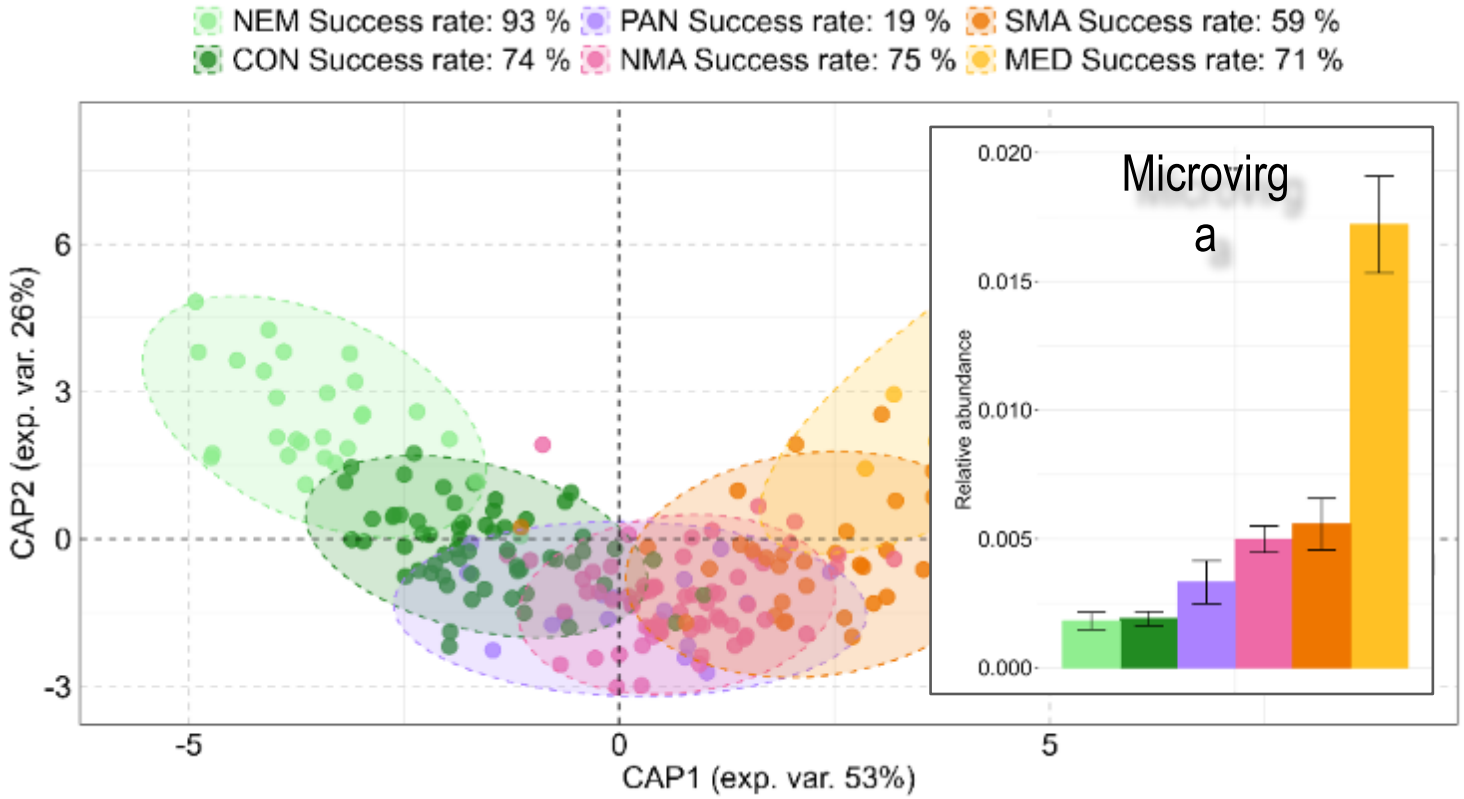
Shifts in soil biodiversity along agro-climate zones

LUCAS Soil Network of Sites

> 200 non-permanent croplands



Shifts in Soil Biodiversity (β-diversity)



Gradual shifts of soil microbial diversity across agro-climate zone

Scientific results

Strategy to predict soil biodiversity and multifunctionality

Data Collection

Current Data

Biodiversity
- Values of alpha diversity and beta diversity
- Bacterial Abundance Data: Eurostat's 2018 Land Use and Coverage Area frame Survey

Soil Functionality
Metrics related to ecosystem functionality

Climate Data

Soil Parameters
Information on soil health and composition

Current Agroclimatic Zone

Future Data

Projected **climatic conditions** from CMIP6 projections

Bioclimatic Data
- Two Shared Socio-economic Pathways (SSPs)
  - 126
  - 585
- Four-year periods
  - 2021-2040
  - 2041-2060
  - 2061-2080
  - 2081-2100

Future Agroclimatic Zone
- Predictions of future agroclimatic zones

Data Integration

Statistics

Combine Data
- Current data
- Projected data

Relationships
- Correlation analysis
- DAG analysis
  - Correlation based
  - Bayesian Causal Model

AI techniques Applied

Predict Taxon

Input: Climatic Data
Output: Taxon abundance predictions

AI Models:
- Machine Learning Models:
  - Random Forest
  - Decision Trees
  - Ridge/Lasso Regression
- Multinomial Neural Networks
- Dirichlet Regression

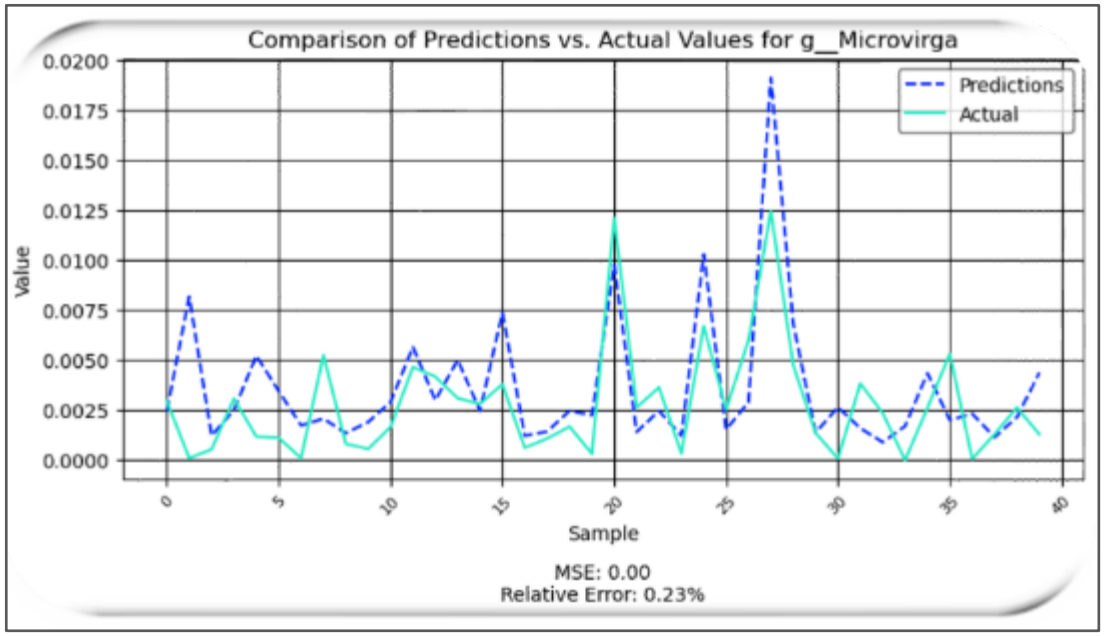
Predict Functions

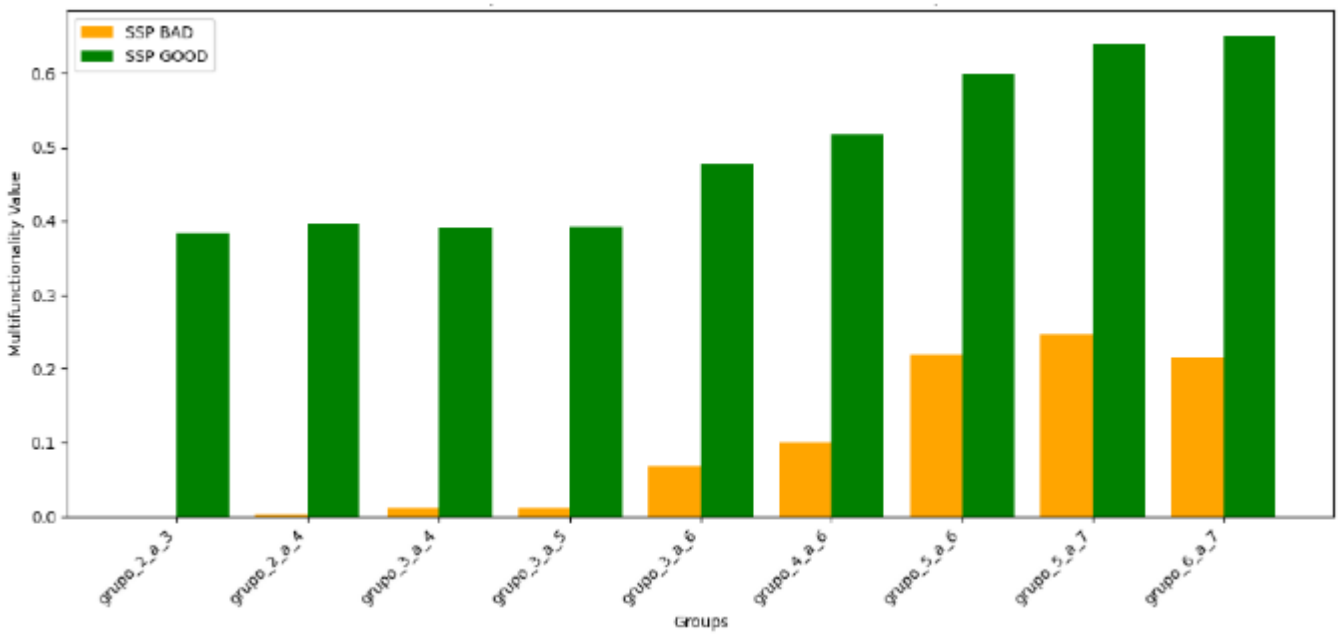
Input: Taxon abundance predictions
Output: Soil functions predictions

Machine Learning Models:
- Random Forest
- Decision Trees
- Ridge/Lasso Regression

Scientific results

Predicting soil biodiversity and multifunctionality



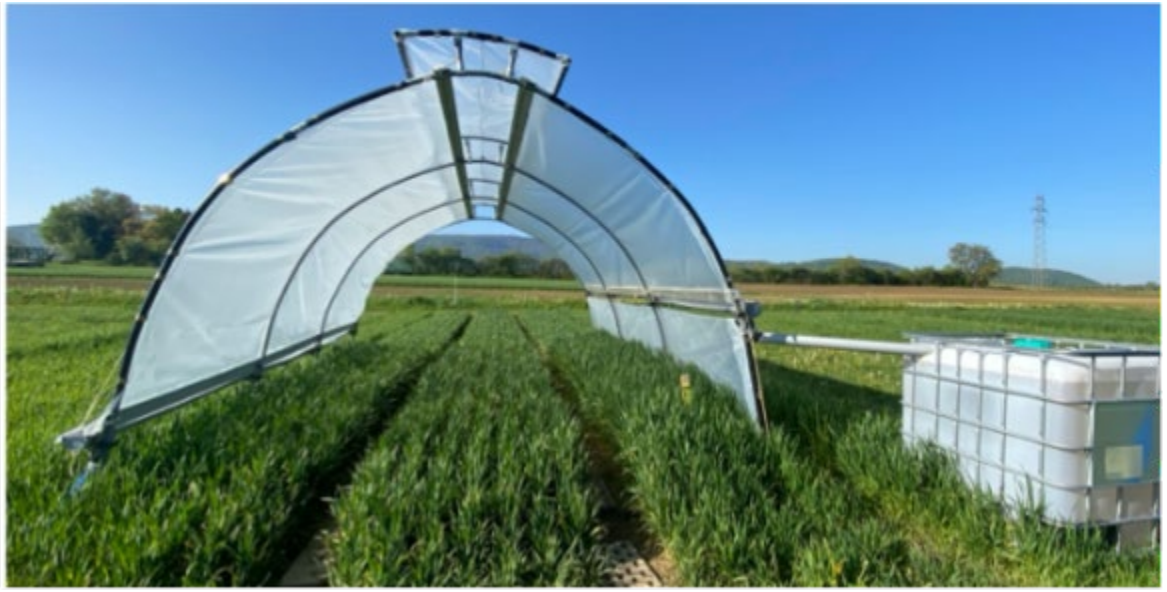


AI-based predictions

- Relative abundances of microbial taxa across different climate scenarios were predicted with <1% error rate
- The low-emission scenario SSP 126 consistently showed higher soil multi-functionality compared to the high-emission scenario SSP 585
- This trend suggests that adopting sustainable, low-emission practices could better preserve critical soil functions

Scientific results

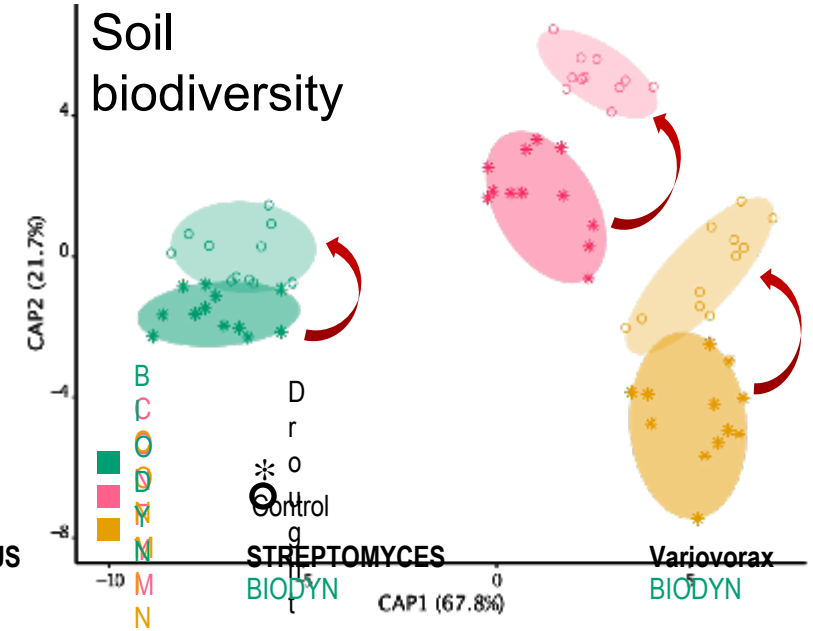
Capacity of organic cropping systems to buffer against climate stress



BIODYN **Organic system** receiving composted manure and crop protection according to biodynamic regulations

CONFYM **Mixed conventional system** receiving manure, mineral fertilizer and synthetic pesticides according to recommended thresholds

CONMIN **Mineral conventional system** receiving mineral fertilizer and synthetic pesticides according to recommended thresholds



RHIZOPHAGUS
BIODYN
↗↗↗ CONFYM
↗ CONMIN

Improves plant nutrient and water uptake (hyphal networks, aquaporins), reduces oxidative stress antioxidant enzymes

STREPTOMYCES
BIODYN
↗ CONFYM
↗↗ CONMIN

Improves plant nutrient & water (root growth stimulation, N-fixation), enhances iron uptake & pathogen suppression (sidero-phores), reduces plant stress response (ACC deaminase)

Variovorax
BIODYN
↗↗ CONFYM
↗↗ CONMIN

Improves plant nutrient & water (root growth stimulation, N-fixation), enhances iron uptake & pathogen suppression (sidero-phores), limits stomatal closure (abscisic acid reduction)

Drought impacts the soil microbiome but bacterial communities are still system-specific

biodiversa+ European Biodiversity Partnership
BiodivClim ERA-NET COFUND
Biodiversity and Climate Change

Policy and societal impacts / results

1) **Innovative Forecasting Framework**: We developed a novel AI-driven prediction model integrating regional climate projections and molecular soil biodiversity data to predict climate change impacts on soil biodiversity and ecosystem functions in agriculture.
2) **Key Insight**: Local soil properties, more than climate drivers alone, drive soil biodiversity shifts, highlighting the need for region-specific soil conservation policies and actions.
3) **Climate Action Matters**: In these prediction models, low-emission scenarios consistently preserved soil biodiversity mediated ecosystem functions, reinforcing the societal value of sustainable, climate-smart agricultural practices.
4) **Legacy of Land Use**: Farming systems retained distinct soil microbiomes with specific plant-growth promoting and stress-tolerating traits under climate stress, showing that investments in soil health today build resilience for tomorrow.
5) **Policy Relevance**: The framework offers actionable evidence for influencing land management and climate policies that protect biodiversity and food security.

Acknowledgements

FNSNF
Fonds national suisse
Schweizerischer Nationalfonds
Fondo nazionale svizzero
Swiss National Science Foundation

Agencia Estatal de Investigación

Agence Nationale de la Recherche
ANR

Federal Ministry
of Education
and Research

GSRI
General Secretariat for
Research and Innovation

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European Biodiversity Partnership

PlantCline

Adapting plant genetic diversity to climate change along a continental latitudinal gradient

Batsleer F, Bonte D, De-la-Cruz IM, Diller C, Hytönen T, Izquierdo JL, Muola A, Osorio S, Posé D, **Stenberg JA**, Vandegehuchte ML.

SLU

GHENT UNIVERSITY

UNIVERSITY OF HELSINKI

UNIVERSIDAD DE MÁLAGA

Aims and objectives

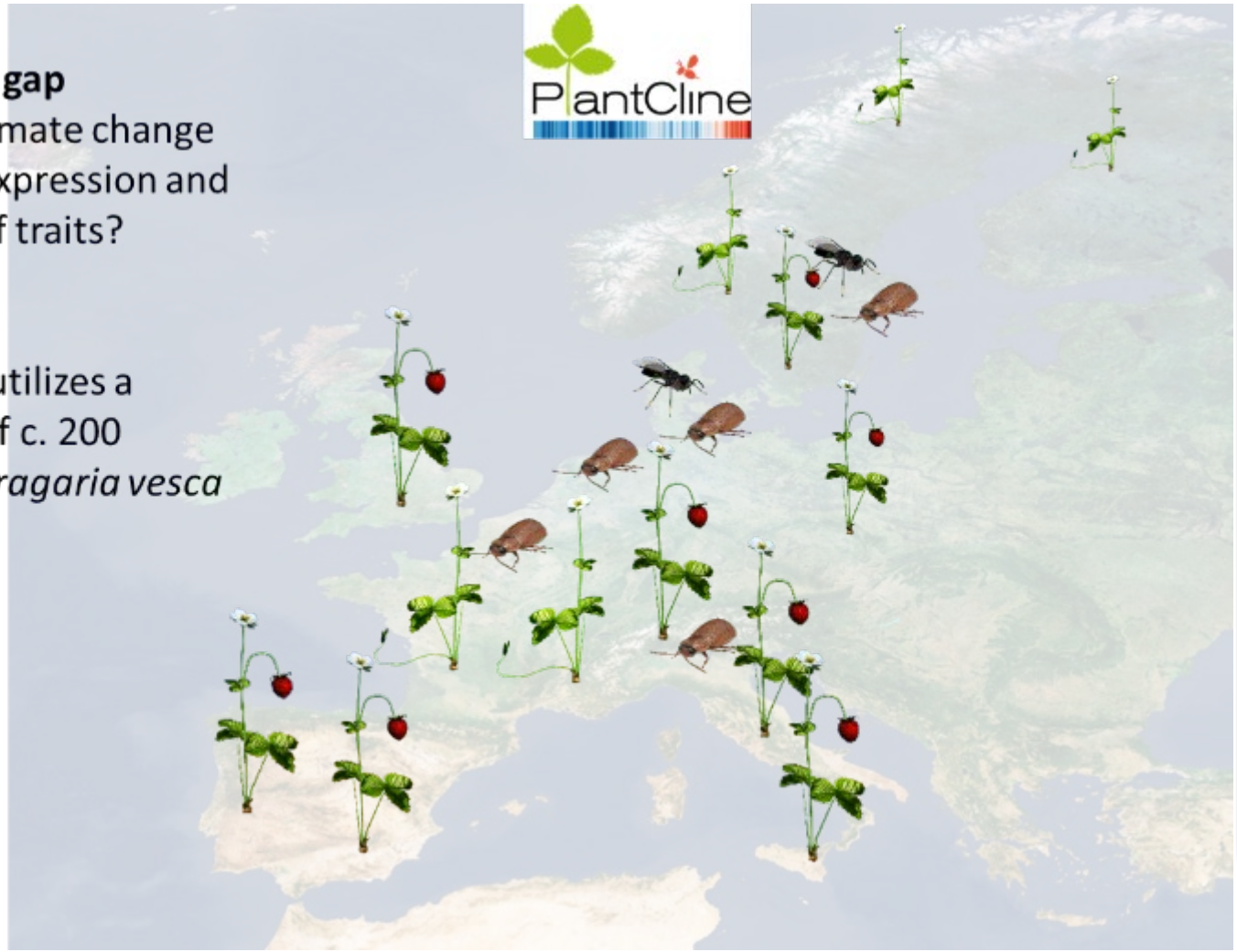
Investigate how climate change affects the evolution of plants, with implications for:

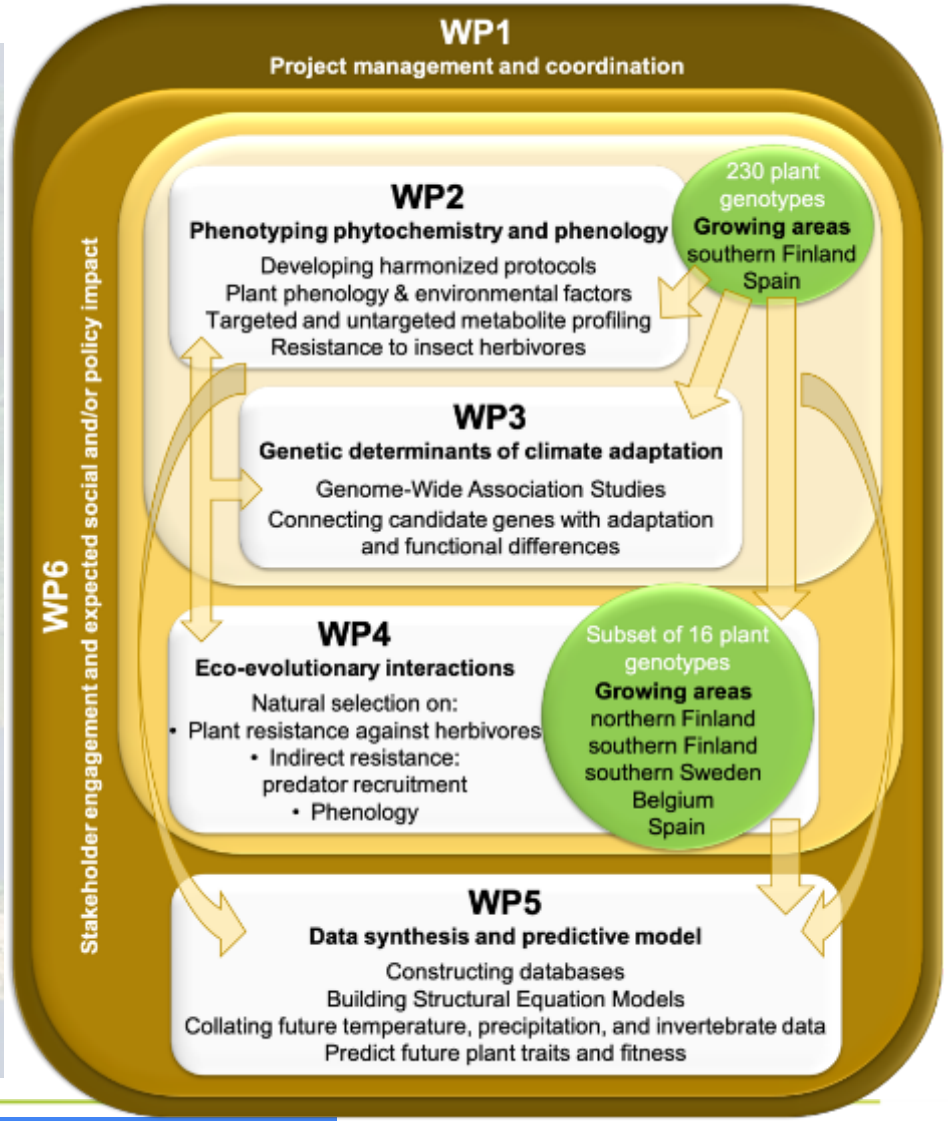
- Wild plant traits available for crop breeding.
- Pest risk analysis.

Aims and objectives

Knowledge gap
How will climate change affect the expression and evolution of traits?

PlantCline utilizes a collection of c. 200 European *Fragaria vesca* genotypes.



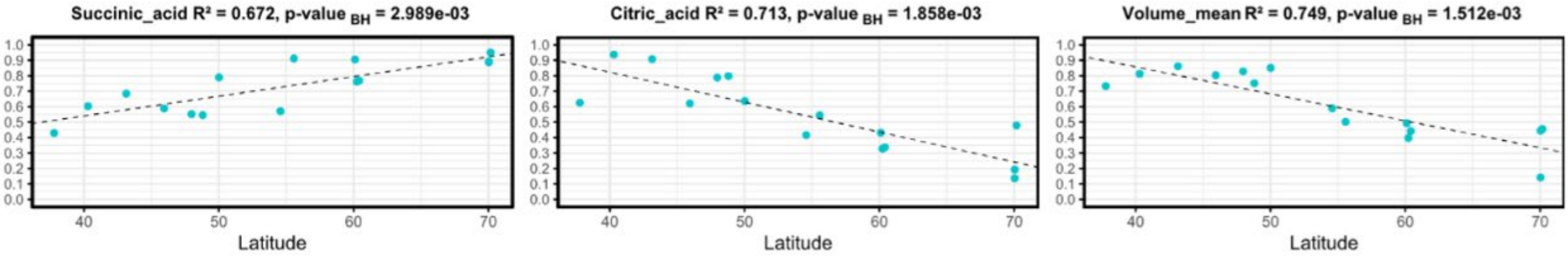


Methods

Common gardens, manipulating precipitation, in Spain, Belgium, Sweden, and Finland.

Results

Latitude determines several important traits

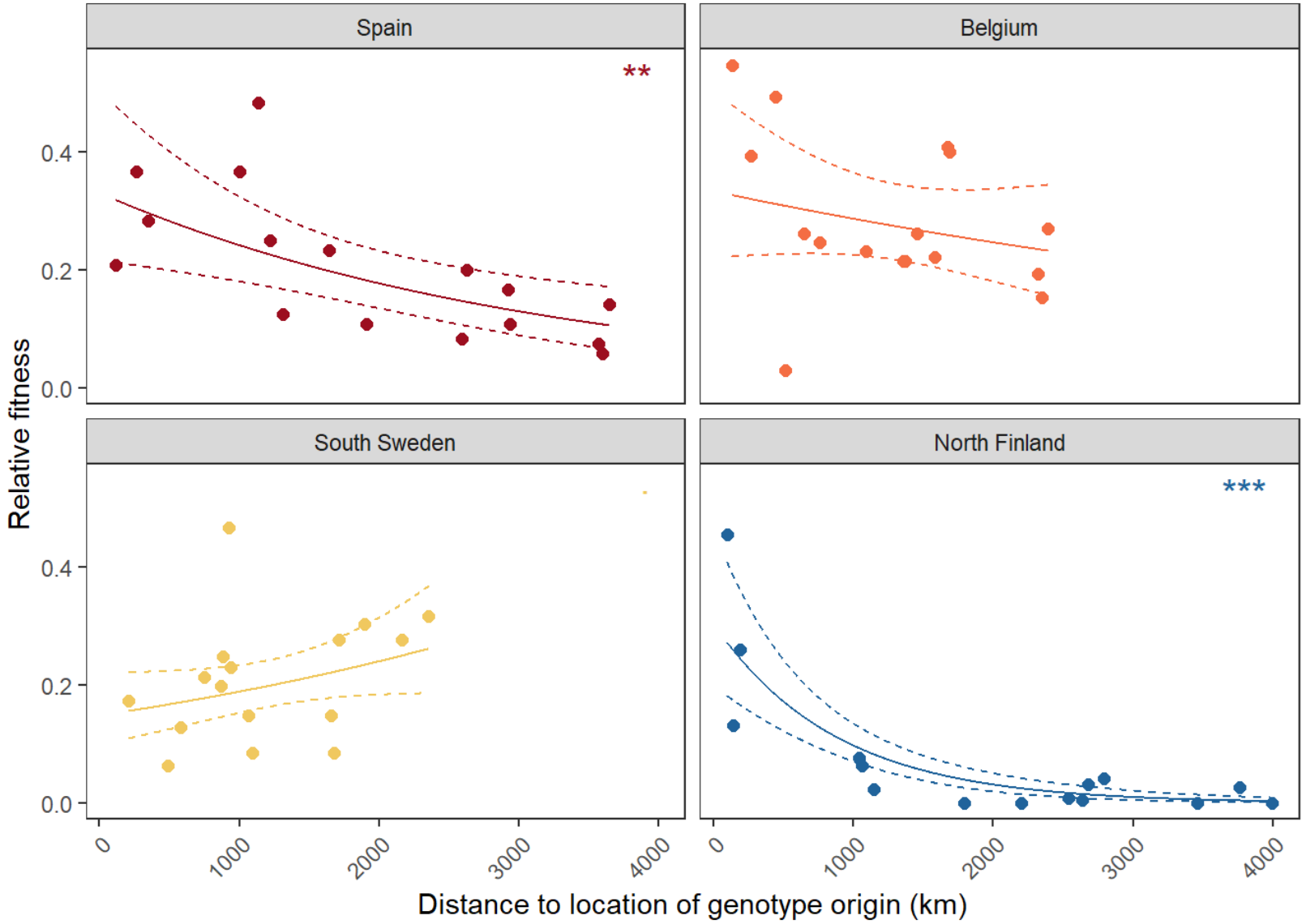


Candidate genes identified.

Results

Local adaptation

Nearby genotypes perform better compared to more distant, especially in the southern and northern common gardens.



Results

Northern, but not southern, plant genotypes can adjust their flowering phenology

I.e., northern genotypes are more resilient to climate change.

QTLs and candidate genes for flowering phenology were identified.

De-la-Cruz et al., *in review*

Scientific conclusions

- **Plants show great trait diversity/variation across Europe, in some cases due to local adaptation.**

- **Some traits can help plants coping with environmental change, but these traits are not available in all populations.**

Policy and societal impacts

- Wild strawberries in southern Europe may face difficulties tackling climate change.
- Wild strawberry populations are gold mines for crop breeders to improve crop resilience to climate change.
- Nature conservation policies typically do not protect rare genes/traits in common species.
- Current *Pest Risk Assessments* (PRA) typically do not take climate change or genetic variation into account.

Acknowledgements

ACADEMY OF FINLAND

GOBIERNO DE ESPAÑA
MINISTERIO DE CIENCIA E INNOVACIÓN

FORMAS

fwo Research Foundation Flanders
Opening new horizons

biodiversa+
European Biodiversity Partnership

Mechanisms underlying the success and impacts on biodiversity and ecosystem functioning of range-expanding species under climate

RANGEX


Olga Hilmo


Vigdis Vandvik


Anne Bjorkman


Paul Kardol


Jonathan Lenoir


Toke Høye


Sylvia Haider


Aníbal Pauchard


Ralph Clark

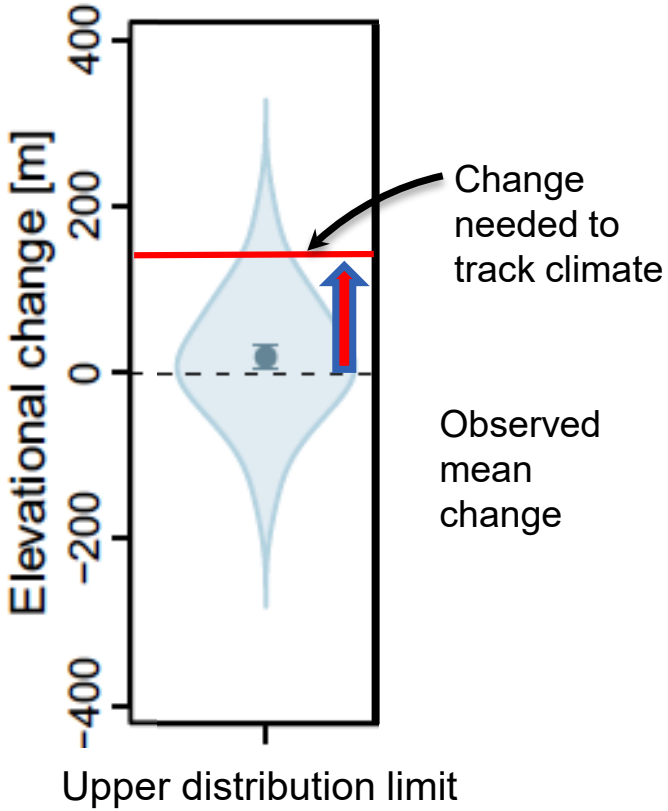

Sandy Steenhuisen

ETH
Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

Background and objectives

Native species range expansions

Rumpf *et al.* 2018. PNAS

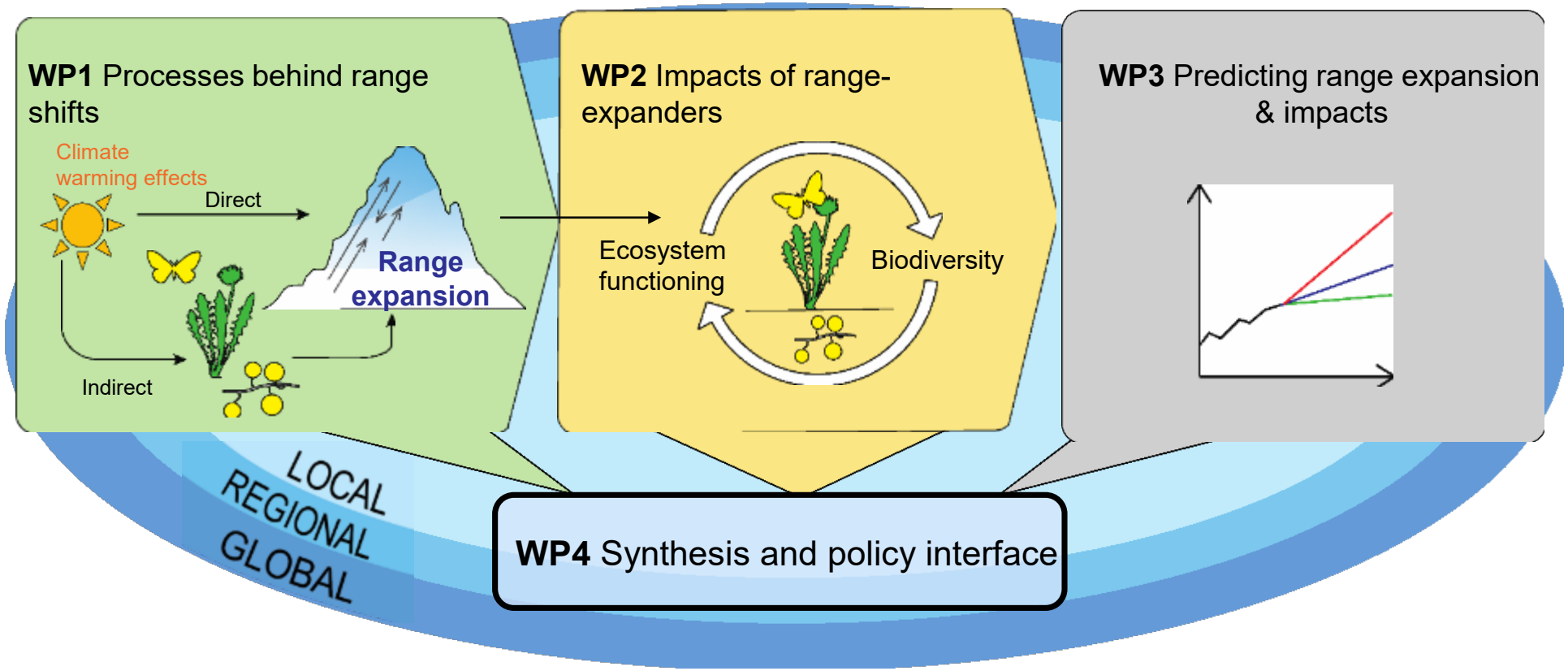


Range expansions are lagging behind climate change

Invasive species

Background and objectives

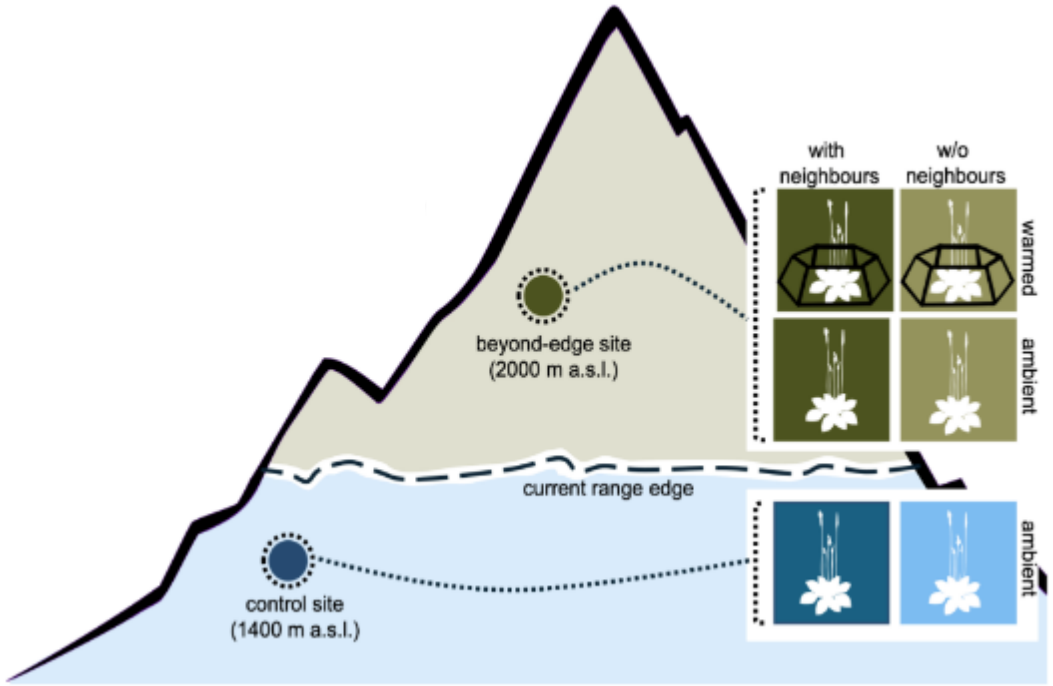
- Understand the processes and impacts of range-expanding plants
- Support the development of policy regarding range-expanding plants



Scientific results

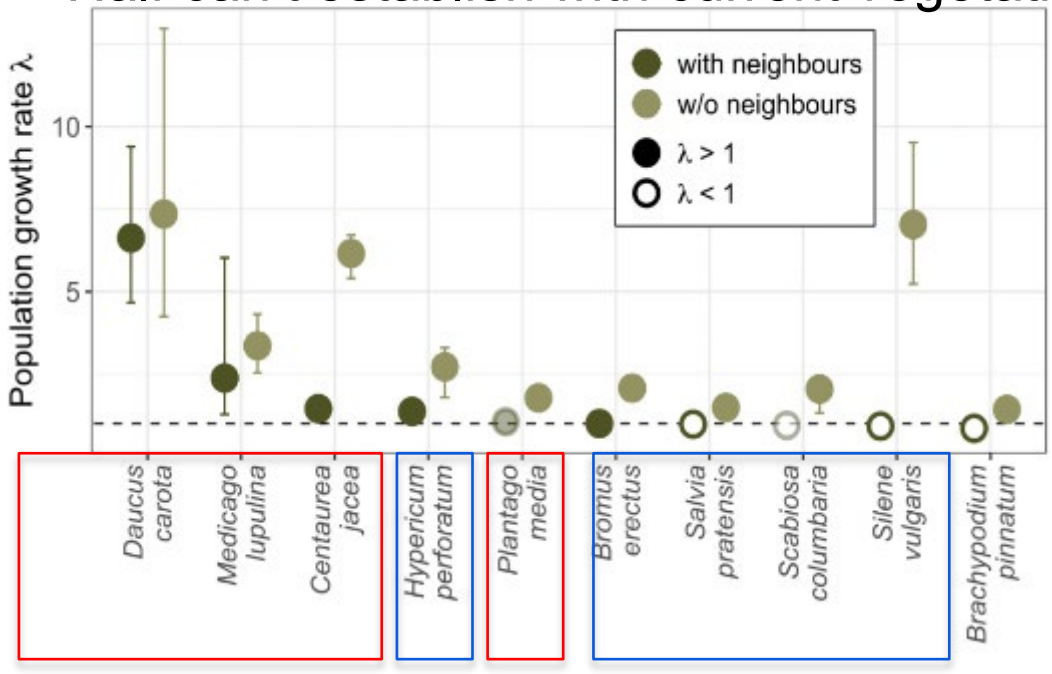
What limits the establishment of range expanding native species?

- Replicated experiments
- Lowland plants transplanted to high elevation site to ask



Scientific results

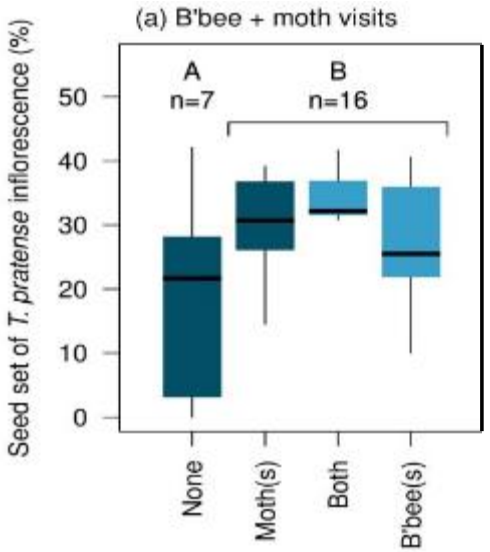
- All focal species can establish under current climate
- Half of focal species can establish with current vegetation => **dispersal limitation**
- Half can't establish with current vegetation => **limited by competition**

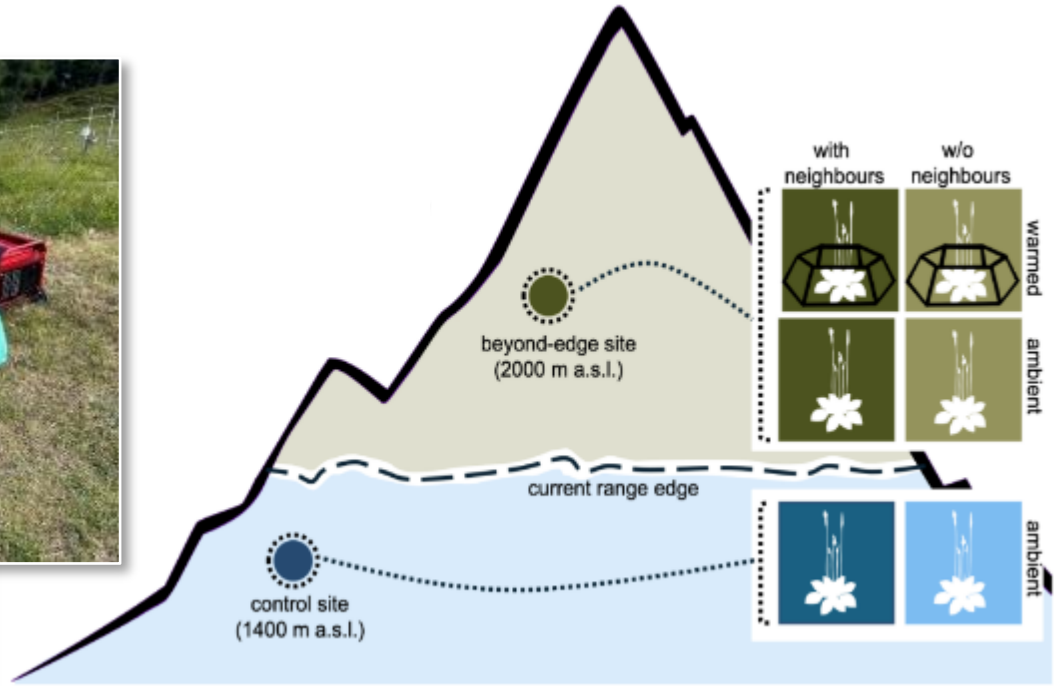


Iseli (2025) *PhD Thesis ETH Zürich*

Scientific results

- Camera traps and computer vision to monitor plant-animal interactions
- Observed novel plant-pollinator interactions
- New tools to measure greenhouse gas fluxes

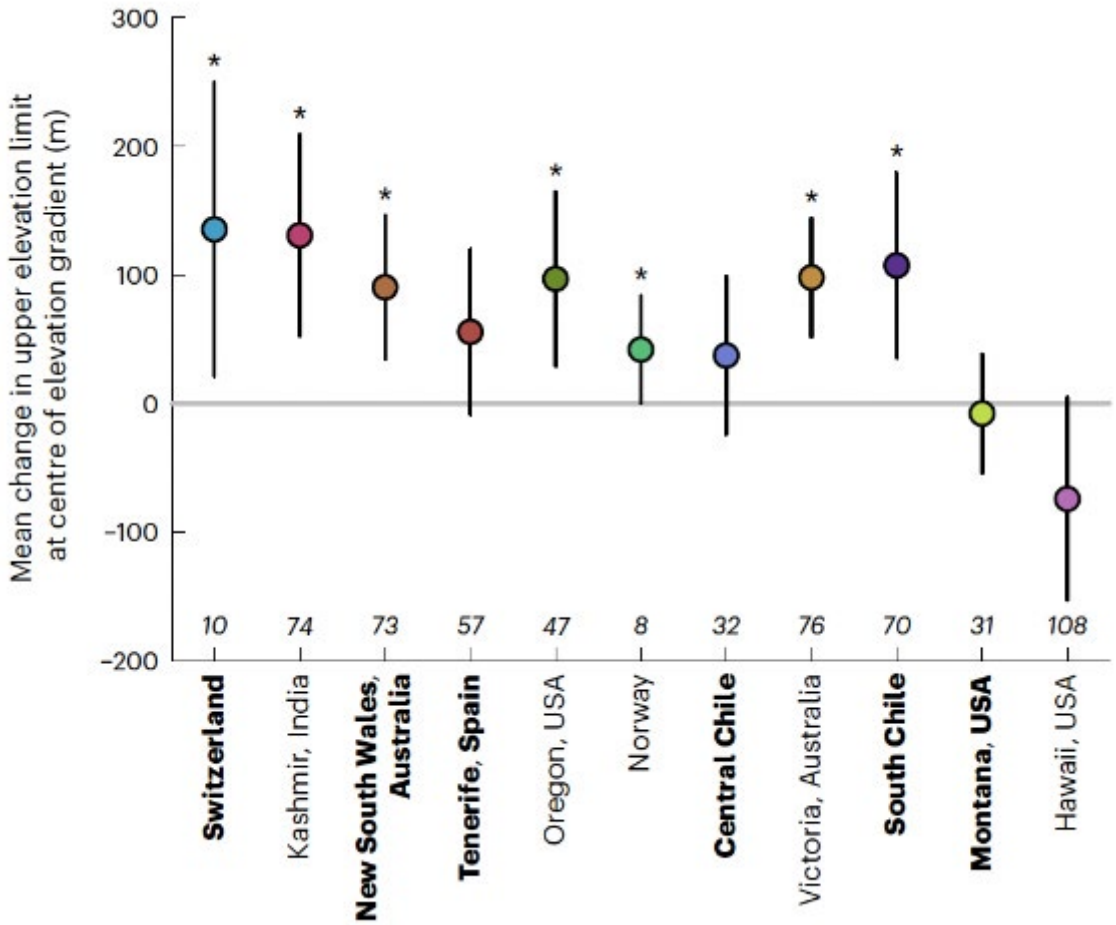




Alison *et al.* (2022) *Biol. Lett.*

Scientific results

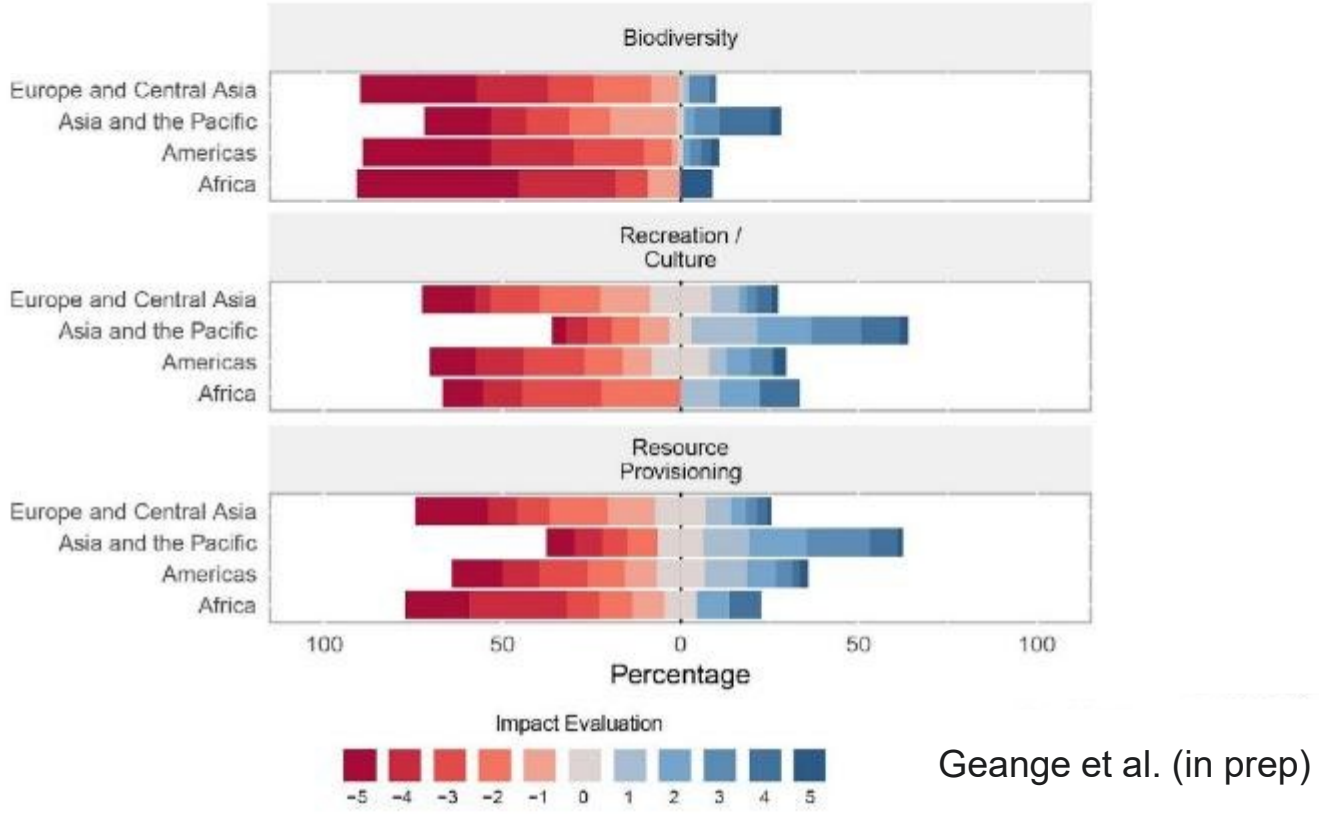
- Rapid upwards shifts in upper elevation limits of non-native plants in only 5-10 years



Iseli et al. (2023). *Nat. Ecol. Evol*

Policy and societal impacts / results

- Invasive species impact ecosystem functions and services across mountains within IPBES regions



Geange et al. (in prep)

Policy and societal impacts / results

Grassland Society of Southern Africa, July 2024

Chur, Switzerland, March 2023

UFS

The Office of the Minister: Department of Forestry, Fisheries & Environment, South Africa
Environment House, Cnr. Steve Biko and Soutpansberg Road
Arcadia, Pretoria, 0083, South Africa

Attention: The Honourable Dr Dion George

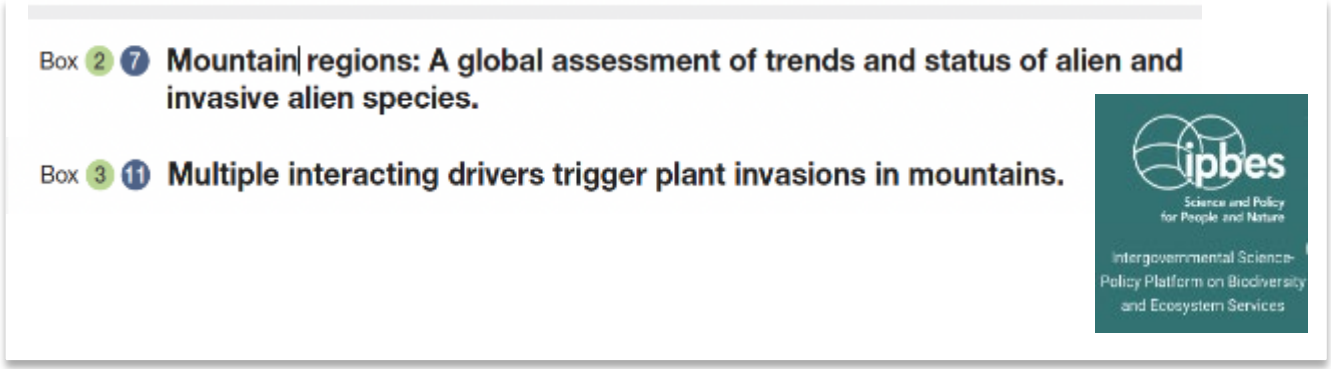
12th February 2025

Dear Dr Dion George

"Waar die kranse antwoord gee"[1]
Brief to the Ministries – Forestry, Fisheries & Environment and Agriculture
Sustainability of Southern African Mountains for Social-economic Viability

Southern African mountains are transboundary systems that support national and regional social-economic development and are critical for regional water security. Active protection of and interventions in our mountain

Plant functional traits course engages in South African RangeX sites



Box 2 7 **Mountain regions: A global assessment of trends and status of alien and invasive alien species.**

Box 3 11 **Multiple interacting drivers trigger plant invasions in mountains.**

ipbes
Science and Policy for People and Nature
Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services

biodiversa+
European Biodiversity Partnership

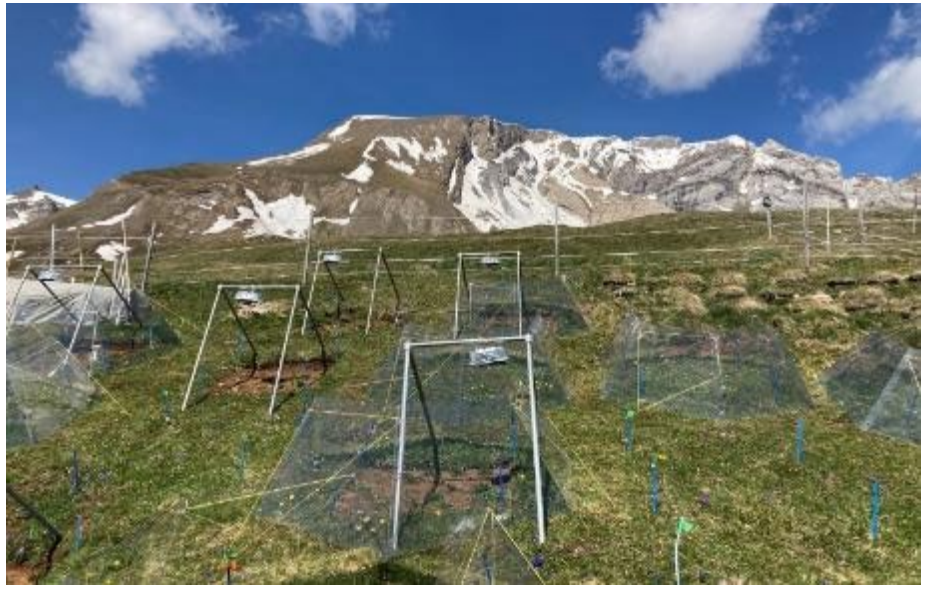
BiodivClim ERA-NET COFUND
Biodiversity and Climate Change

Policy and societal impacts / results

Witsiekshoek – ARU Alpine Base

Acknowledgements

- RangeX Team
- Field sites and local communities
- Field managers and assistants



Dispersal and biotic interactions limit plant range shifts

Non-native and native plants are rapidly moving upslope, and some threaten mountain biodiversity and ecosystems

Monitoring essential for early detection of potentially problematic species ("winners"), and species at risk ("losers")

Risks assessments for range expanding species needed and should focus on species' impact over origin

Transboundary research builds capacity and exchanges leading to longer-term impacts

Innovation Fund Denmark

The Research Council of Norway

science & technology
Department: Science and Technology
REPUBLIC OF SOUTH AFRICA

FORMAS

DFG Deutsche Forschungsgemeinschaft
German Research Foundation

FNSNF
Swiss National Science Foundation

biodiversa+
European Biodiversity Partnership

BiodivClim ERA-NET COFUND
Biodiversity and Climate Change

Panel discussion - Session 2

Moderated by ***Jasmin Godbold***, *Professor in Marine Ecology at the University of Southampton*

- ➔ In a multifunctional system and under climate change forcing, how do we manage resource use and nature's contributions to people whilst maintaining biodiversity and carbon commitments ?
- ➔ How do we balance the impacts of climate change and direct human impacts?
- ➔ What do the results of your projects mean for Policy makers and stakeholders?
- ➔ What research gaps and open questions have emerged? What next?

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European Biodiversity Partnership

[9:05 - 10:45]

Funded Projects Presentations – Session 3

Potential of nature-based solutions for mitigating and adapting to climate change

Moderated by ***Paola Lepori,*** *Senior Expert Biodiversity & Nature-based Solutions at ICLEI Europe*

Network Nature

NetworkNature

Bridging Science Policy and Practice

Network Nature

Bridging science, policy and practice

To accelerate **upscaling of NBS**

- Support **policy-making** through integration and mobilisation of NbS knowledge
- Broaden, guide and engage the **NbS community**
- **Build capacities** and skills of public authorities, NbS investors and society

networknature.eu

ICLEI Local Governments for Sustainability · oppla · IUCN · biodiversa+ European Biodiversity Partnership · Institute for European Environmental Policy · The Nature of Cities Europe · Steinbeis Europa Zentrum · Trinity College Dublin The University of Dublin · Horizon Nua · ALTAMIRA

Key target audiences

- **Local and sub-national governments and their public authorities**

…expand skills and knowledge across policy areas through **tools, best practices, peer exchange, and capacity building**. Includes communication support and a roadmap for societal engagement.

- **NBS investors and entrepreneurs**

…gain guidance to showcase NbS to investors**, access collaboration opportunities and build cross-sector networks** via tailored training and peer learning.

- **Subnational, national and EU policy-makers**

…improve **policy implementation** with NN+ products, service packages, and **integration recommendations** for all stakeholders.

- **Educators, education institutions and students**

…access **educational materials and creative engagement methods** (e.g., co-productions, games, festivals) to promote NbS in transdisciplinary education

Network Nature

6 Priority themes to frame the work of NetworkNature+

EU policy targets as opportunities for NbS integration and improved policy implementation:

- **Biodiversity enhancement & ecosystem restoration**
- **Climate change adaptation & mitigation**
- **Zero pollution**
- **Sustainable food systems** (including soil and agriculture)
- **Sustainable urban and regional transformation**
- **Sustainable finance**, investment and just transition

Identify NbS resources/services needed to enhance NbS integration across policies, and implementation develop NbS product and service packages

Network Nature

Supporting and expanding the NbS community

EU-funded research and innovation projects tackle the climate and biodiversity crises implementing nature-based solutions in different environments.

88 research and innovation PROJECTS

1.538 PARTNERS

EUR 755M (EC contribution)

79 COUNTRIES

NBS IN URBAN AREAS

CLIMATE RESILIENCE

Connecting Nature
Grow Green
GreenInCities[1]
URBREATH[1]
Urban GreenUP
UNaLab
Regreenation[1]

WATER SECURITY

MULTISOURCE
NICE

INCLUSIVE URBAN REGENERATION

CLEVER Cities
EdiCiNet
NATURVATION
Nature4Cities
ProGIreg
URBINAT
UNP+

NATURE PROTECTION AND RESTORATION

EU-CHINA:
CLEARING HOUSE
REGREEN
EU-CELAC:
CONEXUS
INTERFACE

HEALTH AND WELLBEING

EUPOLIS
GO GREEN ROUTES
IN-HABIT
VARCITIES

AIR QUALITY

DivAirCity
JUSTNature
UPSURGE

[1] Project funded under the EU Missions 'Adaptation to Climate Change' and 'Climate-neutral and Smart Cities'.

CROSS-CUTTING PROJECTS

NATURE POSITIVE ECONOMY, FINANCE AND INSURANCE

NAIAD
Invest4Nature
NATURANCE
BIO-CAPITAL
GoNaturePositive
BIOFIN
Nature-SB

EDUCATION

NBSEduWORLD
ENABLES

INCLUSION AND CO-GOVERNANCE

COEVOLVERS
TRANS-Lighthouses
NATURESCAPES

HEALTH AND WELLBEING

GREENME
NATURELAB
RESONATE

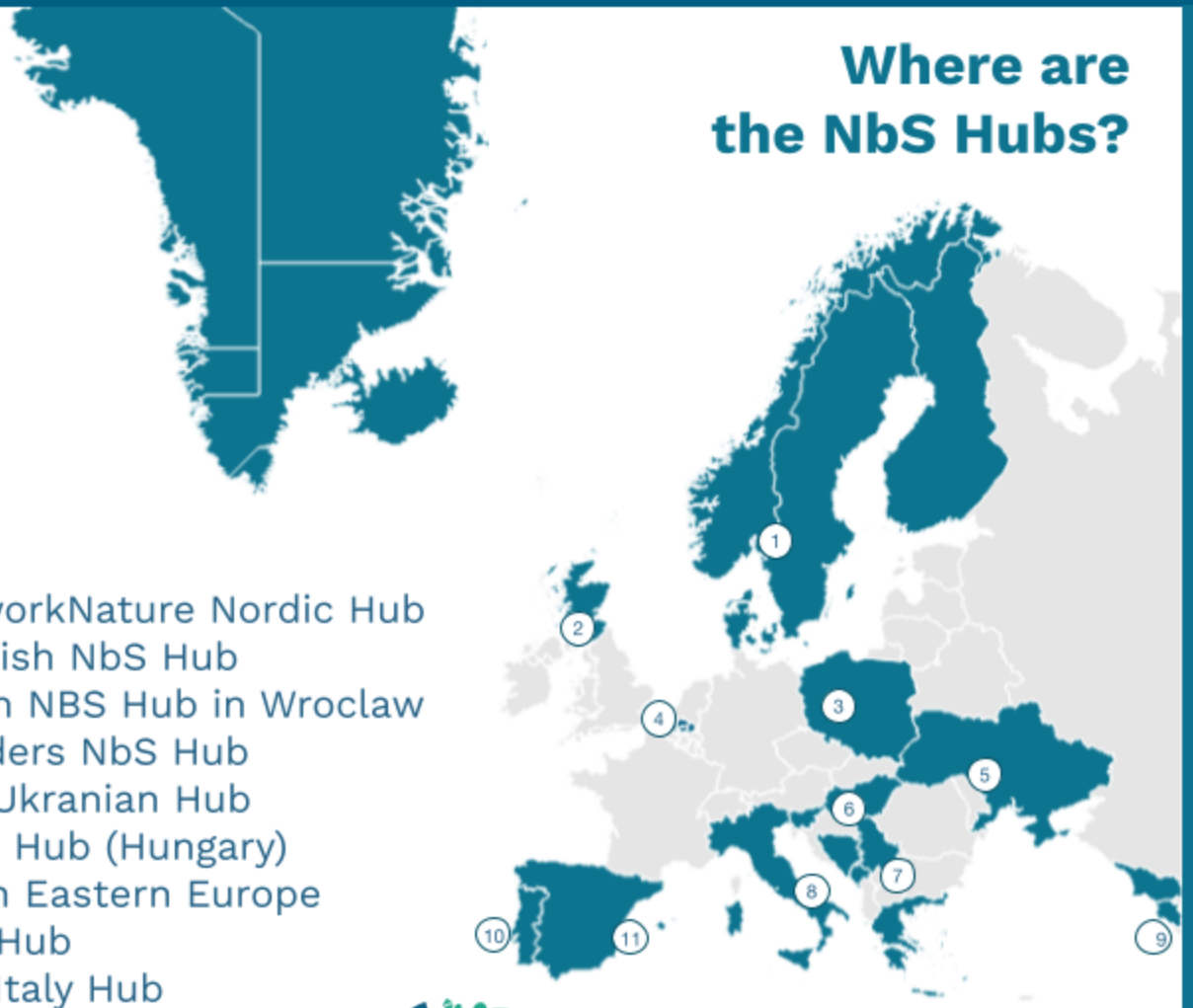
NETWORKNATURE+
Key knowledge broker and information resource fostering and strengthening the European nature based solutions community. NN+ supports EU-funded R&I projects on NBS by offering collaboration opportunities and dissemination services.

European Biodiversity Partnership BIODIVERSA+
The Partnership aims to connect science, policy and practice for transformative change for biodiversity, including contribution to high-end knowledge for deploying NBS.

The NbS Hubs community

Network Nature

Where are the NbS Hubs?



1 NetworkNature Nordic Hub
2 Scottish NbS Hub
3 Polish NBS Hub in Wroclaw
4 Flanders NbS Hub
5 NbS Ukranian Hub
6 TeAM Hub (Hungary)
7 South Eastern Europe NbS Hub
8 NbS Italy Hub
9 Caucasus NbS Hub
10 NbS Hub Portugal
11 Spanish NbS Hub

NbS Hubs
NetworkNature

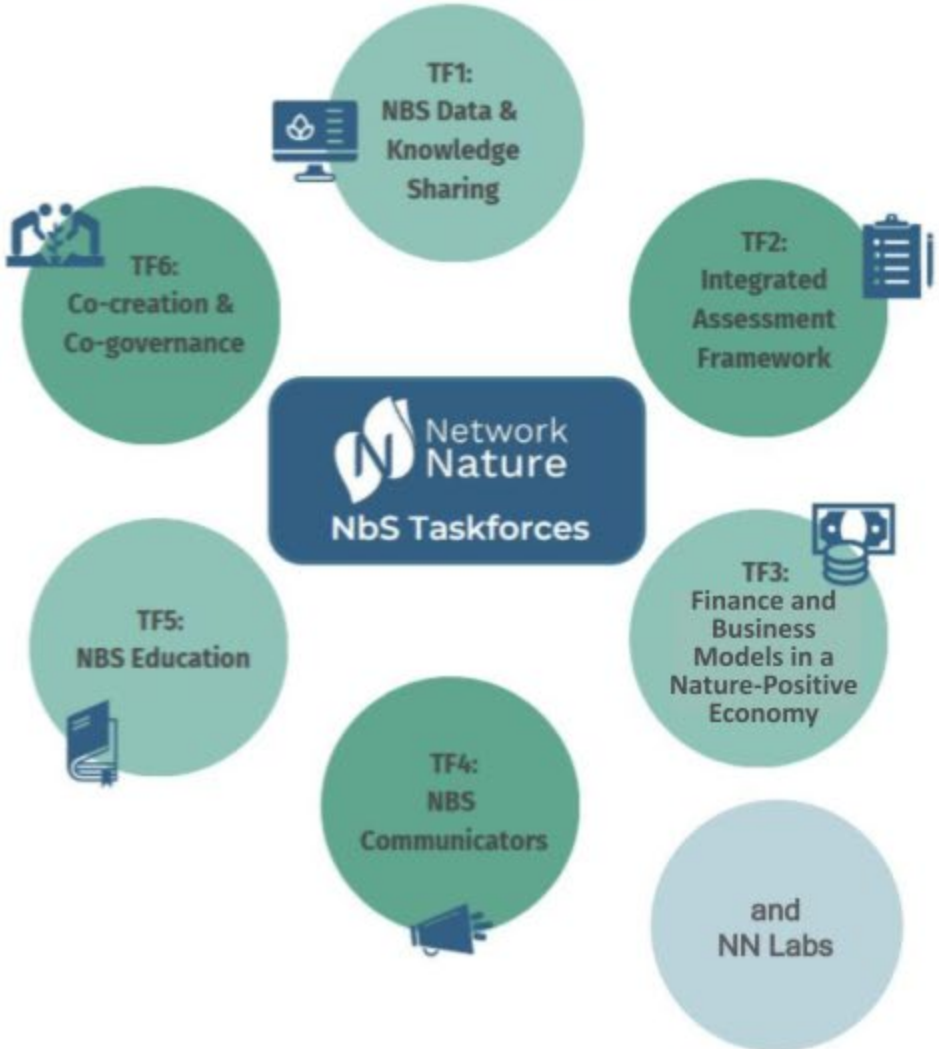
More information about the NbS Hubs is available by scanning the QR Code

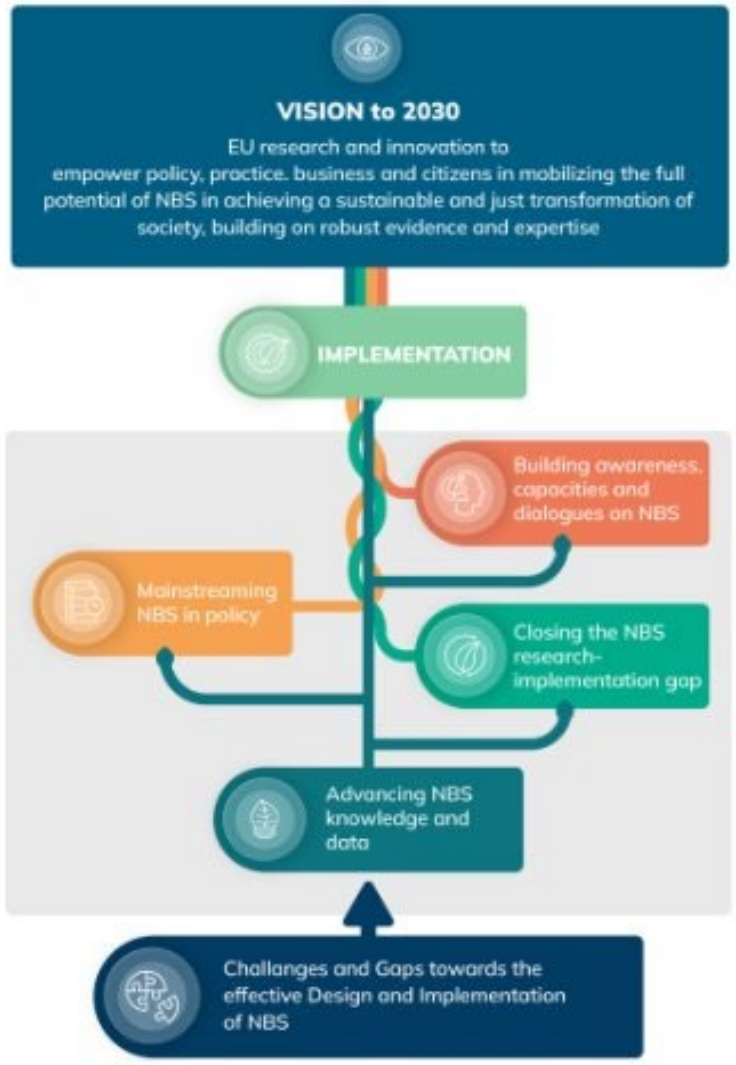
NbS Task Forces

NetworkNature

- **Collaborative Clusters**
  - Groups of representatives from NbS EU-funded Horizon 2020 and Horizon Europe projects
- **Purpose**
  - Synthesise diverse project approaches and outputs
  - Ensure EU added-value and policy relevance
  - Maximise social, ecological, and innovation impact
- **Coordination**
  - Supported by NetworkNature in collaboration with the European Commission (REA and DG RTD). Task Force 5 NbS Education is coordinated via the NbSEduWorld project.

Network Nature





Network Nature

European roadmap for R&I on NbS

- Takes stock of EU research, implementation, and coordination efforts on NbS
- Develops a common vision and meeting point for the coordination and development of EU R&I on NbS

Presented projects - Session 3

- **MixForChange**, Mixed Forest plantations for climate Change mitigation and adaptation, presented by *Joannès Guillemot*
- **RESTORE**, natuRe-basEd SoluTions for imprOving REforestation: Innovative biotechnological strategies to improve tree drought tolerance and microbial diversity for forest restoration purposes: the application of plant associative microorganisms and nature-based materials, presented by *Halley Caixeta de Oliveira*
- **ASICS**, ASsessing and mitigating the effects of climate change and biological Invasions on the spatial distribution of biodiversity in Cold environmentS, presented by *Jan Pergl*
- **BaltVib**, Pathogenic Vibrio bacteria in the current and future Baltic Sea waters: mitigating the problem, presented by *Matthias Labrenz*
- **NAPERDIV**, Nature-based perennial grain cropping as a model to safeguard functional biodiversity towards future-proof agriculture, presented by *Benjamin Dumont*
- **NordSalt**, Climate Change Impacts & Biodiversity Interactions in Nordic Salt Marshes, presented by *Gary Banta*

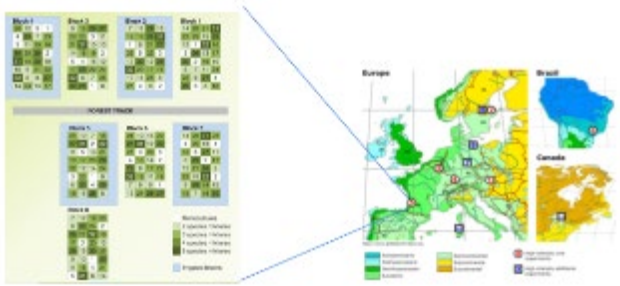
MixForChange

Mixed Forest plantations for climate Change mitigation and adaptation

By Joannès Guillemot (Cirad) joannes.guillemot@cirad.fr

Scientific results: The TreeDivNet network

Scientific results



- **Syntheses on whether and how tree diversity can be a relevant nature-based solution to fight the causes (via C sequestration) and consequences (via increased resilience) of climate change.**

Scientific results: mitigation via C sequestration

- **Diversity in resource use strategies (functional diversity) promotes productivity in young planted tree species mixtures.**
- **Acquisitive species demonstrated greater productivity in more diverse stands, whereas conservative species exhibited neutral to slightly negative responses to species mixing.**
- **Diversity-induced shifts in functional traits and LAI are important driver of overyielding in mixtures (so data from singe-species stands are not enough!),**
- **Not only about trees: tree species diversity increases topsoil carbon storage across Europe, influenced both directly and indirectly by fungal diversity and environmental factors,**

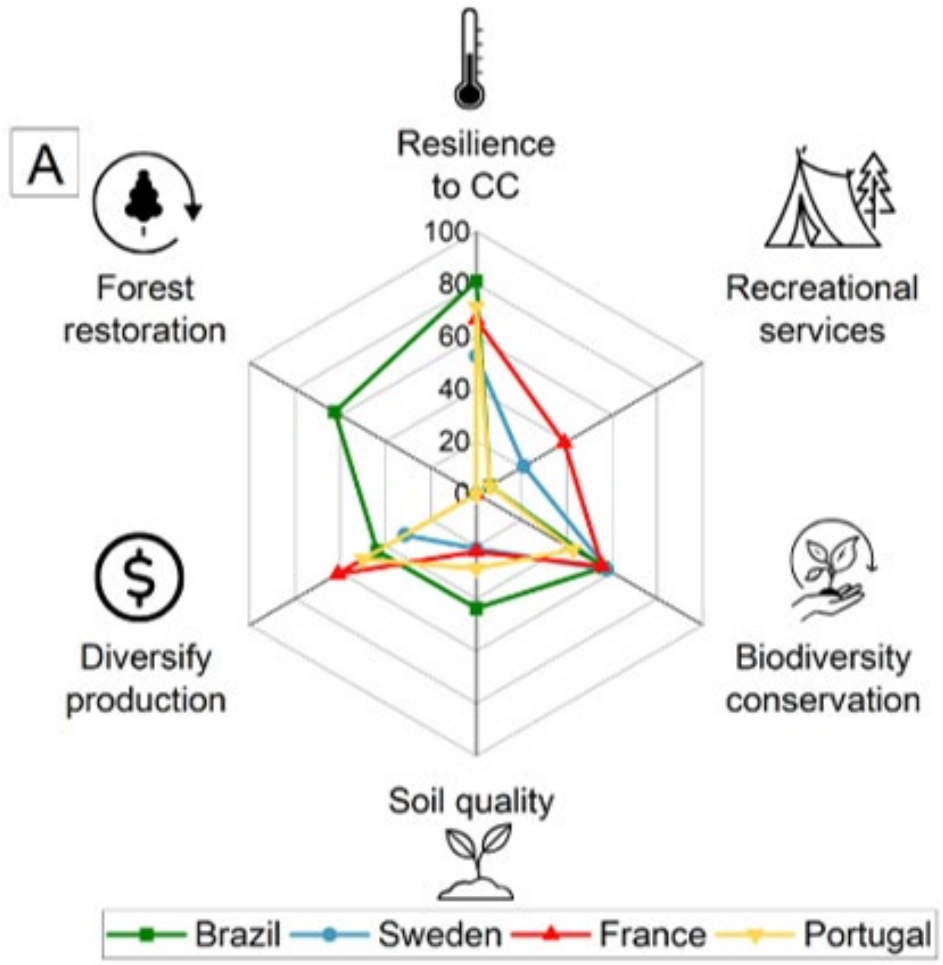
Scientific results: adaptation via drought resilience

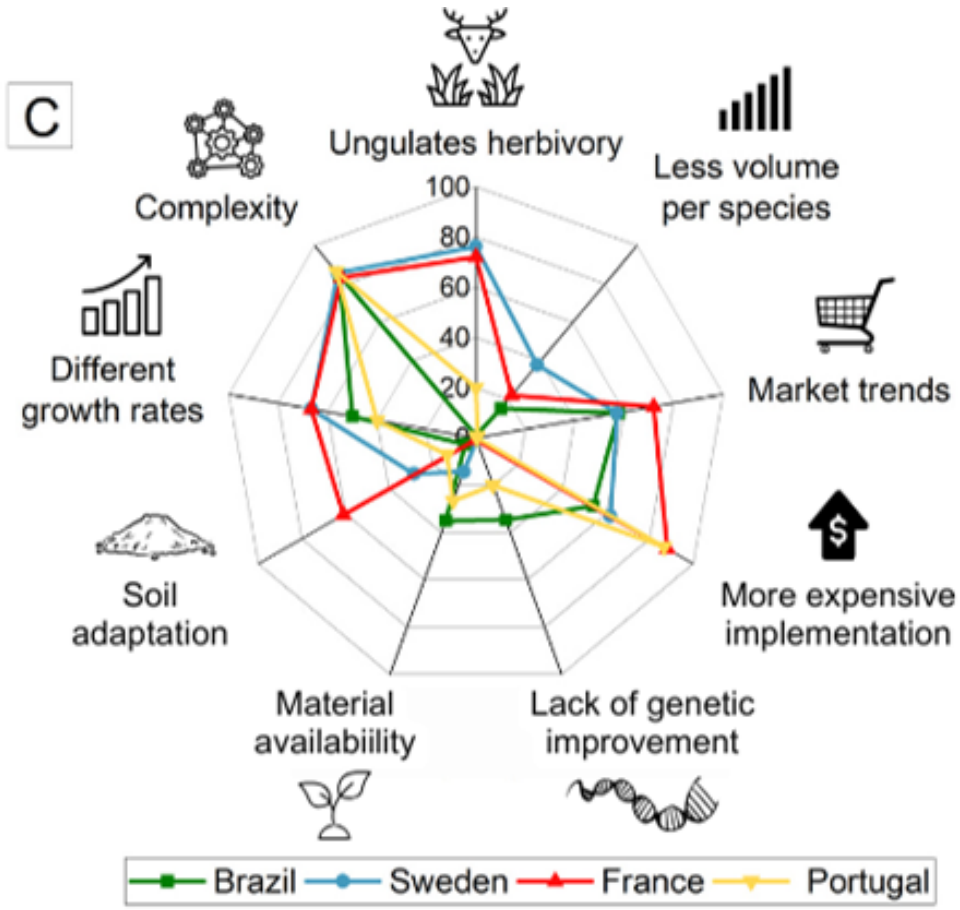
- **Tree xylem resistance and physiological drought responses to extreme drought are primarily driven by species identity, rather than tree diversity *per se*.**
- **Consequently, forest diversification should be considered jointly with management strategies focused on favouring drought-tolerant species.**

Scientific results : adaptation via drought resilience

- **Yet, biodiversity can have a substantial effect on forest drought resistance (even at very young age or under extreme drought), via selection effects or species interactions.**
- **Complementarity effects depends on the functional identities of the species mixed: drought-sensitive species experience less drought stress when mixed with drought-tolerant ones.**
- **This has important implications for management, as the effect can be positive or negative, depending on the functional composition.**
- **It is not only about functional (leaf or hydraulic) traits: structural stand structure is an important predictor of the diversity outcome on drought resistance.**

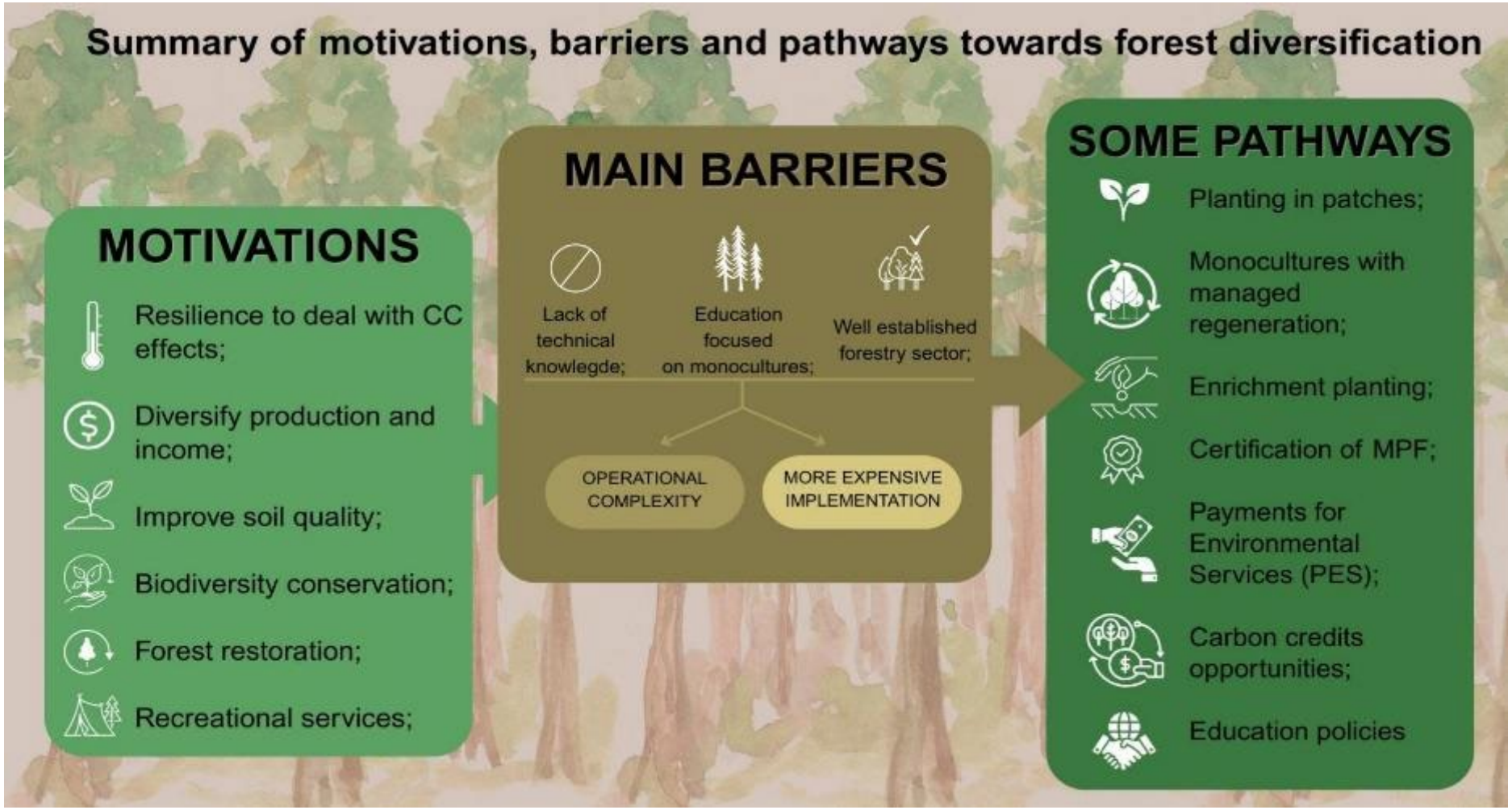
Policy and societal impacts / results: social surveys





Bulascoschi et al., submitted

Policy and societal impacts / results : social surveys



Bulascoschi et al., submitted

Policy and societal impacts / results

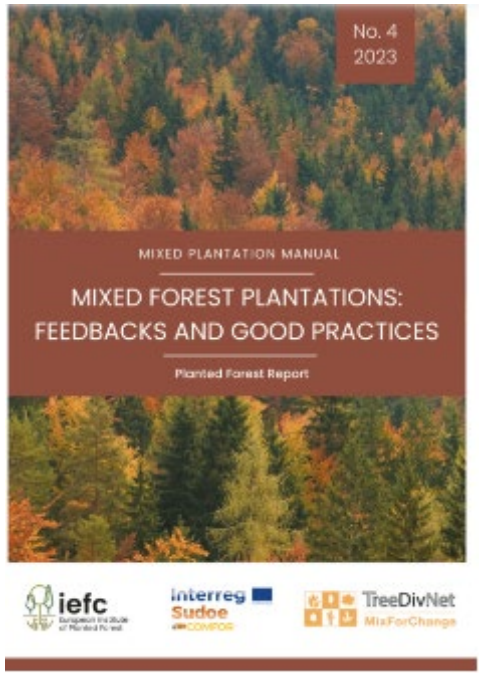
Roma, 2022

Piracicaba, 2023

Workshops

Policy and societal impacts

Manuals



Towards more resilient and diverse planted forests

Unasylva No. 254 - Vol. 74 2023/1

Acknowledgements

MixForChange was funded by ANR , BELSPO, DFG, FAPESP, FWF and FORMAS

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European Biodiversity Partnership

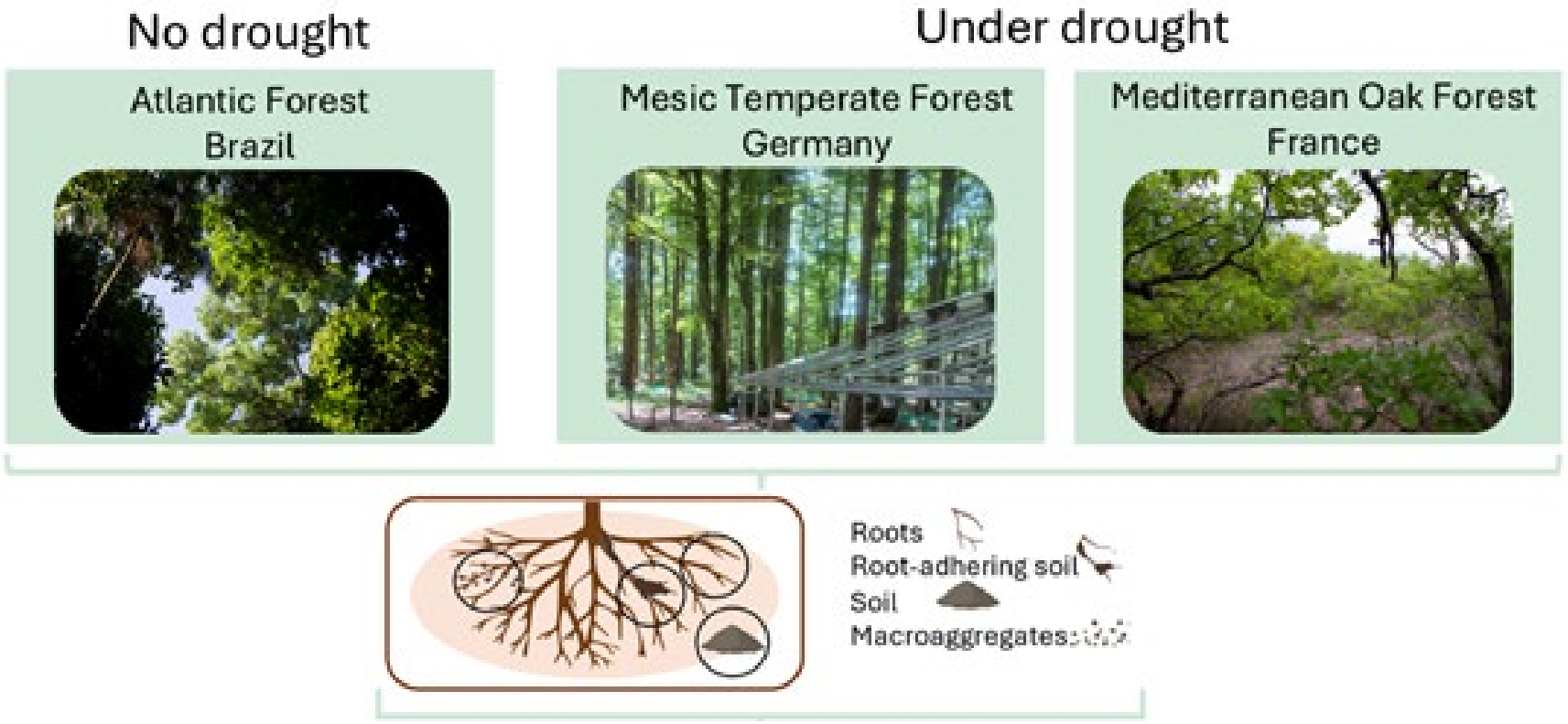
RESTORE
NAPI BIODIVERSIDADE

RESTORE
natuRe-basEd SoluTions for imprOving REforestation

By Prof. Dr. Halley Caixeta de Oliveira (UEL)

Universidade Estadual de Londrina
UEM Universidade Estadual de Maringá
UEPG Universidade Estadual de Ponta Grossa
Universidade Estadual do Norte do Paraná
IDR-Paraná Instituto de Desenvolvimento Rural do Paraná - IAPAR-EMATER
UFABC
unesp
UNISO
TECHNISCHE UNIVERSITÄT MÜNCHEN
HelmholtzZentrum münchen German Research Center for Environmental Health
cea
cnrs
Aix*Marseille université Initiative d'excellence
HP3
ECOSYSTÈMES CONTINENTAUX ET RISQUES ENVIRONNEMENTAUX ECCOREV

Scientific results

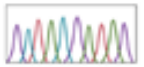


Scientific results

Microbiome

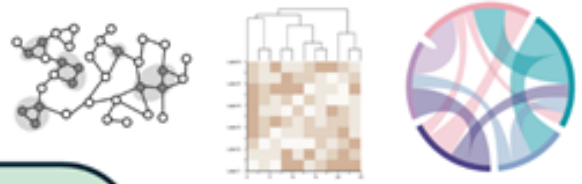
Resident communities

Active communities RNA (cDNA)



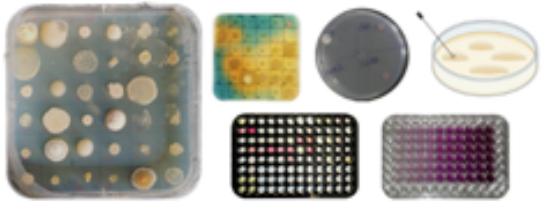
Microbial Diversity and Composition

Interactions, Functions, and Assembly

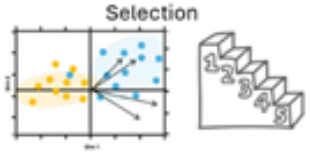


Integrating Microbiome Structure & Function to Guide Drought-Focused Strain Selection & Consortia Design

Microorganisms



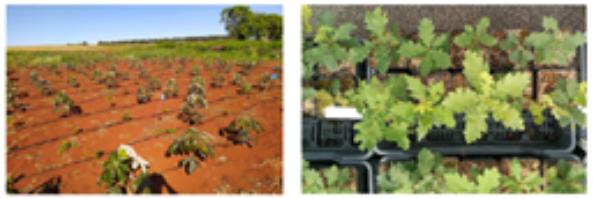
Tolerance to abiotic stresses
Nutrient solubilization
Plant Growth-Promoting properties
Exopolysaccharide production
Biofilm formation



In Vitro and miniaturized soil assays

Selection of the most promising strains

Pots, greenhouse, and field with tree seedlings



BR:
Tree species **diversity** → **microbiome diversity**

DE:
High microbial **diversity** in the **rhizosphere**
Plant Growth-Promoting and stress-tolerance traits

FR:
Roots buffered drought, while **rhizosphere** had **dynamic responses**
Roots are **reservoirs** and **rhizospheres** are **adaptive hubs** for **drought resilience**

WP1

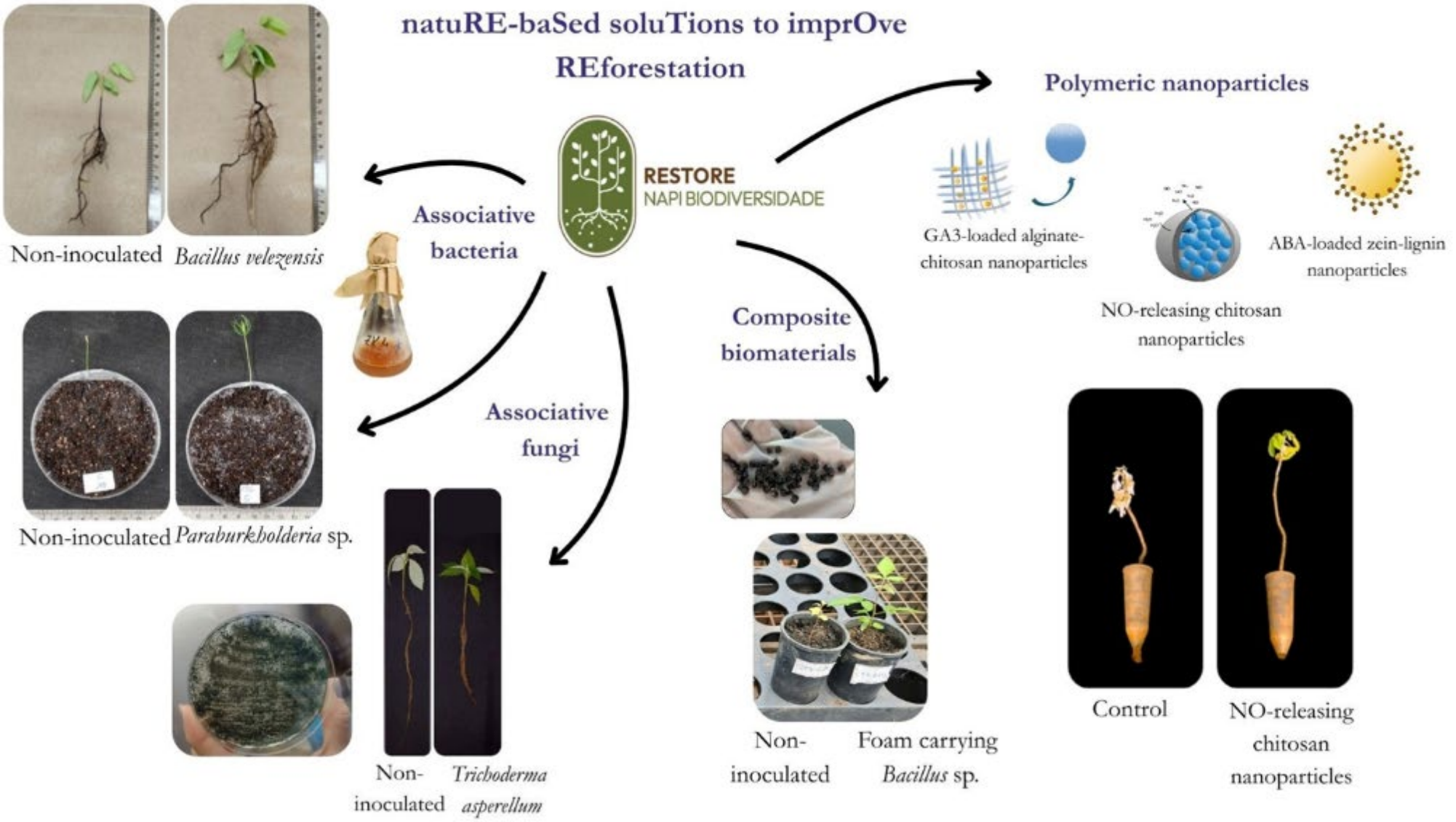
Scientific results

Screening of the responses of seedlings of almost 40 tree species to drought

Evaluation of morphophysiological traits

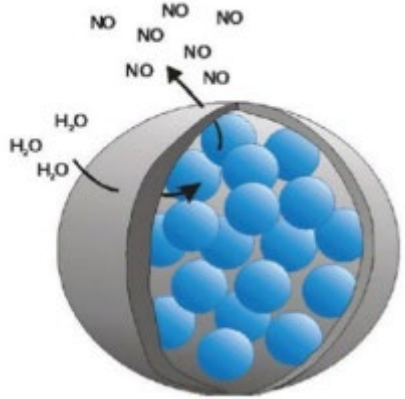
Different drought-imposing protocols

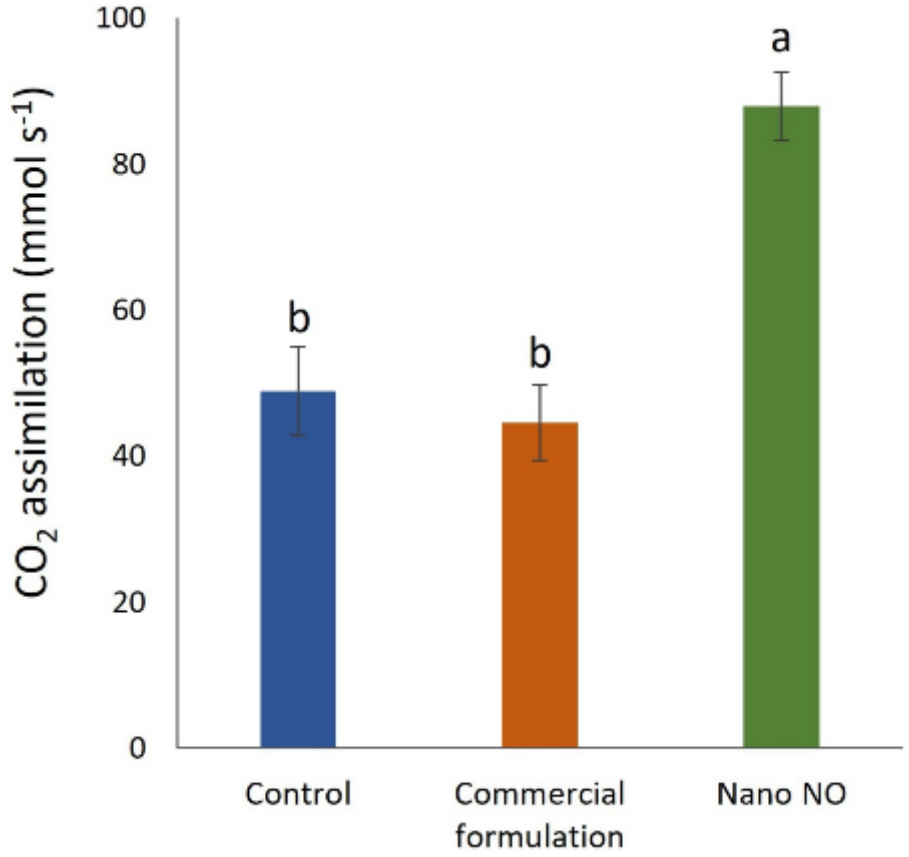
Scientific results



Scientific results

Field trials and cost-benefit analysis to confirm the viability of nitric oxide-releasing nanoparticles in enhancing carbon capture in forest restoration efforts





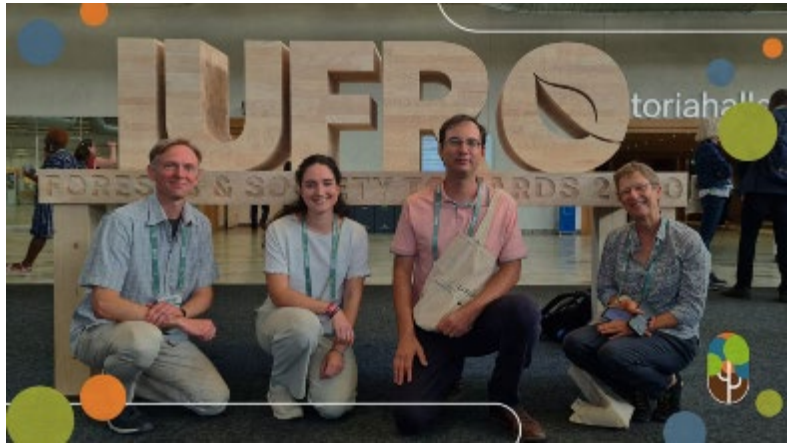
Policy and societal impacts / results

Involvement of various stakeholders → Mainly restoration practitioners who plan, implement and manage restoration projects

- Mapping of priority stakeholders
- Survey to assess the acceptance of nature-based solutions related to the project, as well as the needs and challenges faced by nurseries producing native seedlings
- Workshops and experiments with stakeholders

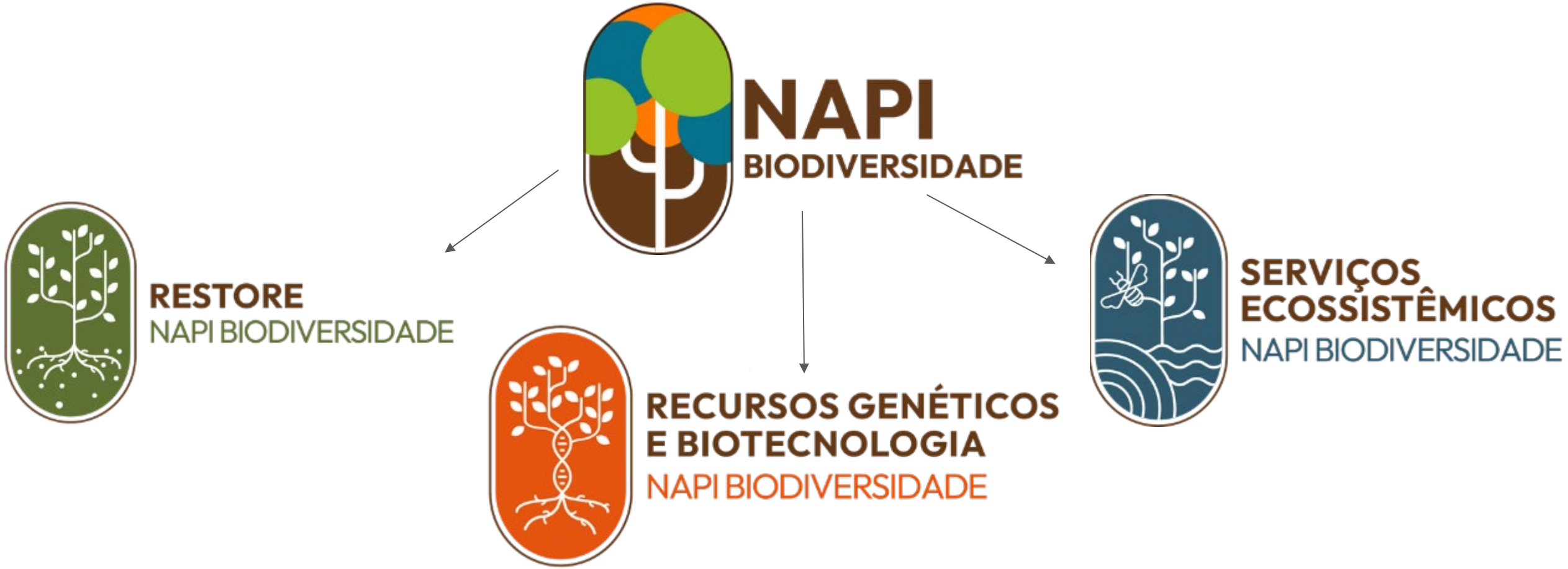
Policy and societal impacts / results

Various dissemination activities of the project thematics and results to reach the general public and the scientific community



Policy and societal impacts / results

Creation of research and innovation networks related to biodiversity
in the Paraná State



Acknowledgements

ASICS

ASsessing and mitigating the effects of climate change and biological Invasions on the spatial redistribution of biodiversity in Cold environmentS

By Jan Pergl (IBOT, pergl@ibot.cas.cz)

consortium

coordinator: Univ Rennes (D. Renault)

CNRS Lille, Univ. Lille (F. Massol)

Univ. Lyon 1 (A-K. Bittebiere)

Univ. Pretoria (M. Greve)

Univ. Antwerp (I. Nijs)

Aarhus Univ. (M. Holmstrup)

Arctic Univ. of Norway (N.G. Yoccoz)

Univ. Vienna (S. Dullinger)

Norwegian University of Science and Technology (K. Westergaard)

Universidad Rey Juan Carlos (M. Olalla-Tarraga)

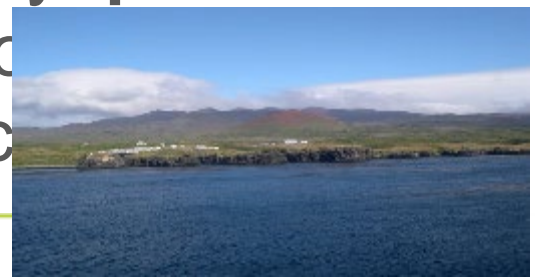
Institute of Botany CAS (J. Pergl)

Aalborg Univ. (T. Kristensen)

Background

...**warming** has already led to **poleward range shifts** across many taxonomic groups, both on land and in the ocean... **altitudinal shifts** within montane and alpine ecosystems are also observed ...

... This trend is particularly consistent in **cold environments** (Polar zones, i.e. Arctic, Antarctic and sub-Antarctic islands, and high-elevation regions), which host most of the world's last remnant wilderness ecosystems, including many **plants** and **invertebrate** communities that are close to their c
...These ecosystems are disproportionately affec
change...



Background

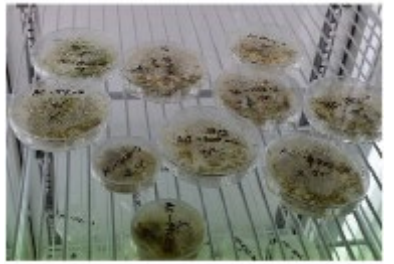
- How climate change and biological invasions reshape **arthropod and plant** biodiversity in polar regions using long-term data from Svalbard, Zackenberg biobasis high-Arctic Greenland, from the French and South African sub-Antarctic Islands, and from mountain regions across the globe.
- We studied the effects of novel **temperature** regimes, and **extreme thermal events**, on the **phenology, physiology, morphometry, and reproductive** success of plants and insects

Background

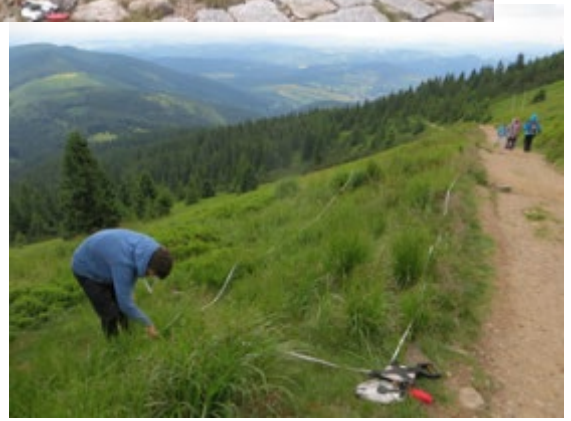
1) Species physiology & adaptation to climate change
2) Species redistribution
3) Species interaction & ecosystem functioning

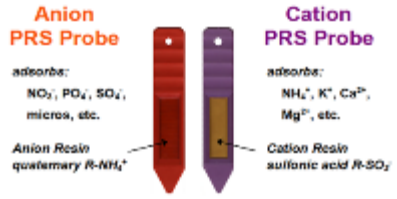
1) -> Tools...

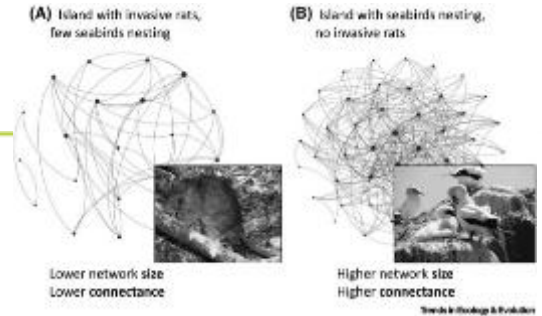
Methods



Species interaction & ecosystem functioning
Field research (species inventories, soil analyses, microclimate...)
Laboratory (climate chambers...)
Growth, germination,
Feeding experiments
Survival of offsprings, reproduction
Species distribution models
Climate measurements (soil)
Phenological shifts
Traffic data







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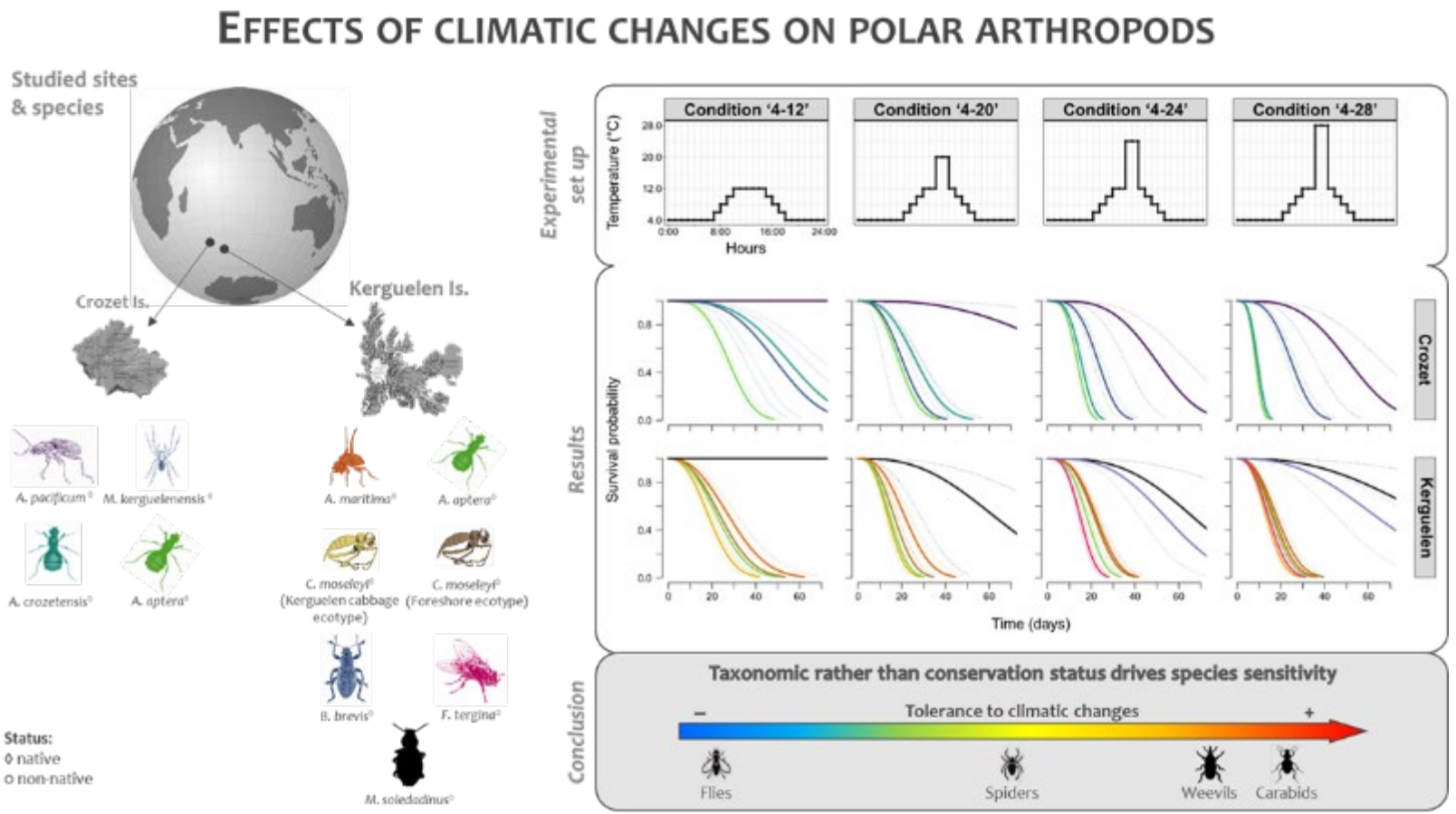
BiodivClim ERA-NET COFUND
Biodiversity and Climate Chang

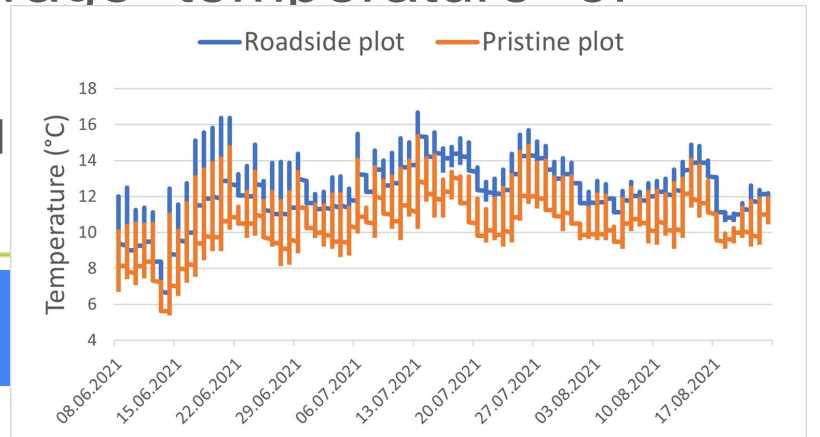
Scientific results



Scientific results

Seed ASICS

Preliminary results show an optimum seed germination in a regime with an average temperature of 14.9°C. At higher temperature, germination was slightly slower in some populations. The two warmer regimes with an average temperature of 14.9°C and 19°C are optimal for seedling growth. In the coolest regime with an average temperature of 6.7°C, seeds of [illegible] populations were u[illegible] during the 5-week.



Scientific results

Biol Invasions (2025) 27:108
https://doi.org/10.1007/s10530-024-03463-7

ORIGINAL PAPER

Using indicators to assess the status of biological invasions and their management on islands—the Prince Edward Islands, South Africa as an example

Laura Fernández Winzer · Michelle Greve · Peter C. le Roux · Katelyn T. Faulkner · John R. U. Wilson

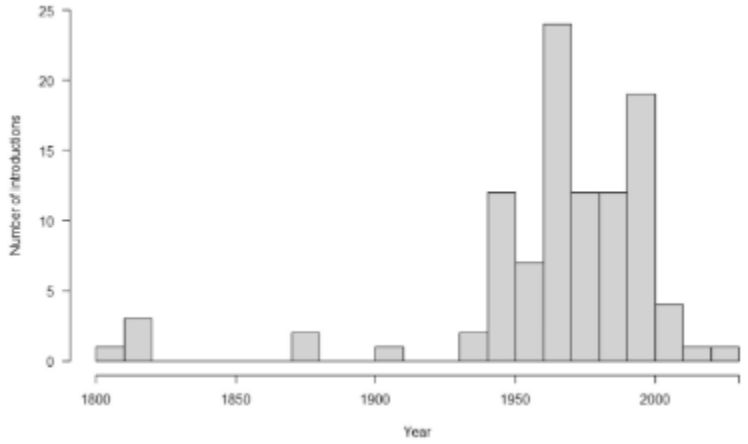


Table 1 Four high-level summary indicators (1–4) and 20 core indicators (1.1–
sions on South Africa's sub-Antarctic Prince Edward Islands (PEIs)

Category	Indicator	Description
	1. Rate of unregulated introduction of new species	The number of tionally but i
	1.1 Introduction pathway prominence	An evaluation per the CBD duction of al indicator con pathway base volume of tr along the pat facilitated
	1.2 Introduction rates	The number of another regio
	1.3 Within-country pathway prominence	The opportuni of alien spec considers the economic da islands). It d or were spre
	1.4 Within-country dispersal rates	The number of islands broke
	2. Number of invasive species that have 'Major' impacts	The number of ful impacts. IUCN's Envi Scheme, EIC Impact Class et al. 2018). tion status of important an
	2.1 Number and status of alien species	The number of indicator, the et al. (2011) a Darwin Co
	2.2 Extent of alien species	How widespre grid-cells oc
	2.3 Abundance of alien species	An estimate of an estimate (e.g., numbe abundance c
	2.4 Impact of alien species	An estimate of impacts caus are based on
	3. Extent of area that suffers 'Major' impacts from invasions	The extent of i 'Major' or ' lost ecosyste versity (the set out by the individual ab
	3.1 Alien species richness	The number of more advanc introduction

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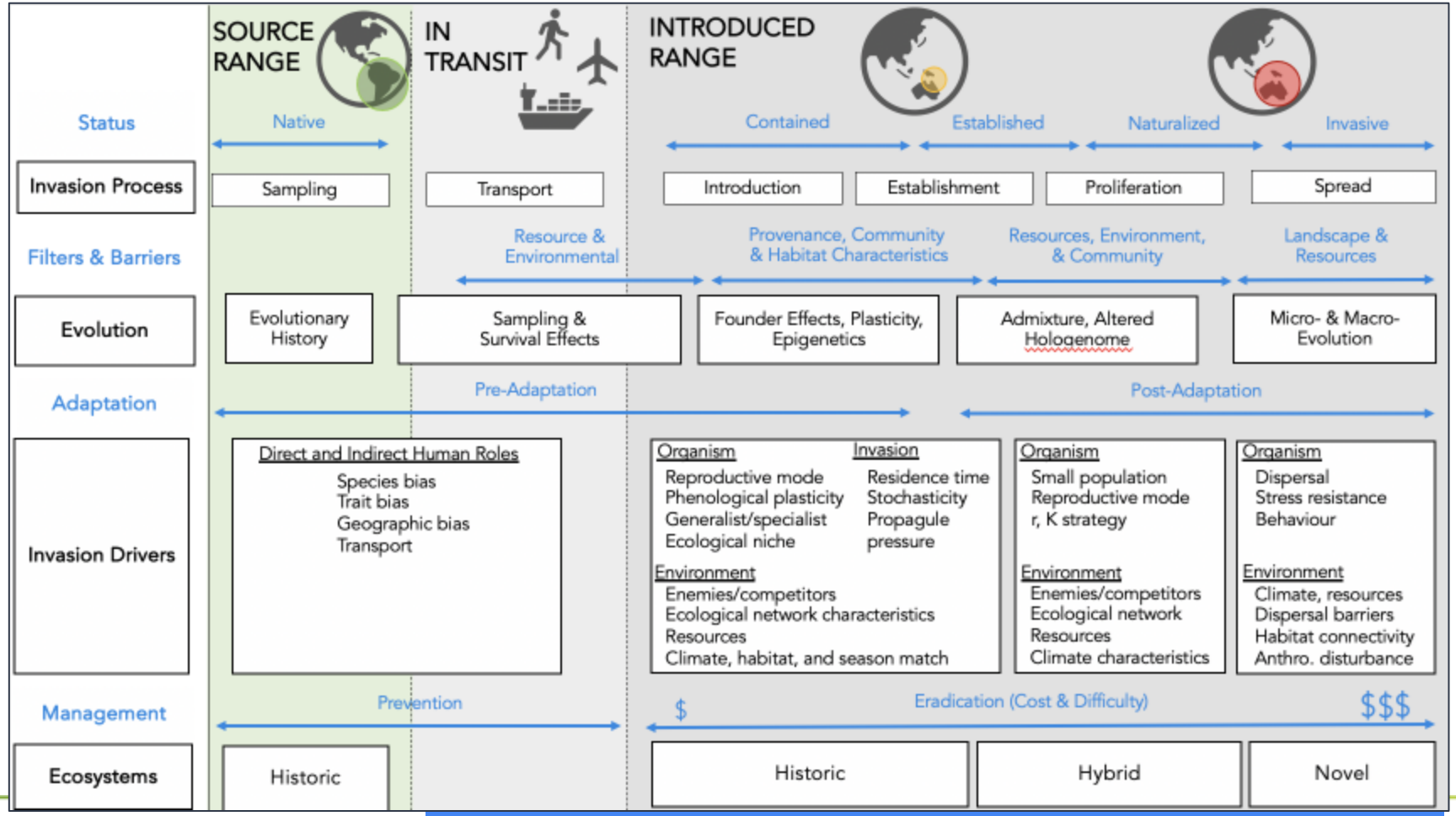
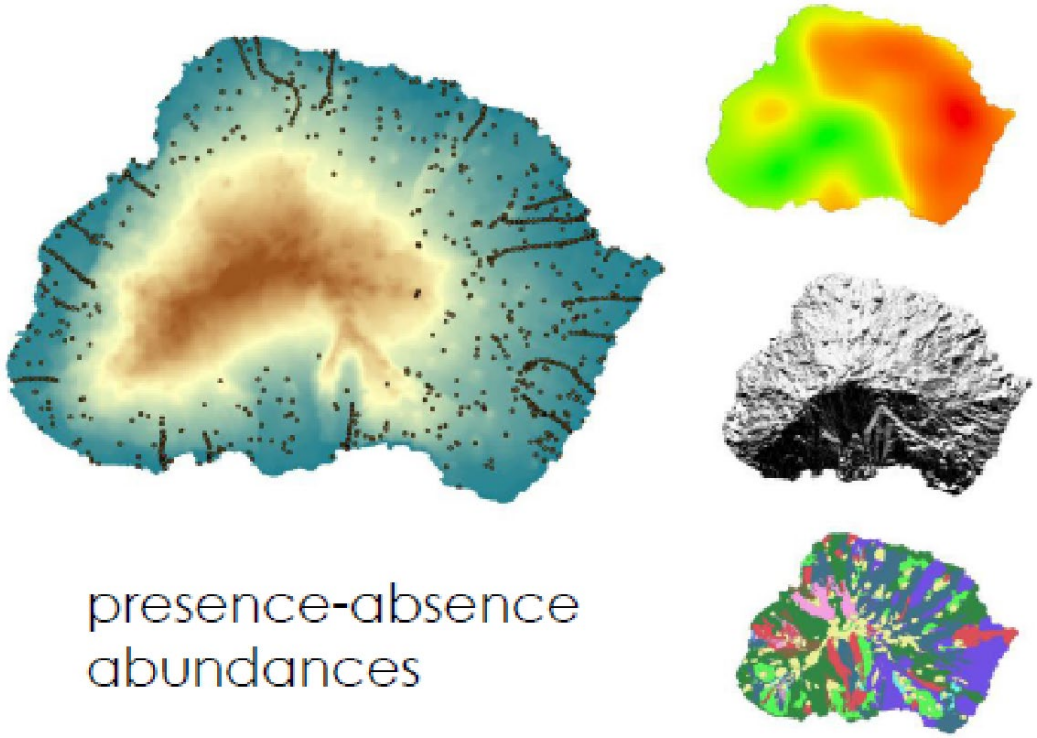
Scientific results

Framework synthesizing concepts across invasion timeline



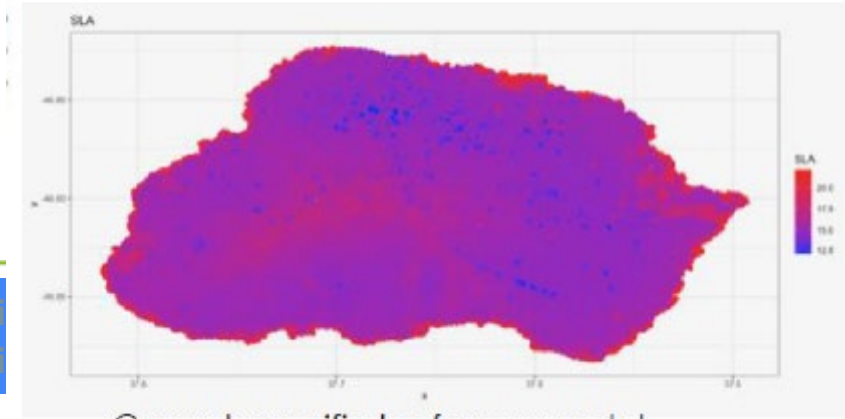
Scientific results

Marion island: functional diversity, ekosystém functioning, changes, alien species, climate scenarios



presence-absence
abundances

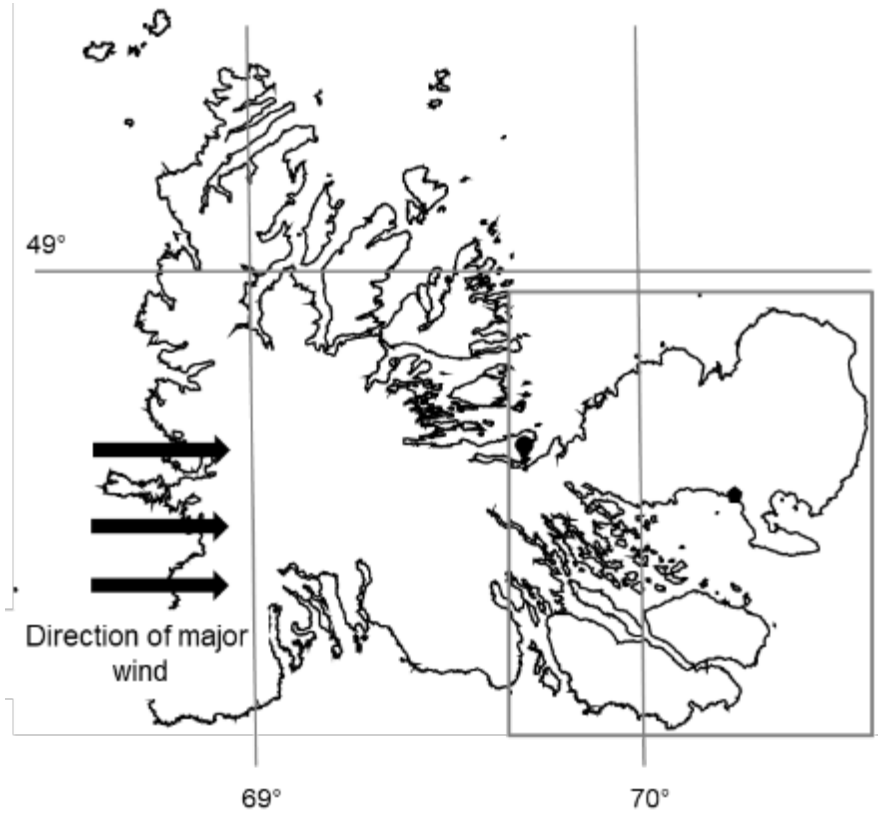
Environmental changes
Shift in species composition

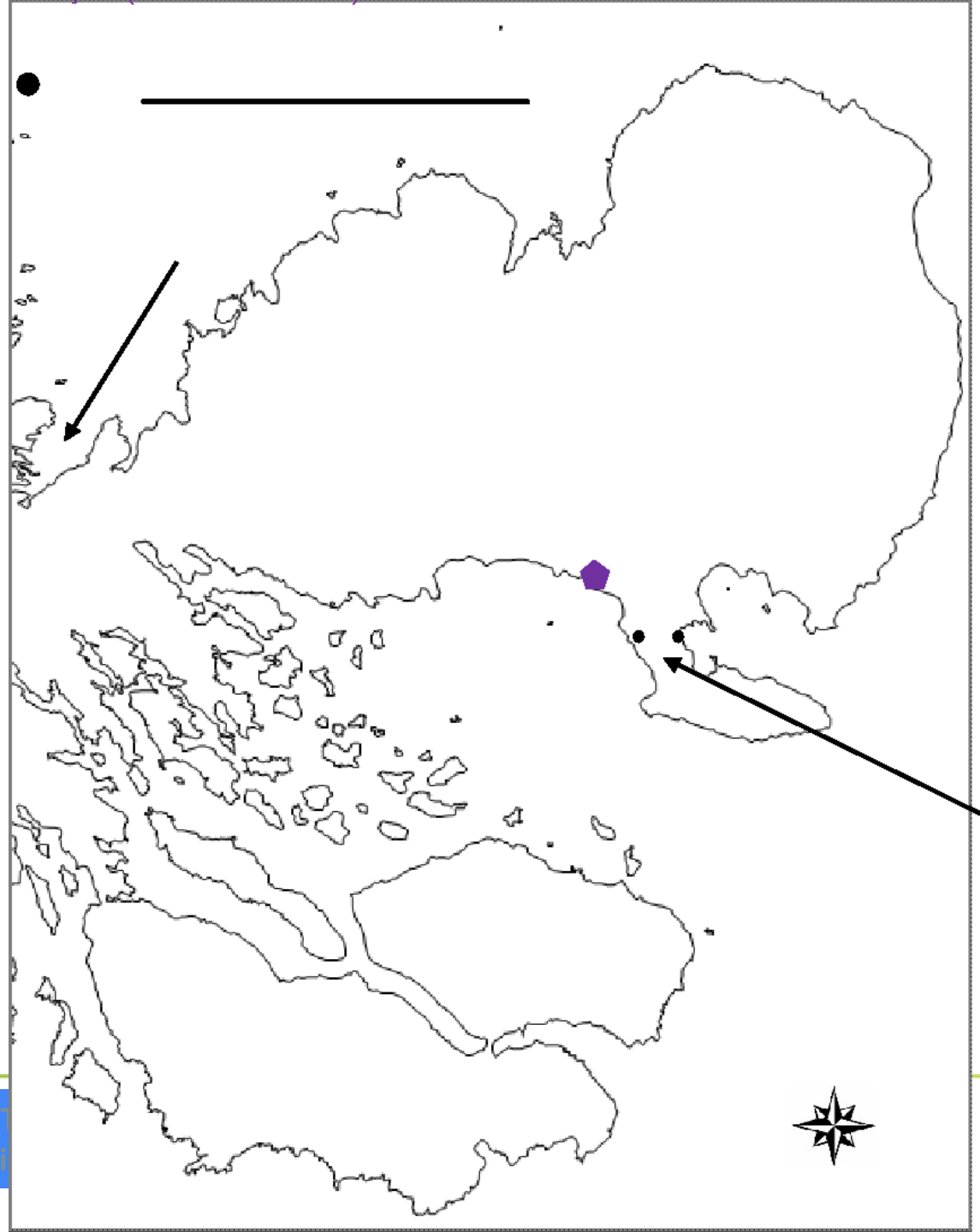


Current specific leaf area model

Scientific results

Invertebrate sampling





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Biodiversity and Cli

Scientific results

interaction with **CartoVege** project, map of the vegetation as a decision-making tool for management operations of the Nature Reserve.

TAF Natural Reserve (Terres Australes).

Policy and societal impacts / results

NP administrations; KRNAP and Šumava (Czech Rep.) ->
Strategy for IAS in Krkonoše; Vítková et al. 2023

regulation of *Lupinus polyphyllus* (Šumava; Perglová & Pergl 2024).

Policy and societal impacts / results

open source "**Guide pratique**" collection from Quae Editions (Espel,D. Agnola, P., Traclet, S. Dupont, V. and Renault, D. (2024). Habitats naturels terrestres des Terres australes françaises : Ile de la Possession, archipel Crozet. Collection Guide pratique. Quae (eds).

Policy and societal impacts / results

nature reserve Terres Australes Françaises -> construction of the '**Plan de Gestion de la Réserve Naturelle**'

designing a biodiversity monitoring programme for **Marion Island** ahead of mouse eradication

Acknowledgements

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BaltVib
Pathogenic *Vibrio* bacteria in the current and future Baltic Sea waters: mitigating the problem

By Prof. Dr. Matthias Labrenz (Leibniz Institute for Baltic Sea Research)

Consortium: KU - Marine Research Institute of Klaipėda University

UCPH - University of Copenhagen

EMÜ - Estonian University of Life Sciences

KTH - Royal Institute of Technology Stockholm

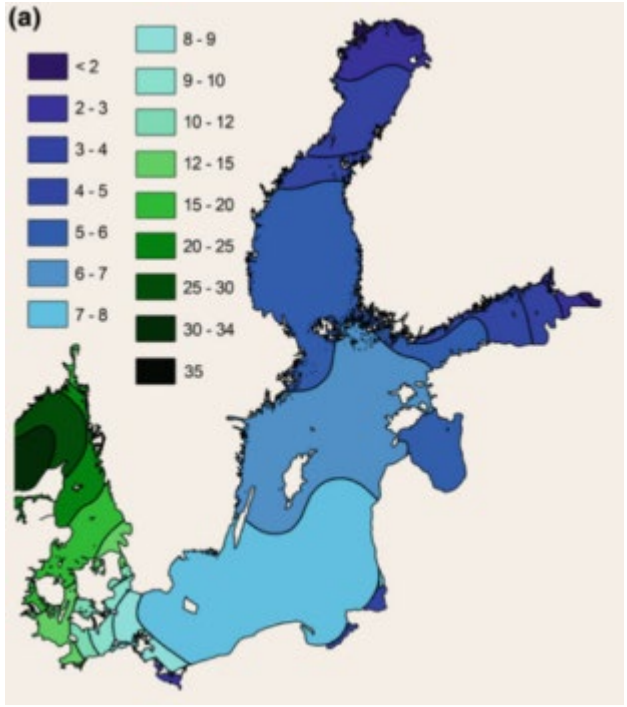
AAU - Åbo Akademi University

GEOMAR - Helmholtz Centre for Ocean Research Kiel

NMFRI - National Marine Fisheries Research Institute

Background

Baltic Sea



Biological Oceanography of the Baltic Sea, 2017

Vibrio vulnificus

- Worldwide occuring in brackish environments: Estuaries, lagoons, etc.
- Optimal growth at:
  - > 18 °C
  - Salinities between 5 and 25

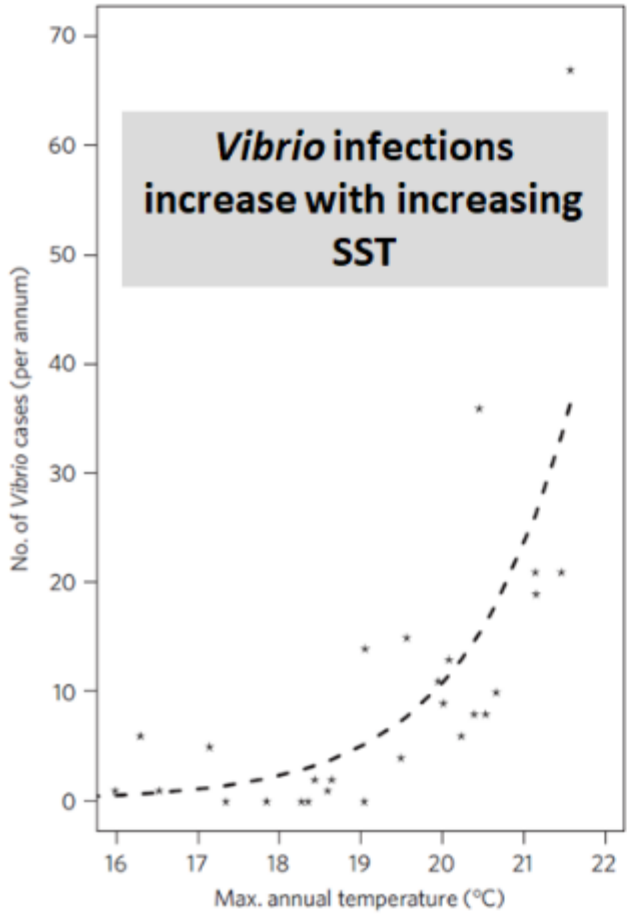
Causes skin infections, sepsis
Immune deficients at risk

Images courtesy of J. D. Oliver, University of North Carolina, NC, USA

- Carries one of the highest mortality rates of any bacterial pathogen
- Lethal within a few days

Robert Koch-Institut (RKI, VibrioNet); Zhao et al., PLOS ONE 2015; https://article.wn.com/view/2011/04/08/Bay_County_FL_One_person_dead_due_to_Vibrio_vulnificus/

Background *Vibrio vulnificus* and infections



Heatwave

Swimmers warned against Baltic Sea as German heat wave approaches

The health ministry in Germany's northeastern state of Mecklenburg-Western Pomerania warned that people living with HIV, the elderly, liver patients and alcohol addicts are particularly prone to bacterial infection.

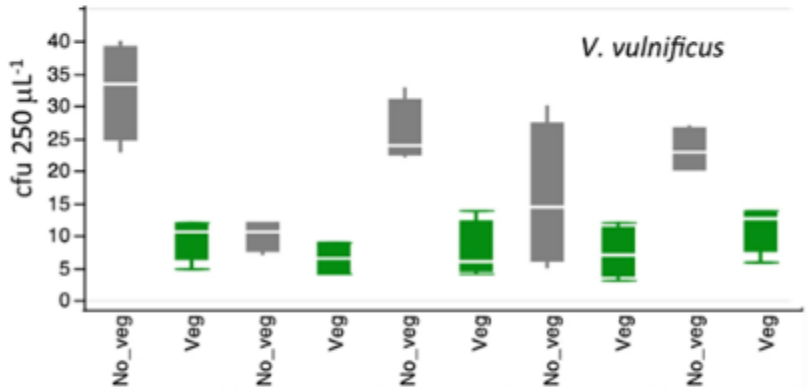
Baker-Austin, Nature Climate Change, 2013

Background

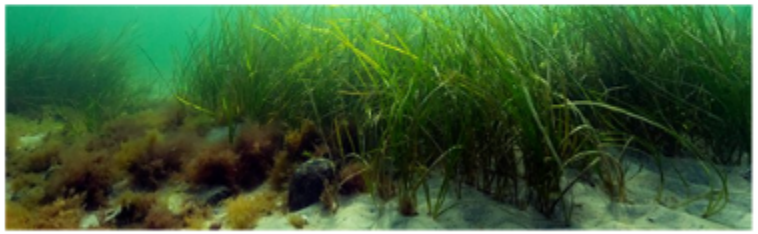
Mitigation measure

Mitigation measure | Seagrass as a local solution, reducing eutrophication as a regional solution

- Locally - Seagrass

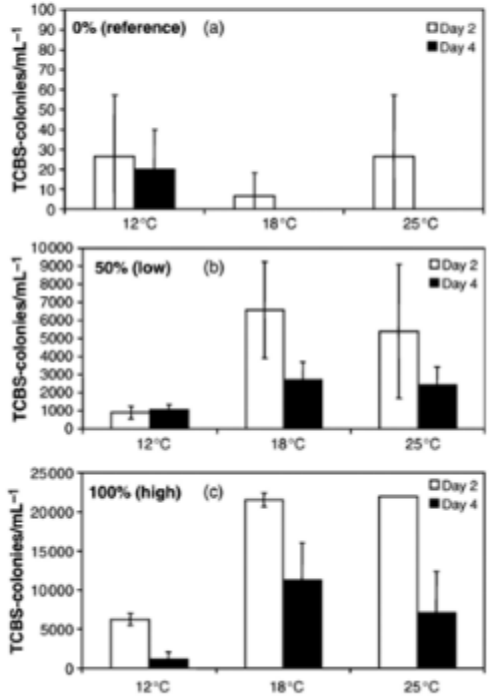


Modified Reusch et al. 2021



IOW / S. Kube

- Regionally - Eutrophication



0 mg C L^{-1} cyanobacterial DOM

2.1 mg C L^{-1} cyanobacterial DOM

4.2 mg C L^{-1} cyanobacterial DOM

Eiler et al. 2007

Methods

Mitigation measure

Field survey | Seagrass fields sampled covering the salinity and eutrophication gradient

- 19 stations
- 3 substation

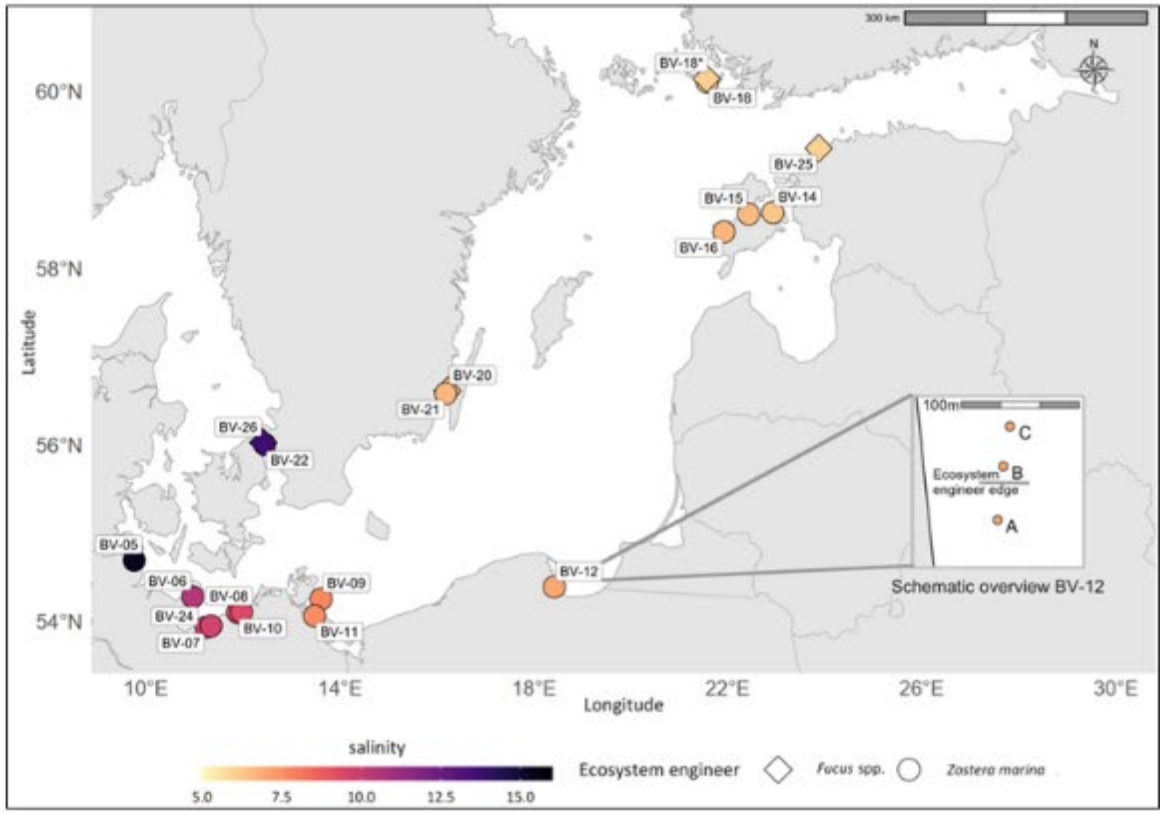
Prokaryotes – Eukaryotes – Macrobenthos – Nutrients – Chl-a – DOC/DON – POC/PON – Salinity – Grainsize – Temperature – DO – pH

Random Forest (RF) + Recursive Feature Elimination (RFE)

vvhA gene concentration

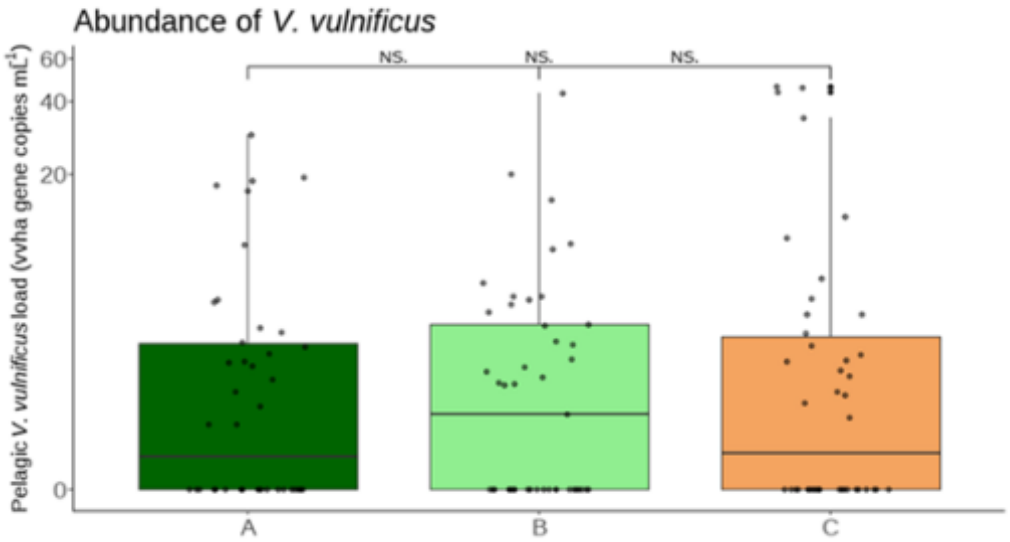
Derived abundance

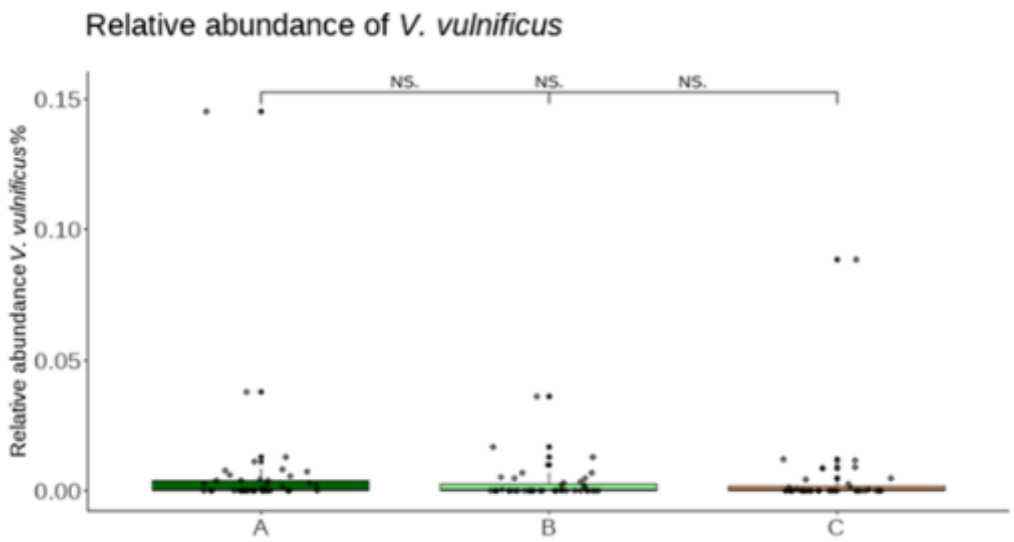
Important features



Scientific results

Local | Effect of Seagrass absent Baltic Sea wide



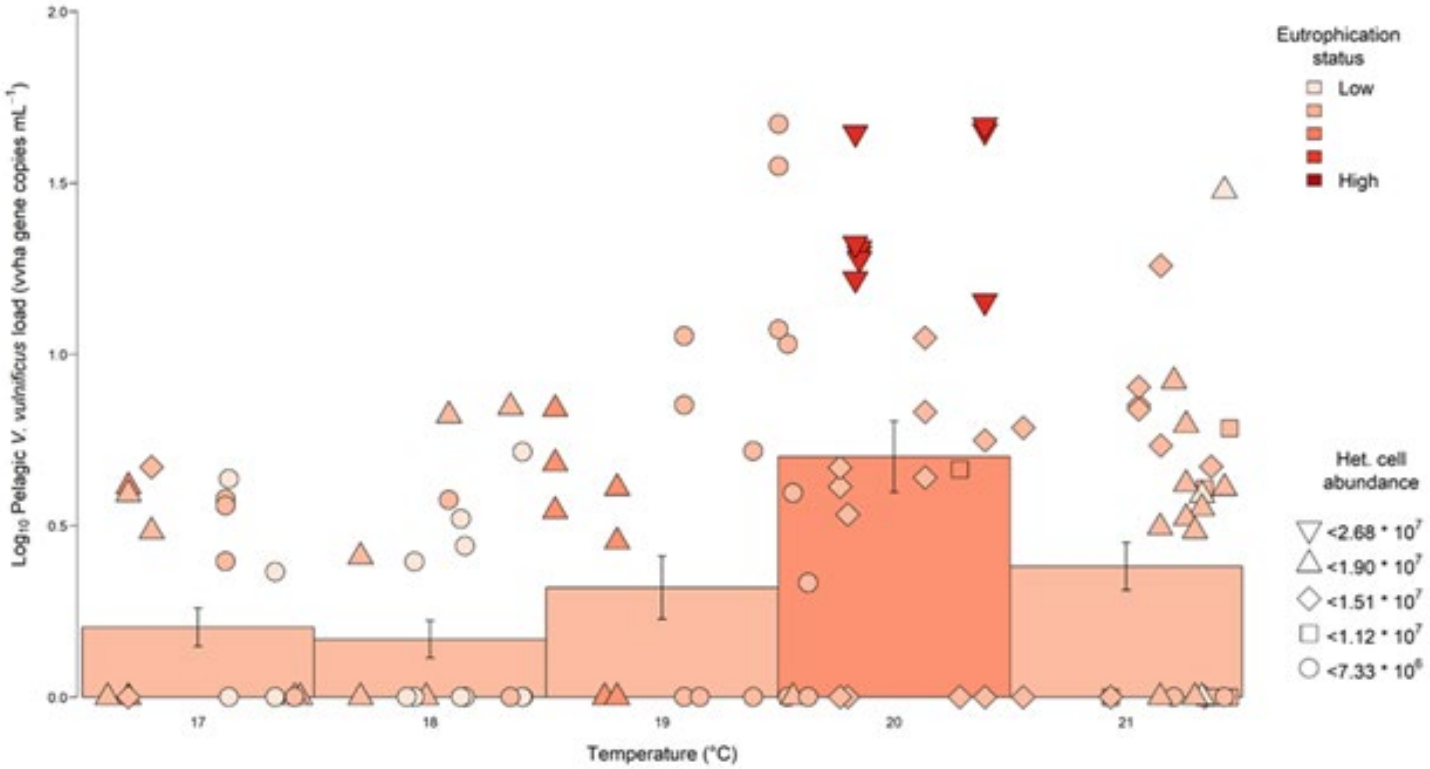


A = In the seagrass meadow
B = At the edge
C = Control station

Riedinger et al. (2024) Comm Earth Env

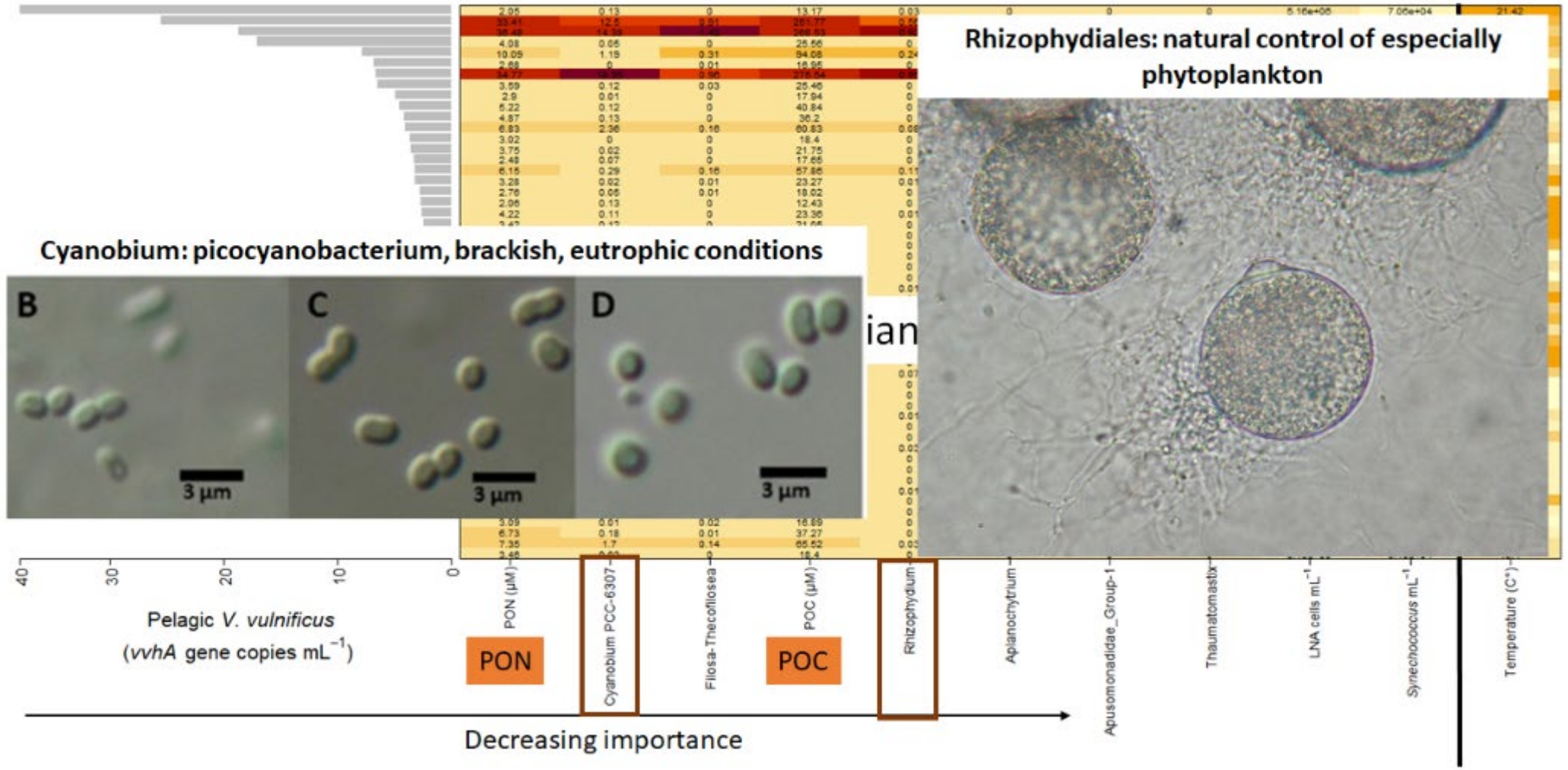
Scientific results

Regional | Eutrophication might influence *V. vulnificus* abundance



Riedinger et al. (2024) Comm Earth Env

Scientific results



Scientific results SUMMARY

Mitigation measure - Reduction of eutrophication likely the best approach

- Effectiveness of local restoration of Seagrass not shown

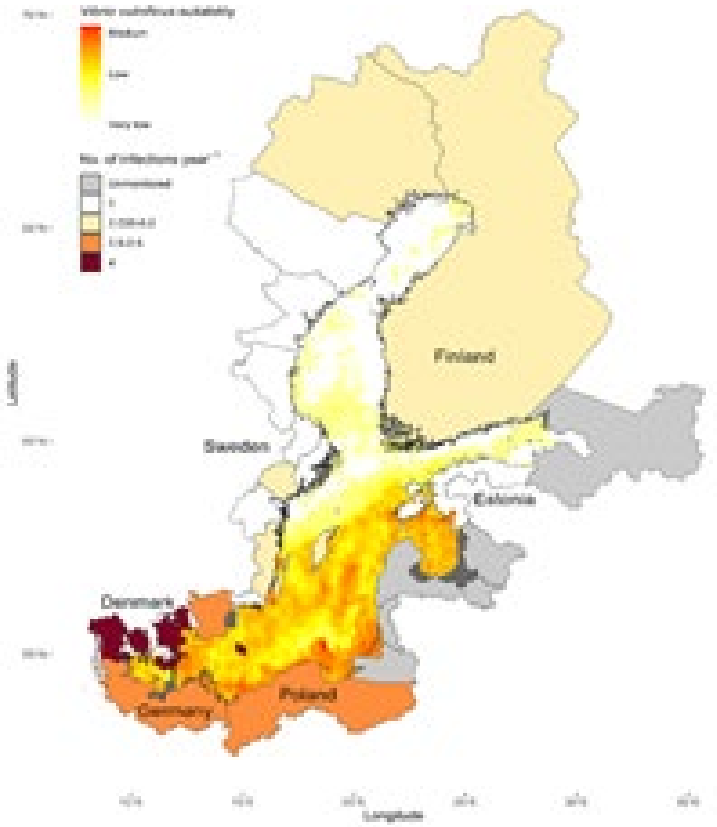
- *V. vulnificus* takes advantage of algae blooms

→Regional reduction of eutrophication would have an effect

- Development of *V. vulnificus* prediction model,

integrating algae blooms

- 6 Publications, 2 manuscripts submitted, 1 follow up project



Riedinger et al. (2025) Comm Earth Env

Policy and societal impacts / results

- Effectiveness of nature-based solutions is highly context-specific
- Short-term solutions may be more difficult to achieve: understanding of long-term approaches should be created

Acknowledgements



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Research Council of Lithuania

NATIONAL SCIENCE CENTRE POLAND

Eesti Teadusagentuur
Estonian Research Council

Innovation Fund Denmark

FORMAS

ACADEMY OF FINLAND

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NAPERDIV

Nature-based perennial grain cropping as a model to safeguard functional biodiversity towards future-proof agriculture

Prof. Benjamin Dumont & Prof. Frank Rasche

Consortium : F. Rasche, K. Martin, C. David, F. Celette, O. Duchene, C. Bathelier, K. Hrynkiewicz, T. Cernava, K. Michl, S. Issifu, L.-M. Dimitrova Martensson, A. Barreiro, S. Li, C. Emmerling, A. Forster, A. Balogh, B. Dumont, P. Aubry

Consortium

SLU

LIÈGE université Gembloux Agro-Bio Tech

ISARA AGRO SCHOOL FOR LIFE

NICOLAUS COPERNICUS UNIVERSITY IN TORUŃ

UNIVERSITÄT TRIER

UNIVERSITÄT HOHENHEIM

SAPIENTIA HUNGARIAN UNIVERSITY OF TRANSYLVANIA

TU Graz

A picture is worth a thousand words

A multi-year pan-EU experimental network

Scientific results

- Intermediate wheatgrass (**IWG**) / *Thinopyrum Intermedium* / **Kernza®** growth is driven by a resource-conservative strategy. Allocation of C and N to organs revealed that the strategy of perenniality lied mainly in stem bases storage and root exudates.

- Extrapolation of results at EU scale using process-based soil-crop modelling

Figure : Illustration of a clean and fresh sample of belowground and ground-level biomass of Th. intermedium from the BE1 experimental site (i.e., stem bases, rhizomes and roots).

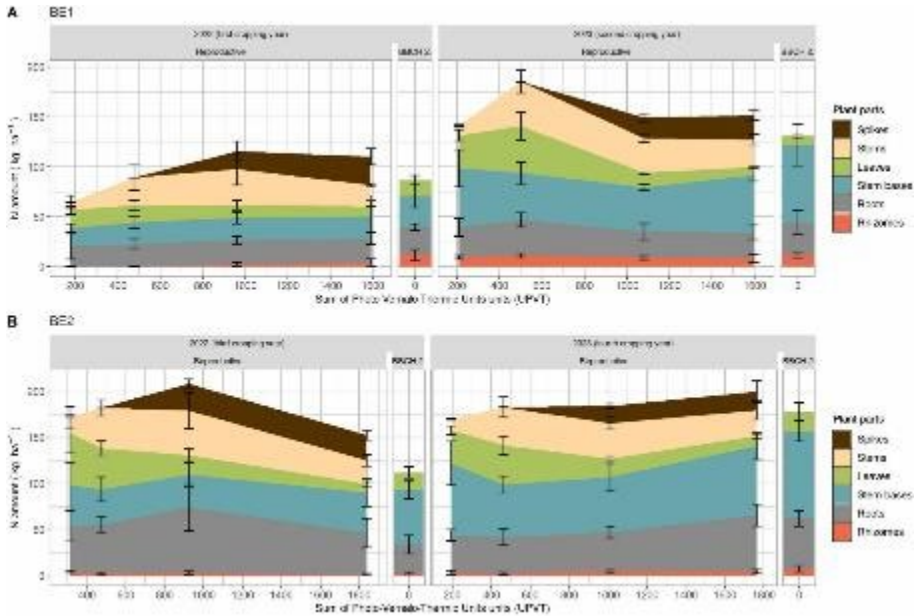
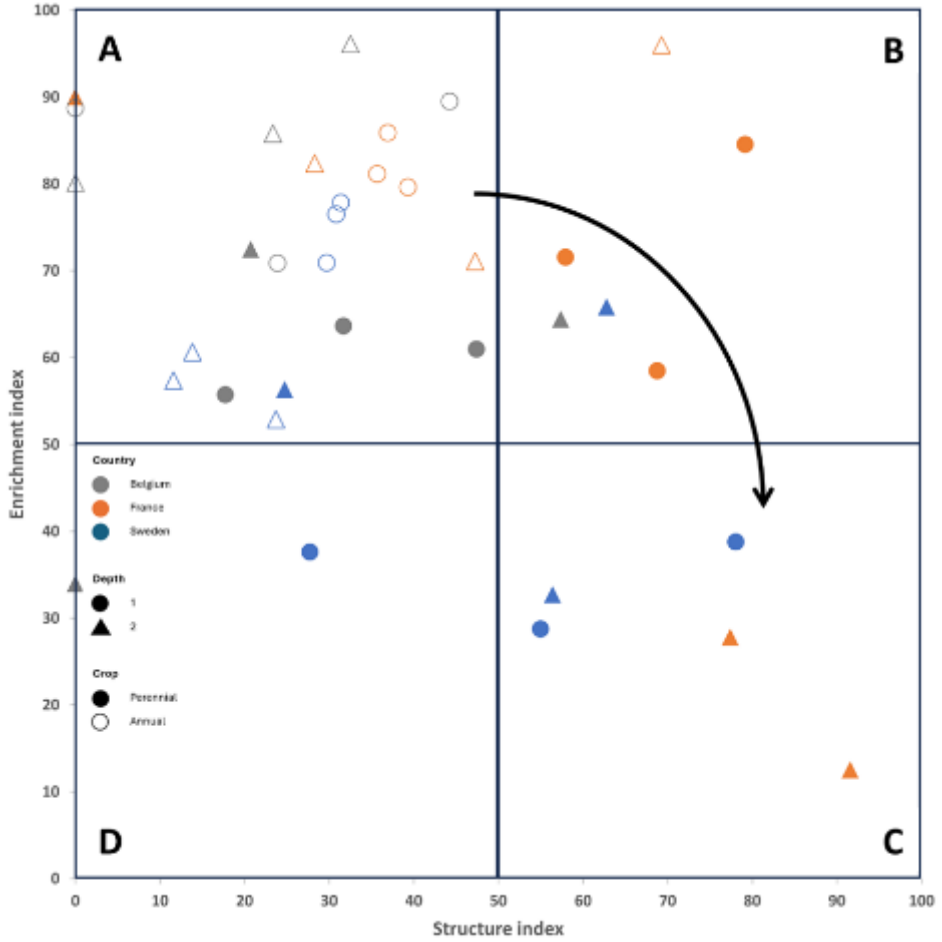


Figure : Nitrogen (N) allocation within Th. intermedium plant parts (A) for the BE1 experimental site (i.e., 1st and 2nd cropping seasons in 2022-2023) and (B) BE2 experimental site (i.e., 3rd and 4th cropping seasons in 2022-23). X-axis represents accumulation of photo-vernalo-thermic units. Black error bars represent the mean ± st.

Fagnant, Aubry et al., 2025 https://doi.org/10.1016/j.eja.2025.127522

Scientific results



- IWG creates a better habitat for earthworms due to its more excessive root growth and an increased food source. This leads to a more species-rich community with representatives of all ecological earthworm categories.

- The soil nematode community structure (Figure) revealed that, compared to annual cereal sites, IWG sites exhibit greater food web structure and appeared as a generally undisturbed system with efficient nutrient cycling and balanced distribution of feeding types, as well as higher metabolic footprint values for root feeders (including plant-parasitic nematodes) and fungivores.

Figure : Depiction of the structure (SI) and enrichment index (EI) and divided into four Quadrats after Ferris et al. The arrow indicates a shift from Quadrat A to C following a transition of an annual (empty shapes) to a perennial (filled out shapes) cropping system. A: high disturbance, N-enriched, bacterial decomposition channel, low C-N ratio, disturbed food web condition. B: low to moderate disturbance, N-enriched, balanced decomposition channels, low C-N ratio, maturing food web condition. C: undisturbed, moderate enrichment, fungal decomposition channel, moderate to high C-N ratio, structured food web condition. D: stressed system, depleted enrichment, fungal decomposition channel, high C-N ratio, degraded food web condition.

Forster et al., 2023 10.1016/j.ejsobi.2023.103561 & Forster et al., 2024 10.1002/sae2.12112

Scientific results

- Compared to annual cereals, the root microbiome of IWG showed signatures of a more stable and connected microbial network structure.
- IWG harbored a different bacterial community composition, characterized by a higher diversity and higher richness.

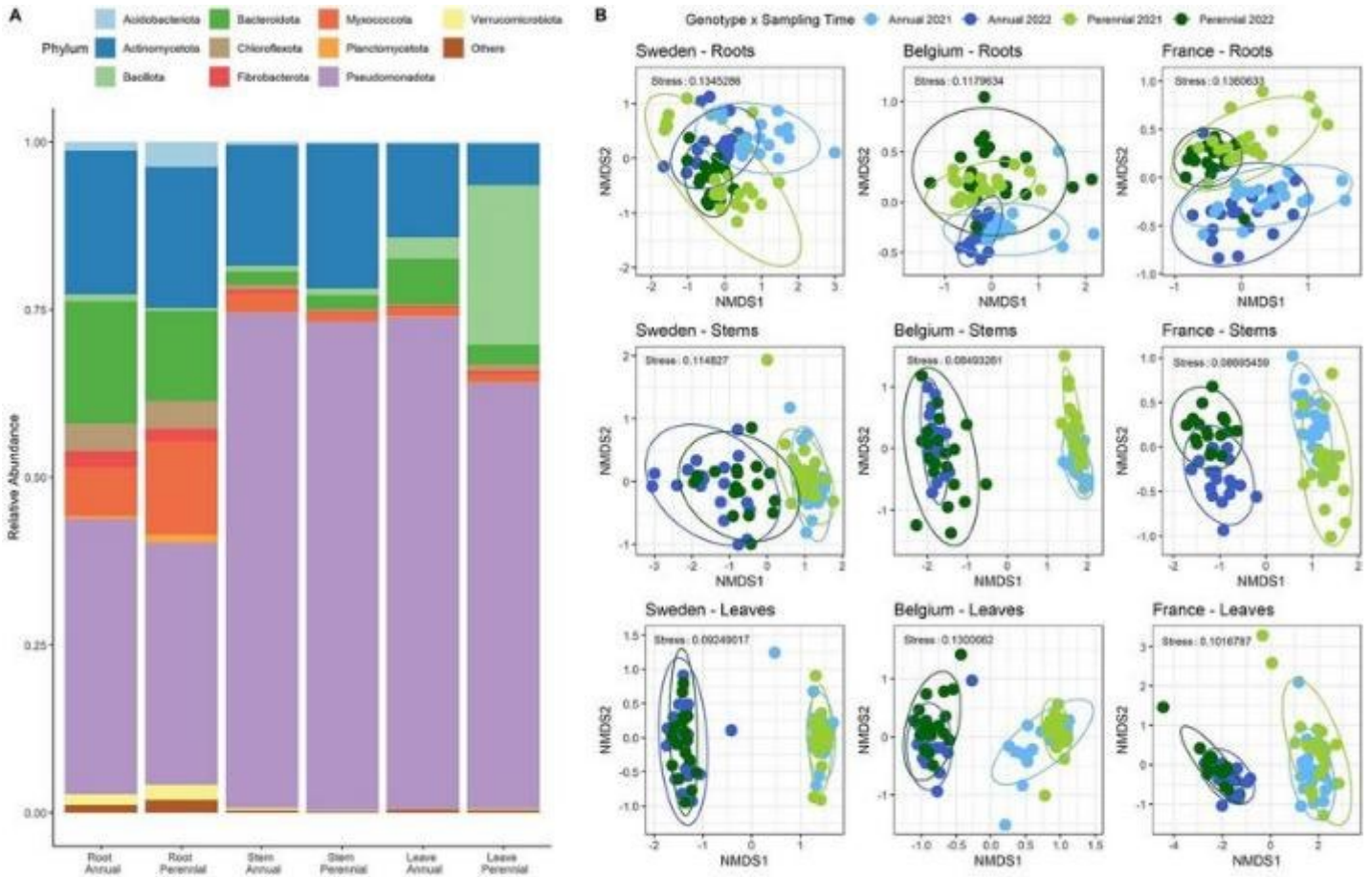


Figure : Bacterial taxonomic composition of root, stem, and leaf endophytes from intermediate wheatgrass and annual wheat at phylum level

Michl et al., 2024 10.1093/ismeco/ycae165

Scientific results

- Evidence obtained through a metabolome analysis revealed that IWG hosts multiple phytochemicals that operate as biological nitrification inhibitors.

- Our research revealed the intricate role of the metabolome of IWG in achieving control of nitrification, which has implications for ecosystem health.

Table : Interactive effects of metabolite combinations on nitrifiers

Combinations	*N. europaea*	*N. multiformis*	*N. briensis*	*N. tenuis*	*N. viennensis*
CA + PHE	− 0.03	− 0.04	− 0.06	-0.08	− 0.06
CA + VAN	− 0.11	− 0.13	− 0.29	− 0.30	− 0.29
CA + VA	− 0.57	− 0.04	14.00	0.72	− 0.06
VA + VAN	− 0.36	− 0.38	9.60	0.64	− 0.45
VA + PHE	− 1.38	− 0.59	42.54	3.12	− 0.03
VA + SA					0.03
VAN + SA					0.08

CA caffeic acid, *PHE* phenylalanine, *VA* vanillic acid, *VAN* vanillin, and *SA* syringic acid. The operative sign + is used to signify combinations of the metabolites. Interpretation of q values (Jin equation); < 0.85 means antagonistic interaction; 0.85–1.15 means additive interaction; ≥ 1.15 means synergistic interaction [51]

Issifu et al., 2024 10.1007/s00248 - 024 - 02456 - 2

Scientific results

- By engaging stakeholders through the set-up of a farmers' network, the introduction of IWG in cropping system was analyzed from the farmer's perspective, as a set of decision plans and goals.

- Most of farmers showed willingness to experiment with a new crop because
  - They wanted to try something that is not commonly done.
  - They were looking for solutions to agronomic, economic, or climatic issues.

- Satisfaction to work with scientists was mentioned, as well as learning and exchanging knowledge, and limiting the impact of agriculture for the future.

Ginot et al., 2024 https://doi.org/10.1007/s13593-024-00993-1

Scientific results

20 papers published in int. peer-reviewed journals

4 PhD theses

1 consolidated DB

1 application - candidate "novel food" @ EFSA

And more are to come **;-)**

Policy and societal impacts / results

- Perennial grain crops - among which IWG was here studied - were again proven to provide key ecosystem services, including soil protection, reduced nutrient loss, lower pest needs, and climate mitigation.

- NAPERDIV widely contributed to verify the key role of perennial grain cropping systems in enhancing biodiversity at macro- and micro-scale, benefiting to the "supporting" and "regulating" categories of ecosystem services.

- IWG creates favorable conditions for a diverse soil food web, including improved nutrient cycling and a heterogeneous resource environment, regardless of climatic conditions, establishing it as an agricultural management system characterized by a greater stability and resilience

- IWG has a great potential to meet consumer demand for nutritious and environmental-friendly food products. Provided it opens new perspective, farmers were very keen to adopt the crop.

- The envisioned adoption of perennial-based cropping system, as NBS, aligns with societal goals for sustainable, resilient, eco-friendly food systems in Europe.

Thanks to our EU and national funding organisations

FORMAS

fnrs FREEDOM TO RESEARCH

RÉPUBLIQUE FRANÇAISE

anr agence nationale de la recherche

NATIONAL SCIENCE CENTRE POLAND

DFG

FWF Austrian Science Fund

biodiversa+ European Biodiversity Partnership

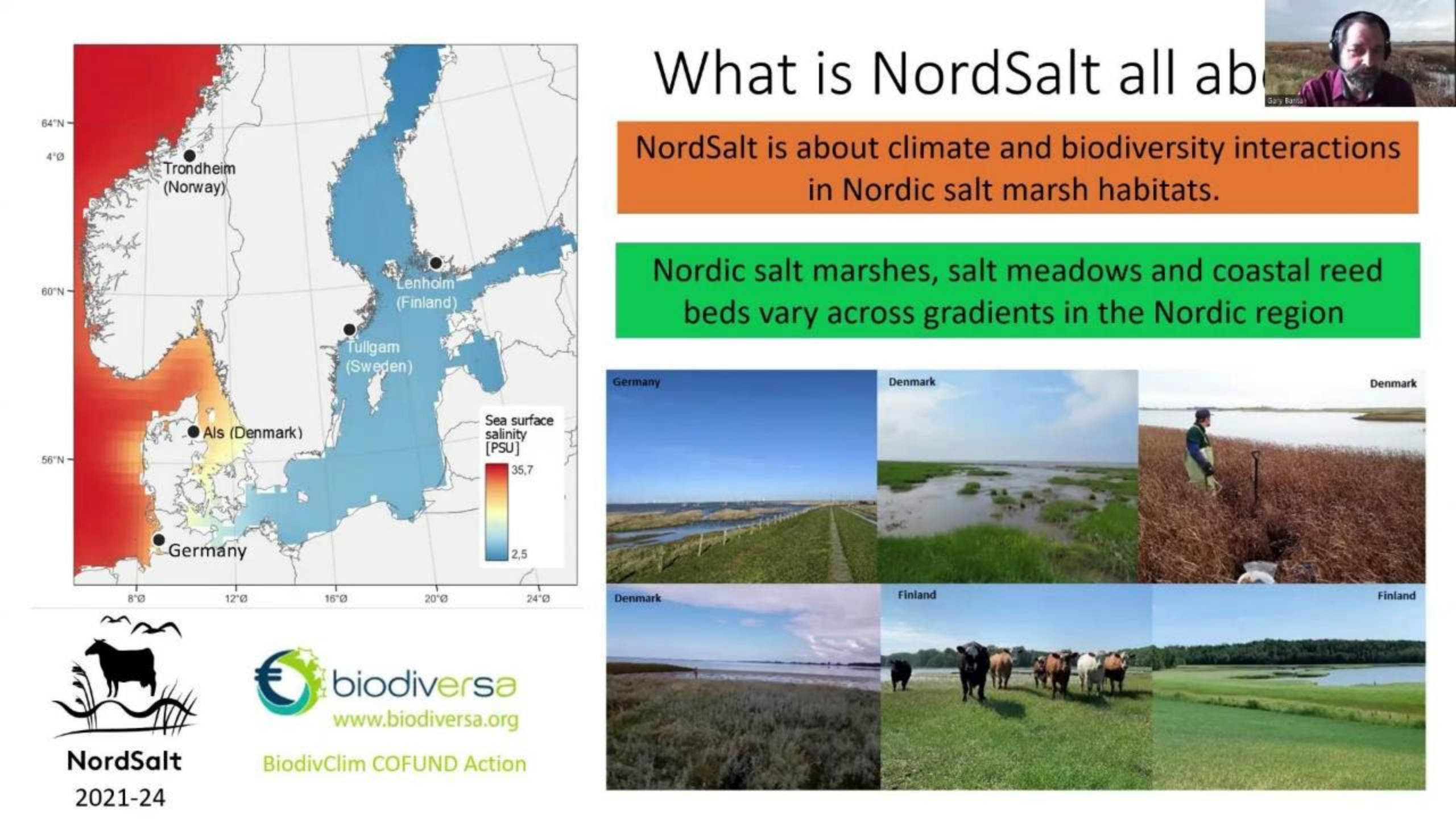
BiodivClim ERA-NET COFUND
Biodiversity and Climate Change

Thanks for your attention

https://naperdiv.uni-hohenheim.de/

biodiversa+
European Biodiversity Partnership

BiodivClim ERA-NET COFUND
Biodiversity and Climate Change



What is NordSalt all ab

NordSalt is about climate and biodiversity interactions in Nordic salt marsh habitats.

Nordic salt marshes, salt meadows and coastal reed beds vary across gradients in the Nordic region

NordSalt
2021-24

biodiversa
www.biodiversa.org
BiodivClim COFUND Action

Panel discussion - Session 3

Moderated by ***Paola Lepori,*** *Senior Expert Biodiversity & Nature-based Solutions at ICLEI Europe*

- Questions

biodiversa+
European Biodiversity Partnership

[11:05 - 12:30]

Funded Projects Presentations – Session 4

Synergies and trade-offs between policies on biodiversity, climate and other relevant sectors, and the role of agents of change

Moderated by ***James Lloyd***, *Strategy and advocacy lead at Nature4Climate*

Presented projects - Session 4

- **EASMO**, Eastern Tropical Pacific reef fish on the move: biodiversity reorganisation and societal consequences, presented by Sonia Bejarano
- **EPICC**, Environmental Policy Instruments across Commodity Chains Multilevel governance for Biodiversity-Climate in Brazil, Colombia, Indonesia, presented by Tomaso Ferrando
- **FUNPOTENTIAL**, Potential of functional diversity for increasing the disturbance resiliency of forests and forest-based socio-ecological systems, presented by Mikko Peltoniemi
- **PRINCESS**, Peatland Rewetting In Nitrogen-Contaminated Environments: Synergies and trade-offs between biodiversity, climate, water quality and Society, presented by Eric Verbruggen
- **SUSTAIN-COCOA**, Sustainable sourcing policies for biodiversity protection, climate mitigation, and improved livelihoods in the cocoa sector, presented by Patrick Meyfroidt

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EASMO
Eastern Tropical Pacific Reef fish ***on the move***: Biodiversity reorganisation and societal consequences

By Sonia Bejarano

Jerry Tjiputra, Priscilla Mooney, Chiara de Falco, Fernando Zapata, Fresia Villalobos, Tayler Clarke, Camilo Mora, Carolina Madeira, Pedro Costa, Mario Diniz, Anna Woodhead, Albert Norström, Jan McDonald, Juan Pablo Zamora.

easmo

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BiodivClim ERA-NET COFUND
Biodiversity and Climate Change

Scientific results

How is the Eastern Tropical Pacific **climate** changing?

How are **reef fish** redistributing in response to climate change?

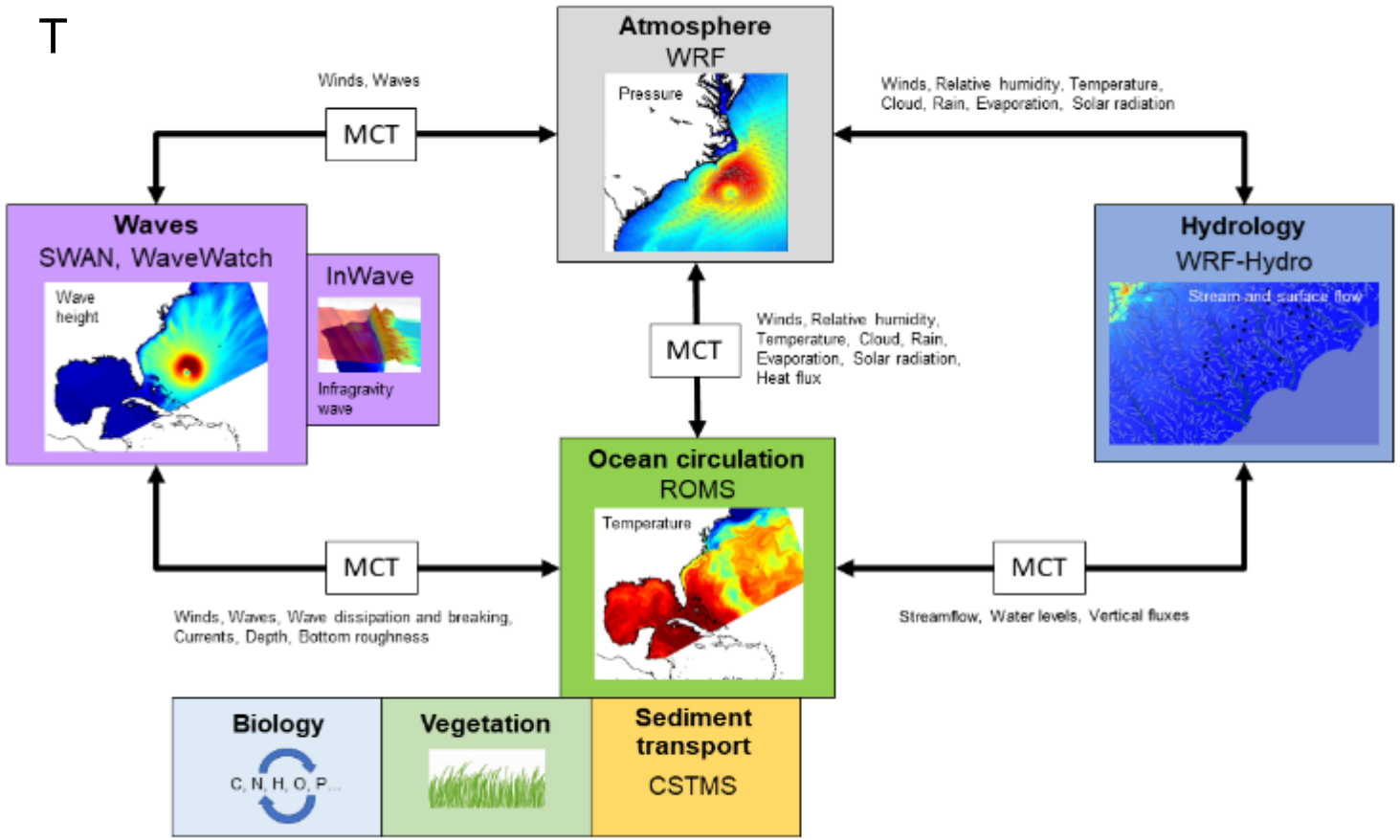
How do **people** perceive and react to these changes?

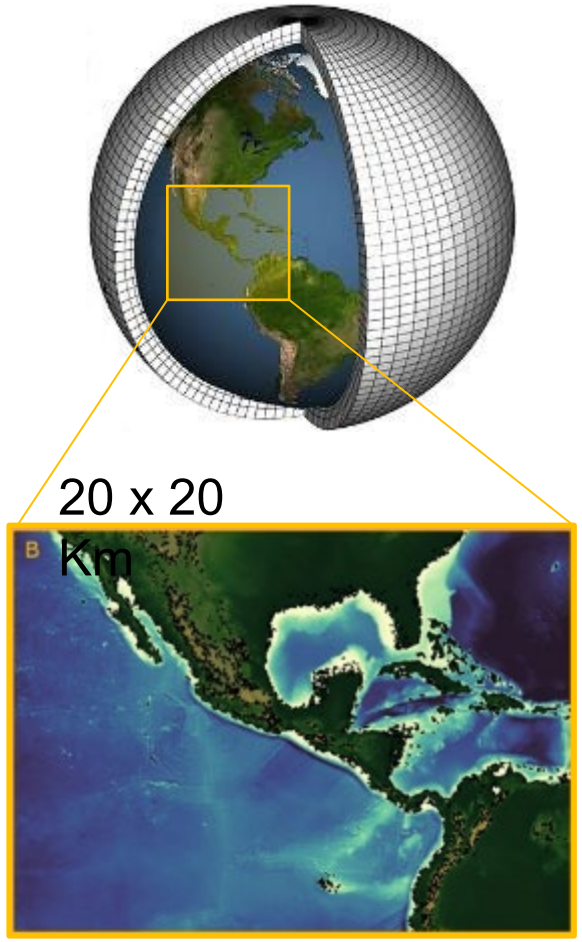
Why does this matter for **science**, **stakeholders** and **policy**?

Scientific results

Climate change

COAWS
T

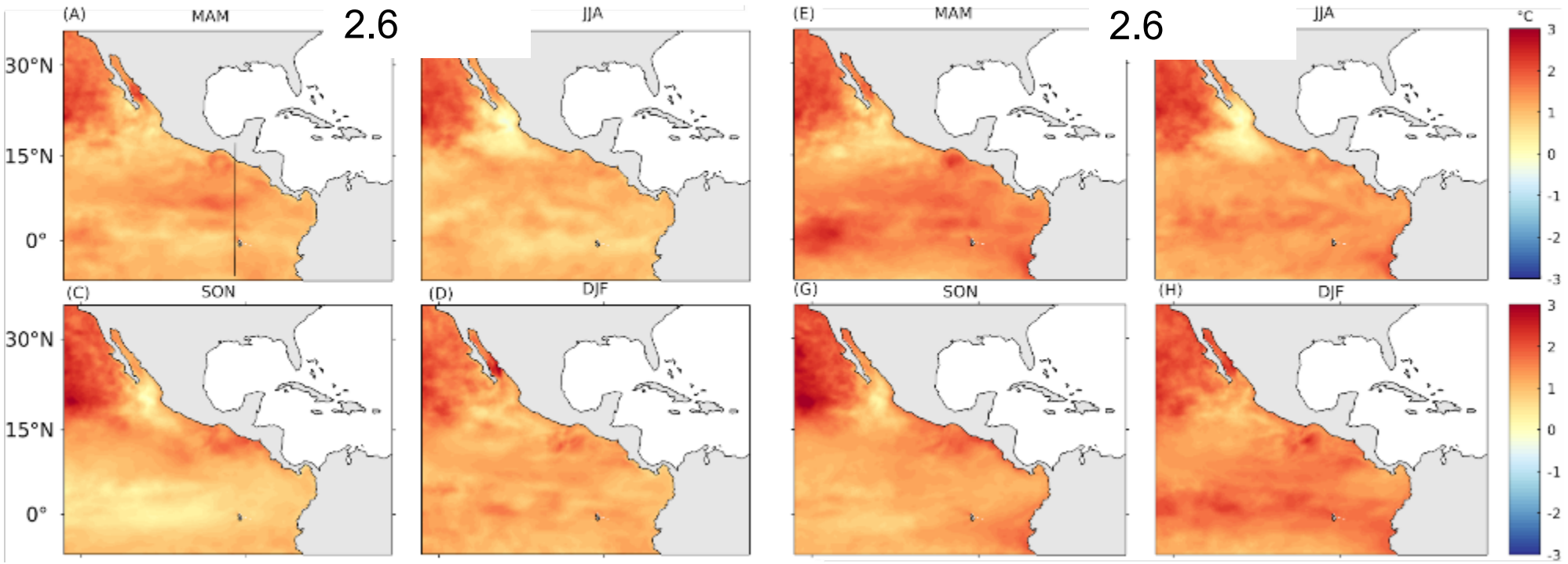




Scientific results

By 2050, overall sea surface warming (≥1°C), strongest warming in northern Mexico,

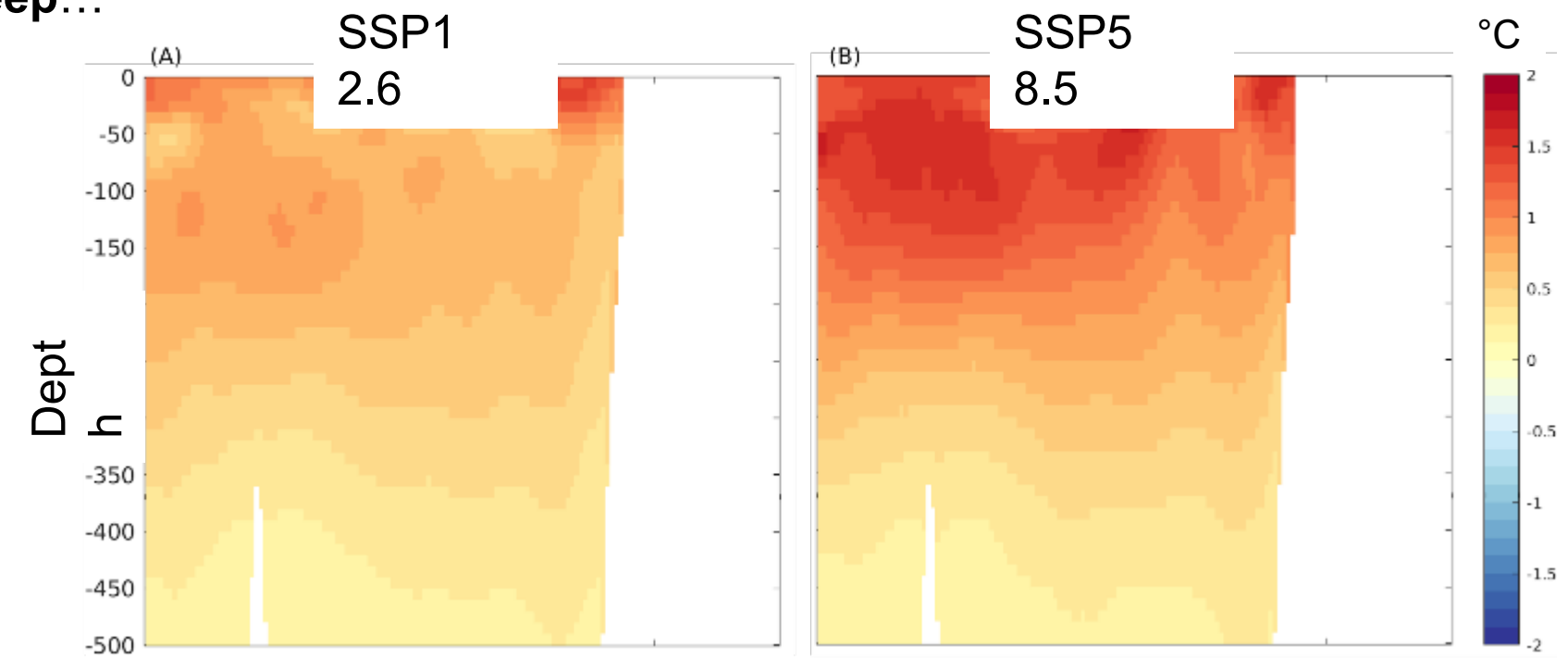
same magnitud ng in both SSP1 2.6 and SSP5 8



De Falco *et al* (*in prep*)

Scientific results

But the **difference runs deep**…



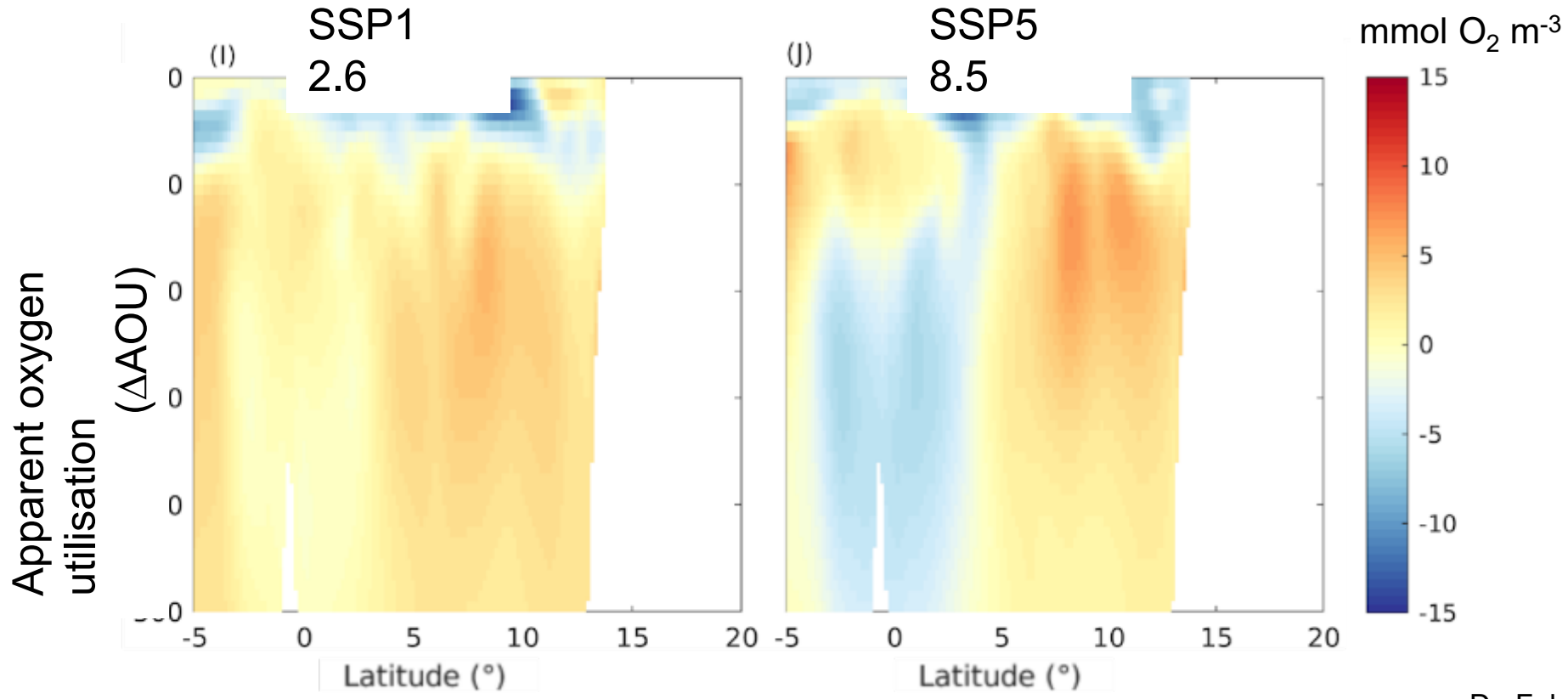
Warming remains **superficial**

Up to **200 m** warming is >1°

De Falco *et al* (*in prep*)

Scientific results

Deoxygenation



De Falco *et al* (*in prep*)

Scientific results

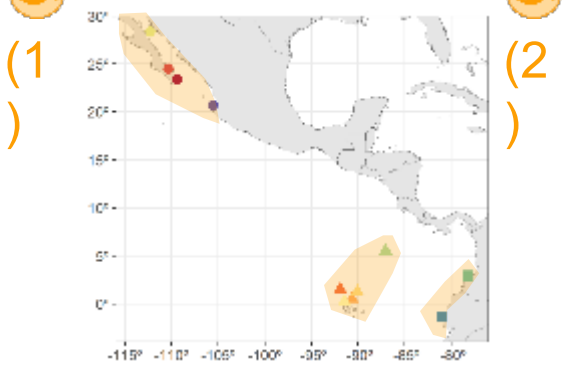
What drives **latitudinal gradients** of reef fish **biodiversity** (1 time point)

(1)

Scientific results

What drives **latitudinal gradients** of reef fish **biodiversity** (1 time point)

(1)



(2)

Past climate-driven fish **redistribution** (2012 – present)

Scientific results

What drives **latitudinal gradients** of reef fish **biodiversity** (1 time point)

(1)

(2)

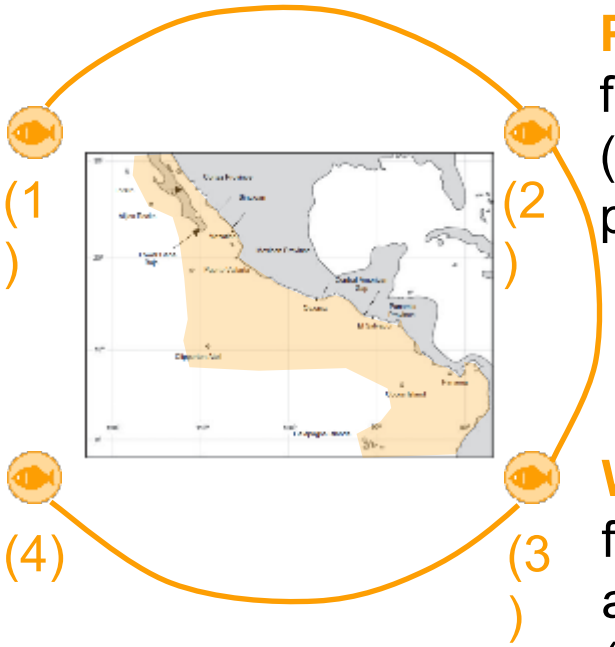
Past climate-driven fish **redistribution** (2012 – present)

(3)

Warming effects on fish benefits for nature and people (experiment)

Scientific results

What drives **latitudinal gradients** of reef fish **biodiversity** (1 time point)



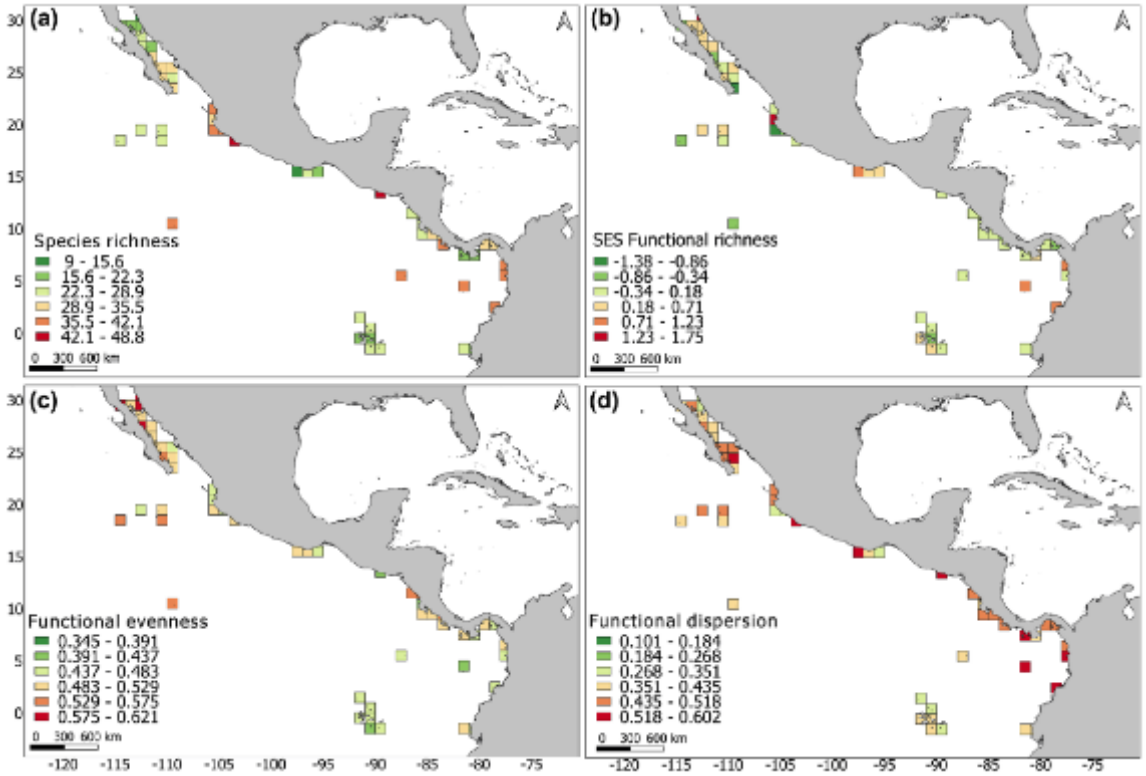
Past climate-driven fish **redistribution** (2012 – present)

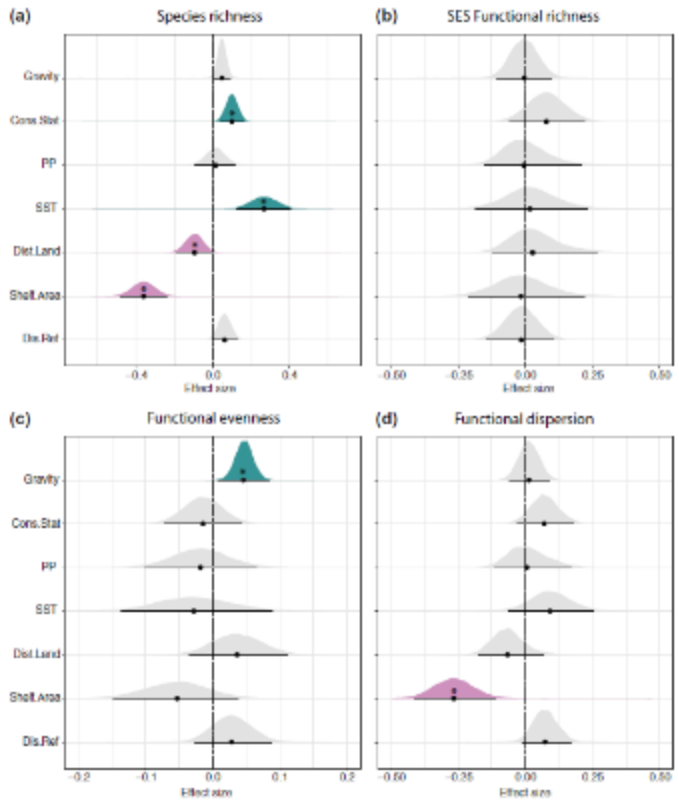
Modelling near-future redistribution of fish and associated benefits for nature and people

Warming effects on fish benefits for nature and people (experiment)

Scientific results

(1) Four biodiversity facets varied differently across latitude influenced by different drivers

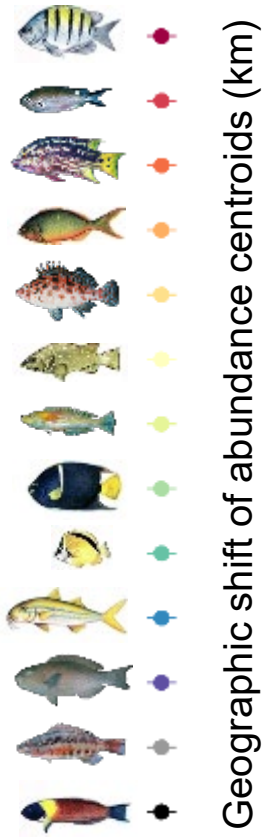




Dubuc *et al* (2023) Ecography

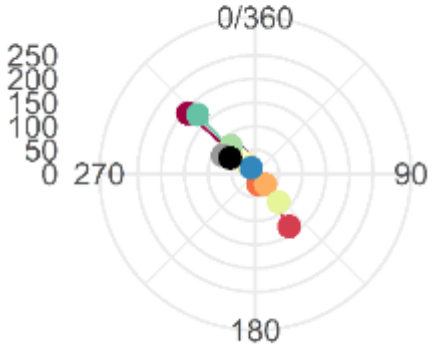
Scientific results

(2) Climate-driven species range shifts in response to warming and cooling (2012 to present)

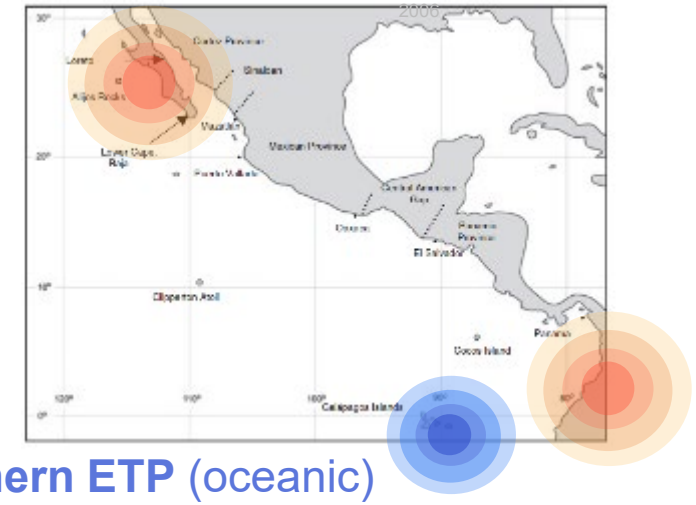


Geographic shift of abundance centroids (km)

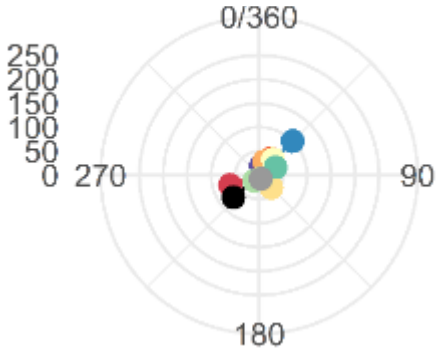
Northern ETP (continental)



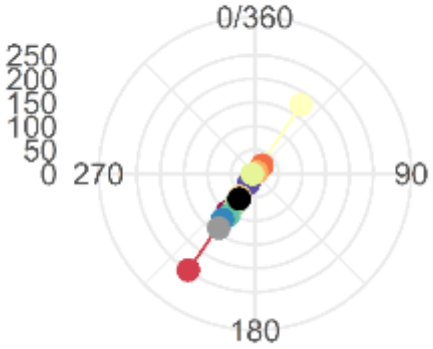
Modified from Craig *et al*



Southern ETP (oceanic)



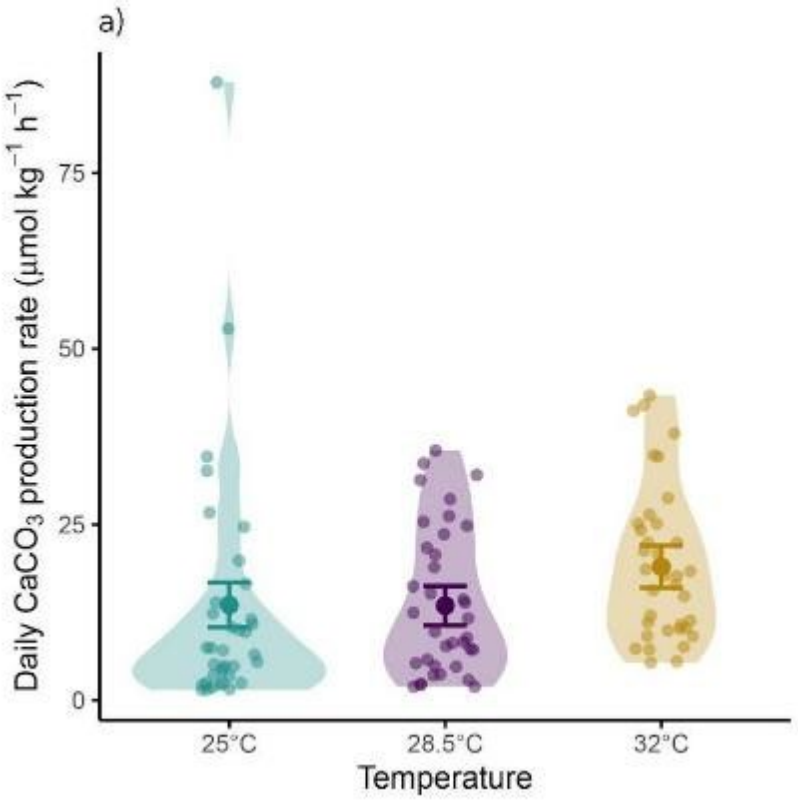
Southern ETP (continental)



Clarke *et al* (*in prep*)

Scientific results

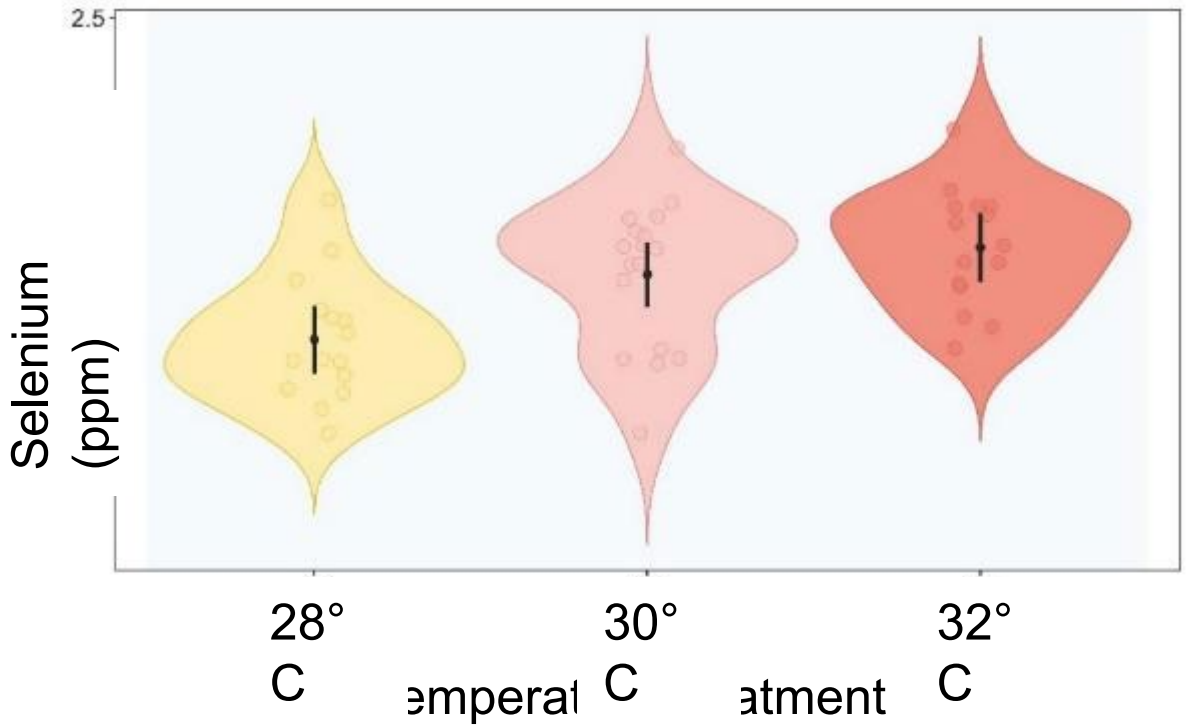
(3) Warming slightly (but significantly) changes fish role within the inorganic carbon cycle



Kuek *et al* (*in prep*)

Scientific results

(3) Warming slightly (but significantly) changes the nutritional composition of reef fish (Selenium content)



von Hammerstein *et al* (*in prep*)

Scientific results

(4) **Near future changes** in functional diversity and benefits for nature and people

Andrea Arriaga-Madrigal

PhD 2024-2028

ZMT University of Bremen

DAAD Deutscher Akademischer Austauschdienst German Academic Exchange Service

EASMO PARTNER SUPERVISION

Scientific results

Societal perceptions and adaptation to change

What ecological and environmental changes have artisanal fishers **perceived** since 1970s and how do they **respond**? **(interviews)** (1)

Woodhead *et al* (*in prep*)

Scientific results

Societal perceptions and adaptation to change

What ecological and environmental changes have artisanal fishers **perceived** since 1970s and how do they **respond**? **(interviews)** (1)

(2) How prepared are governance frameworks to manage resources *on the move* **(Legal desktop analysis)**

Woodhead *et al* (*in prep*)

Scientific results

Societal perceptions and adaptation to change

(1) Key informant interviews (9), Group interviews (3), Individual interviews (23)

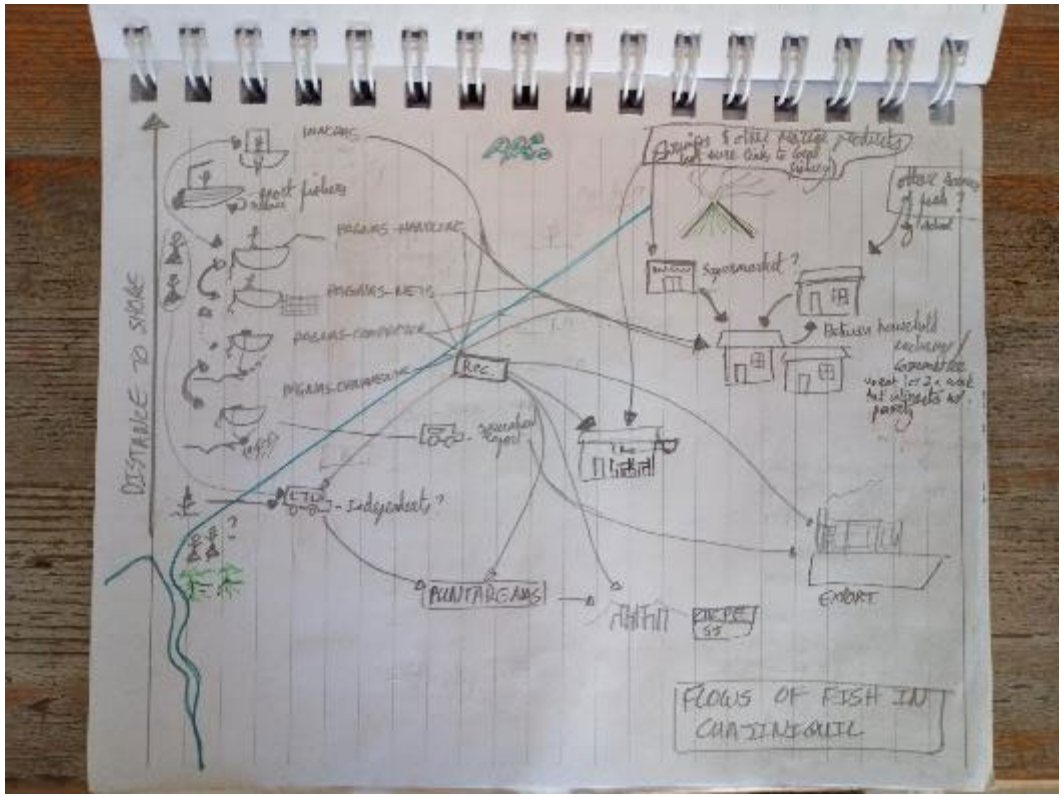
Cinner and Barnes 2019

Woodhead *et al* (*in prep*)

Scientific results

Societal perceptions and adaptation to change

(1) Climate-driven changes in fishery resources are one of many serious challenges



Domestic abuse
Fatalities at sea
Teenage alcoholism
Life threatening injuries

Changes in fishery resources

Family trauma
Periods of hunger
Illegal migration
Drug addiction
Displacement due to floods

Important gender differences in the adaptive capacity to changes in fishery resources

Woodhead *et al* (*in prep*)

Scientific results

Societal perceptions and adaptation to change

(2) **Legal database** of governance frameworks Colombia, Panama, Costa Rica

Zamora *et al* (*in prep*)

Scientific results

Societal perceptions and adaptation to change

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30.07.2025 Comparative **legal analysis Colombia**, **Costa Rica**, **Panama**

Zamora *et al* (*in prep*)

Scientific results

Societal perceptions and adaptation to change

(2)

Legal database of governance frameworks Colombia, Panama, Costa Rica

30.07.2025

Comparative **legal analysis Colombia**, **Costa Rica**, **Panama**

Country-specific case study **reports**

30.08.2025

Draft **scientific manuscript**

Zamora *et al* (*in prep*)

Scientific results

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Zamora *et al* (*in prep*)

Scientific results

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30.09.2025 Submitted **manuscript**

20.11.2025 **Workshop** policy-makers in **Costa Rica**

15.12.2025 **Co-developed** policy brief

Zamora *et al* (*in prep*)

Societal impacts

Why does this matter?

- Improved regional-scale open-source **data availability** and **sharing**

Societal impacts

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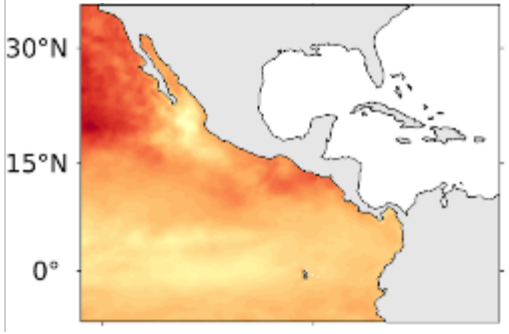
- Strengthened **regional** and **global scientific** and **stakeholder cooperation**

Societal impacts

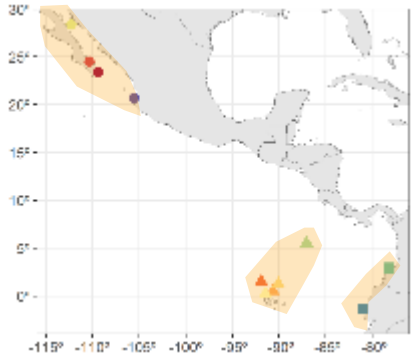
Why does this matter?

- Improved regional-scale open-source **data availability** and **sharing**
- Strengthened **regional**-scale and **global scientific** and **stakeholder cooperation**
- Co-developed **climate modelling capacities**

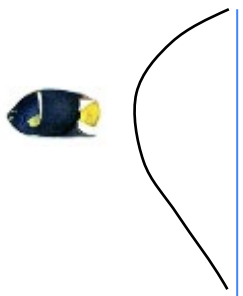
Climate model outputs



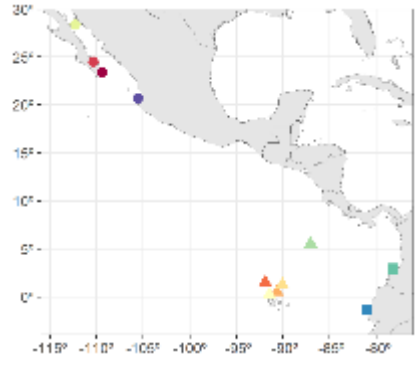
Shared fish data

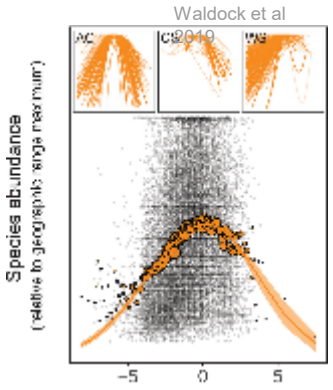


Species distribution modelling training



Abundance





Policy implications

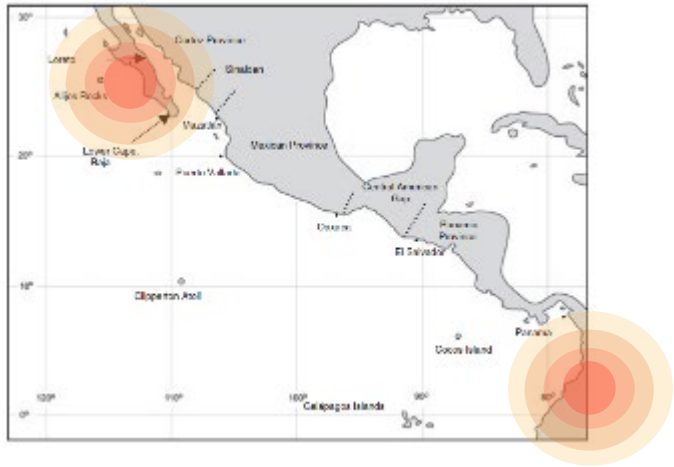
Why does this matter?

Areas of fish decline — **Adjustment of MPAs or complementary management strategies** to maintain fish-derived benefits

Areas of fish stability/increase — **Potential to identify climate-refugia**

Need to monitor of “invasive” species and rewired trophic interactions

Evidence-based decision making
Conservation/Intervention planning considering climate change



Policy implications

Why does this matter?

- Evidence-based decision-making **conservation/intervention planning** considering climate change
- Protecting reef fish *on the move* will require **region-wide coordination among policy-makers**

Policy implications

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Policy implications

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- Climate-informed adjustments to knowledge on **fish species contributions to** recommended **daily human intake** of micronutrients (e.g., Selenium).
- Fisheries and aquaculture management considering warming risks
  Policies promoting more **conservative harvesting** and **climate-aware aquaculture** contributing to sustainable food systems

Policy implications

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- Evidence-based decision-making **conservation/intervention planning** considering climate change
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- Climate-informed adjustments to knowledge on **fish species contributions to** recommended **daily human intake** of micronutrients (e.g., Selenium).
- Fisheries and aquaculture management considering warming risks
- Fish physiological thresholds □ projecting the **impact of different policies** on fisheries and aquaculture production
- Need to better understand the role of women in fisheries and differences in **adaptive capacities for policies that promote equality (leave no-one behind)**

Impact on policy

Why does this matter?

Acknowledgements

NORCE
ZMT LEIBNIZ CENTRE for Tropical Marine Research
UNIVERSIDADE NOVA DE LISBOA
MarViva
ECOMARES
Stockholm University
Stockholm Resilience Centre
University of Hawai'i
UNA Universidad Nacional
Universidad del Valle
Parque Marino del Pacífico
NPTE GCRMN
The Research Council of Norway
DFG Deutsche Forschungsgemeinschaft
FCT Fundação para a Ciência e a Tecnologia
FORMAS
Bundesministerium für Bildung und Forschung
IUCN

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Biodiversity and Climate Change

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biodiversa+
European Biodiversity Partnership

EPICC

Environmental Policy Instruments across Commodity Chains

COMPARING MULTI-LEVEL GOVERNANCE FOR BIODIVERSITY PROTECTION AND CLIMATE ACTION IN BRAZIL, COLOMBIA AND INDONESIA

By Tomaso Ferrando, Universiteit Antwerpen

www.biodiversa.eu

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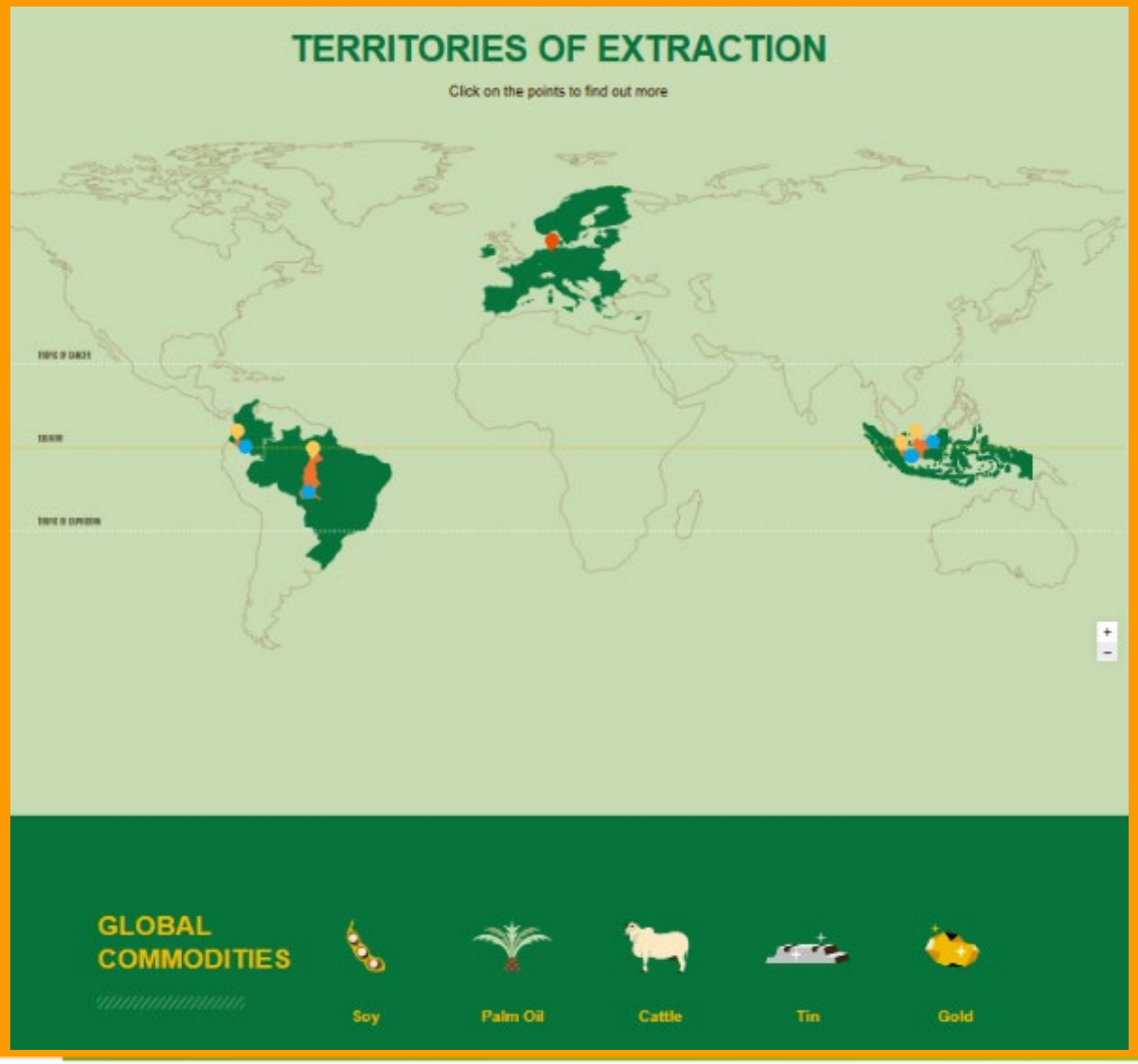
Biodiversity and Climate Change

EPICC IN BRIEF



- 4 TERRITORIES OF PRODUCTION AND 5 COMMODITIES
- BOTTOM-UP AND TOP-DOWN APPROACH – 100S OF INTERVIEWS
- VISIBLE AND HIDDEN CONNECTIONS BETWEEN TERRITORIES OF EXTRACTION AND TERRITORIES OF PRODUCTION (EU)
- CONTRIBUTION TO CLIMATE CHANGE AND BIODIVERSITY LOSS
- POLICY AND PRIVATE INTERVENTIONS
- TO WHAT EXTENT ARE TERRITORIAL KNOWLEDGE, RESISTANCE AND PARTICIPATION MEANINGFULLY ACCOUNTED FOR
- HOW TO DO NON-EXTRACTIVE RESEARCH AND PLACE IT AT THE CORE OF SCIENCES-BASED POLICY MAKING?

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Environmental Policy Information across Commodity Chains

SCIENTIFIC RESULTS

LAND AND TERRITORIES	UNILATERAL POLICIES	GOVERNANCE GAPS	CLIMATE AND BIODIVERSITY NEXUS
DISPUTES AND CONFLICTS	**EU IMPORT RESTRICTION ON DEFORESTATION-EMBEDDED COMMODITIES (EUDR)**	**INTERCONNECTEDNESS BETWEEN MINERAL AND AGRI-FOOD AND BETWEEN DISTANT REGIONS THROUGH TRADE AND POLICY RESPONSES**	**BEYOND INCLUSIVE AND SUSTAINABLE GLOBAL GOVERNANCE FOR CLIMATE AND BIODIVERSITY**
INTENSIVE AND EXTENSIVE LAND-USE BY GLOBAL COMMODITY CHAINS LED TO A GROWING PATTERN OF "SACRIFICE ZONES" ALONG THE EQUATOR. THE EXPANSION OF AGRIBUSINESS AND MINING ACTIVITIES CREATE CONFLICTS OVER LAND RIGHTS, EITHER DELAYING OR OBSTRUCTING ACCESS AND RIGHT TO LAND AND TERRITORY.	UNILATERAL PUBLIC MEASURES, SUCH AS THE EUDR CAN CREATE UNINTENDED SOCIO-ECONOMIC TRANSFORMATIONS AND NOT SUFFICIENTLY ADDRESS CLIMATE CHANGE AND BIODIVERSITY LOSS. THEY MAY EXACERBATE LOCAL AND REGIONAL INEQUALITIES, DISPLACE SMALL-SCALE PRODUCERS, OR SHIFT DEFORESTATION PRESSURES TO OTHER REGIONS.	WE PUT AT WORK THE NOTION OF TELECOUPLING THROUGH TRADE AND ENVIRONMENTAL/CLIMATE POLICIES. WHILE AGRICULTURAL AND MINERAL SUPPLY CHAINS OVERLAP IN PRODUCTION TERRITORIES, GOVERNANCE MECHANISMS ADDRESSING THEIR ENVIRONMENTAL IMPACTS REMAIN FRAGMENTED SOCIO-ENV TRADE OFFS ARE COMMON	TRANSFORMATIVE POLICIES ARE NEEDED THAT INCREASE TRANSPARENCY AND INTEGRATE LOCAL VOICES INTO GLOBAL DECISION-MAKING. IT IS NOT SUFFICIENT TO TACKLE THE NEGATIVE IMPLICATIONS OF THE EXPANSION OF GVCS. CLIMATE AND BIODIVERSITY PRIORITIES SHOULD BE PRESUPPOSED TO TRADE AND COMMERCIAL POLICIES.

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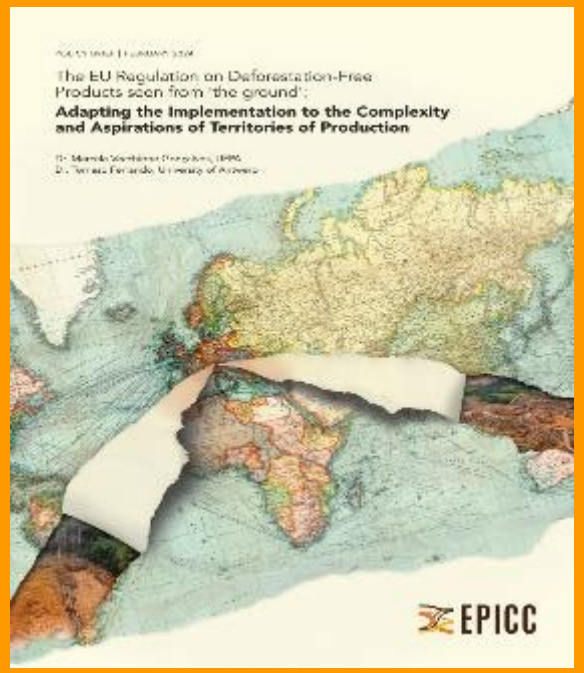
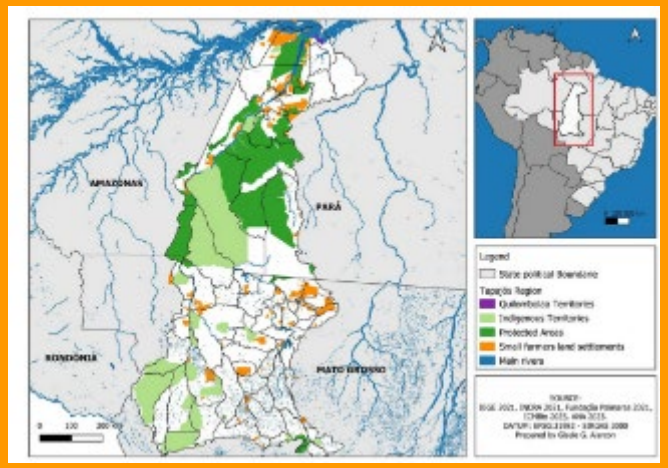
EPICC Environmental Policy Instruments across Commodity Chains

Policy and societal impacts





Reinforcing path marginalization: revealing the unaccounted labour organization at a mining frontier in Indonesia

Vela Almeda, D., & Karlsen, A. (2023). Reinforcing path marginalization: revealing the unaccounted labour organization at a mining frontier in Indonesia. *Cambridge Journal of Regions, Economy and Society*, rsad018.

Acknowledgements

www.epiccproject.org

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FunPotential

Potential of functional diversity for increasing the disturbance resiliency of forests and forest-based socio-ecological systems

By Mikko Peltoniemi, research prof, Natural Resources Institute Finland (Luke)

On the behalf of the Funpotential Consortium

Luke
NATURAL RESOURCES INSTITUTE FINLAND

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Results on methodologies and capacities building

1. Compiled and harmonized four-country NFI dataset for mortality analyses
2. Developed background and disturbance mortality models for forest trees.
3. Developed a demographic forest simulator (R Package Matreex) with new regeneration, disturbance mortality, and management modules. OA.
4. Developed a detailed economic valuation model (WoodValuationDE) for Germany, OA.
5. Developed an R Shiny app for interactive analysis of economic modelling results with stakeholders.
6. Introduced a novel game-theoretical approach to evaluate storm impacts on non-cooperative forest owner management decisions

Results: disturbance impacts on forests

1. Conservative tree species (e.g., with high bark thickness, slow growth, low productivity) were more resistant to disturbances.
2. Species mixture offers no panacea for forest adaptation: its effectiveness depends on species identity and traits, structural diversity, spatial scale, and the severity of disturbance.
3. It is important to selectively manage structure and species mixtures.
4. Species diversity improves the recovery potential of forests at climate margins

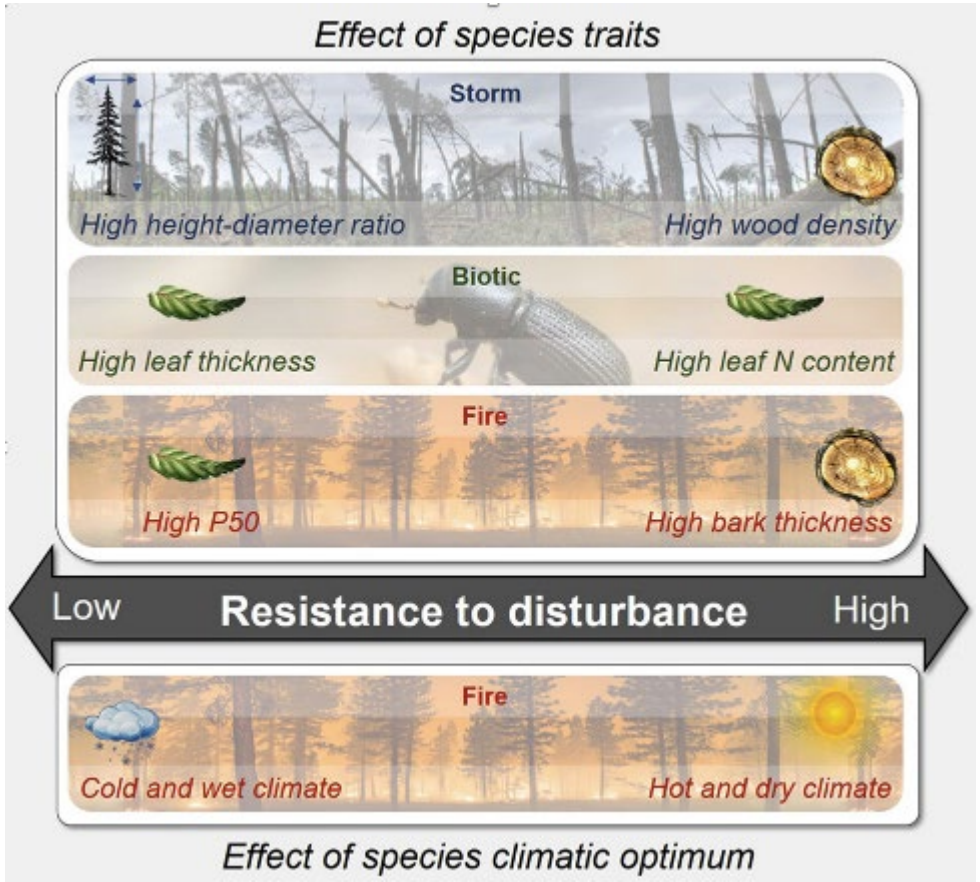

Fig. Barrere et al. (2023)

Scientific results: Economics of species & structural diversity

1. Stand stability typically trades off with economic profit, particularly under extreme weather and under pessimistic climate scenarios - profitable but sensitive conifers
2. Investments on increasing tree species diversity and structure of forests will not fully pay back if disturbances intensify as has been predicted.
3. Mixed species forestry become relatively more profitable for forest owners with higher carbon prices, although generally the effectiveness of subsidies decreases with increasing disturbances.
4. Tree species diversification should not be limited to stand-level diversification, as diversification at larger spatial scales may also be relevant from both an ecological and economic perspective

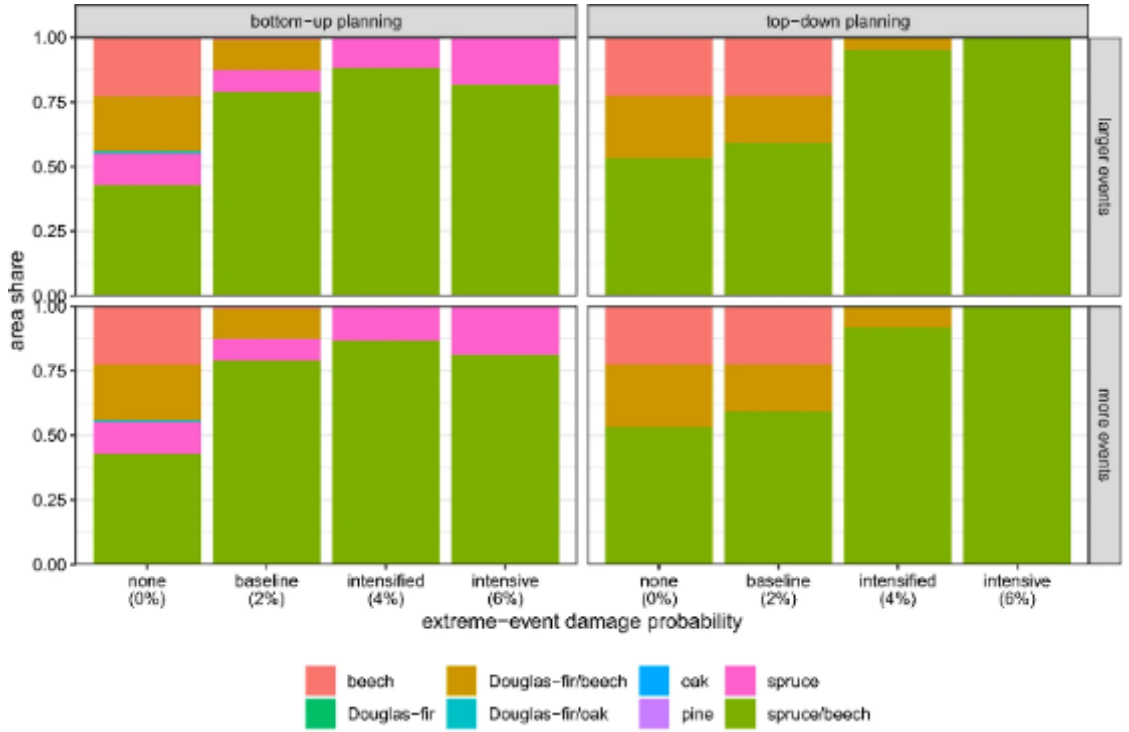

Figure Optimised stand-type composition of the forest enterprise as sum of all planning units, reflecting gamma-diversity. Optimal compositions were derived under top-down and bottom-up planning (panel columns) and different extreme-event scenarios, defined by a probability of stand damage within 10 years (horizontal axis) and an increase in the size or number of events (panel rows). (Taken from Fuchs et al. 2024, see original publication for details).

Policy and societal impacts / results

1. Share NFI data (and metadata) and other monitoring data openly and continuously
2. New management solutions are required, particularly for mixtures and when moving to cont-cover harvesting
3. Ensure diversification at all scales: stand and landscape (species & structure) - appropriate mixtures require planning → consider in policies
4. Forest policies reducing forest owners' investment risks are needed to establish stable forests that provide multiple ecosystem services. E.g. incentives for stand establishment (+ tending) of resistant stands
5. Mixed species forestry becomes more viable option for owners if the forest owner joins carbon payment scheme and compensations are high
    a. I.e. C payment systems could benefit diversification of forestry

Thank you!
Acknowledgements

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References

Barrere, J., Reineking, B., Cordonnier, T., Kulha, N., Honkaniemi, J., Peltoniemi, M., Korhonen, K.T., Ruiz-Benito, P., Zavala, M.A., Kunstler, G., 2023. Functional traits and climate drive interspecific differences in disturbance-induced tree mortality. Global Change Biology 29, 2836–2851. https://doi.org/10.1111/gcb.16630

Barrere, J., Reineking, B., Jaunatre, M., Kunstler, G., 2024. Forest storm resilience depends on the interplay between functional composition and climate—Insights from European-scale simulations. Functional Ecology 38, 500–516. https://doi.org/10.1111/1365-2435.14489

Fuchs, J.M., Husmann, K., Schick, J., Albert, M., Lintunen, J., Paul, C., 2024. Severe and frequent extreme weather events undermine economic adaptation gains of tree-species diversification. Sci Rep 14, 2140. https://doi.org/10.1038/s41598-024-52290-2

Fuchs, J.M., Husmann, K., von Bodelschwingh, H., Koster, R., Staupendahl, K., Offer, A., Möhring, B., Paul, C., 2023. woodValuationDE: A consistent framework for calculating stumpage values in Germany (technical note). woodValuationDE: Ein konsistentes Modell zur Abtriebswert-Berechnung in Deutschland (technischer Leitfaden). https://doi.org/10.23765/afjz0002090

Fuchs, J.M., v. Bodelschwingh, H., Lange, A., Paul, C., Husmann, K., 2022a. Quantifying the consequences of disturbances on wood revenues with Impulse Response Functions. Forest Policy and Economics 140, 102738. https://doi.org/10.1016/j.forpol.2022.102738

Fuchs, J.M., Husmann, K., v. Bodelschwingh, H., Koster, R., Staupendahl, K., Offer, A., Möhring, B., & Paul, C. 2022b. woodValuationDE: Wood Valuation Germany (v1.0.1). R Cran

Kulha, N., Heikkinen, J., Holder, J., Honkaniemi, J., Kuronen, M., Laapas, M., Suvanto, S., Peltoniemi, M., 2024. Landscape configuration and storm characteristics drive spatial patterns of wind disturbance in boreal forest landscapes. Landsc Ecol 39, 119. https://doi.org/10.1007/s10980-024-01916-x

Kulha, N., Honkaniemi, J., Barrere, J., Brandl, S., Cordonnier, T., Korhonen, K.T., Kunstler, G., Paul, C., Reineking, B., Peltoniemi, M., 2023. Competition-induced tree mortality across Europe is driven by shade tolerance, proportion of conspecifics and drought. Journal of Ecology 111, 2310–2323. https://doi.org/10.1111/1365-2745.14184

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PRINCESS Peatland Rewetting In Nitrogen-Contaminated Environments: Synergies and trade-offs between biodiversity, climate, water quality & Society

Erik Verbruggen (University of Antwerp)

Jürgen Kreyling (University Greifswald; **coord.**)

Franziska Tanneberger (University Greifswald)

Wiktor Kotowski (Warsaw University)

Stephan Glatzel (University of Vienna)

Hanna Silvennoinen (NINA, Norway)

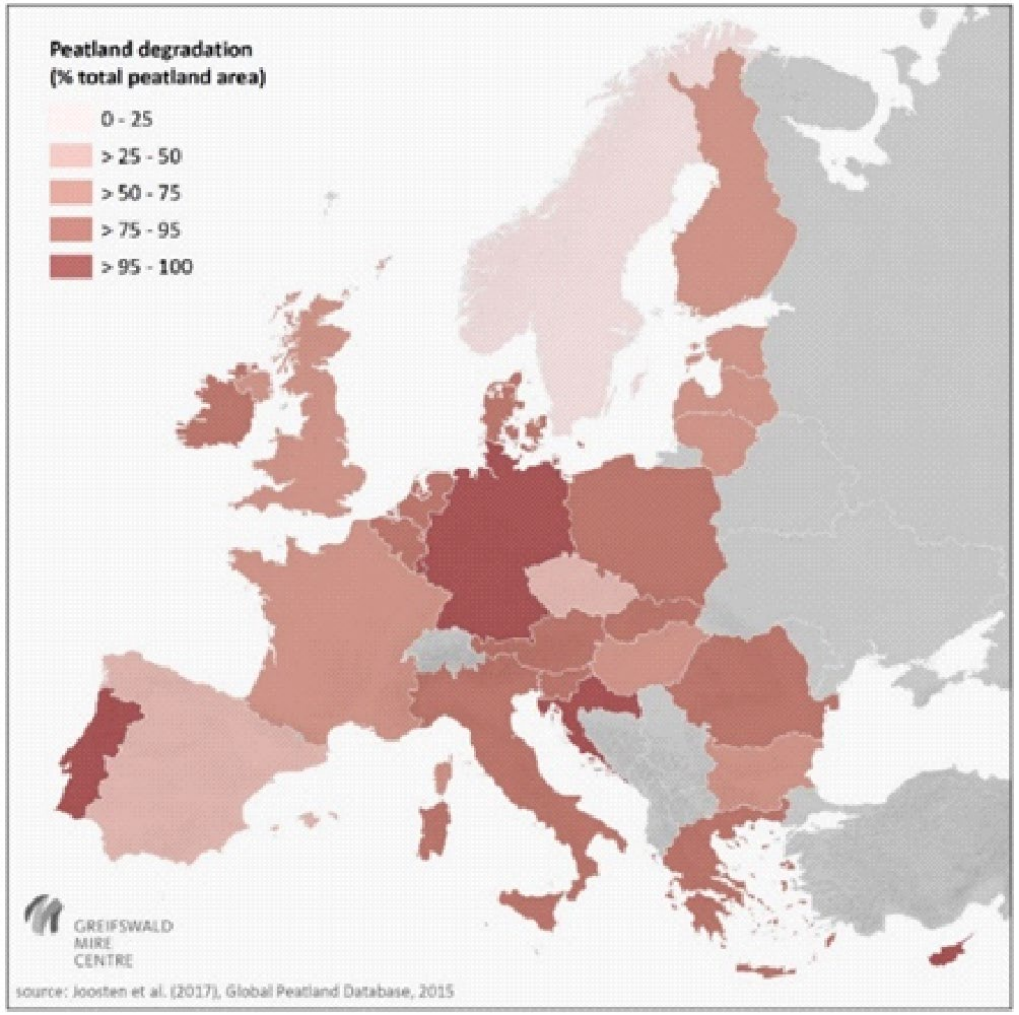
Kristiina Lång (LUKE, Finland)

(01.02.2021) 01.04.2021- 31.03.2025

Scientific results

Europe faces three major environmental challenges: greenhouse gas (GHG) emissions, nitrogen (N) pollution, and biodiversity loss. **Peatlands** can play a vital role in addressing these challenges:

- 200 Mt CO_2e (5% of total EU)
- 1-5 Mt NO_3
- Natural peatland biodiversity devastated
- Wet peatland agriculture (paludiculture) part of the solution portfolio?



Scientific results

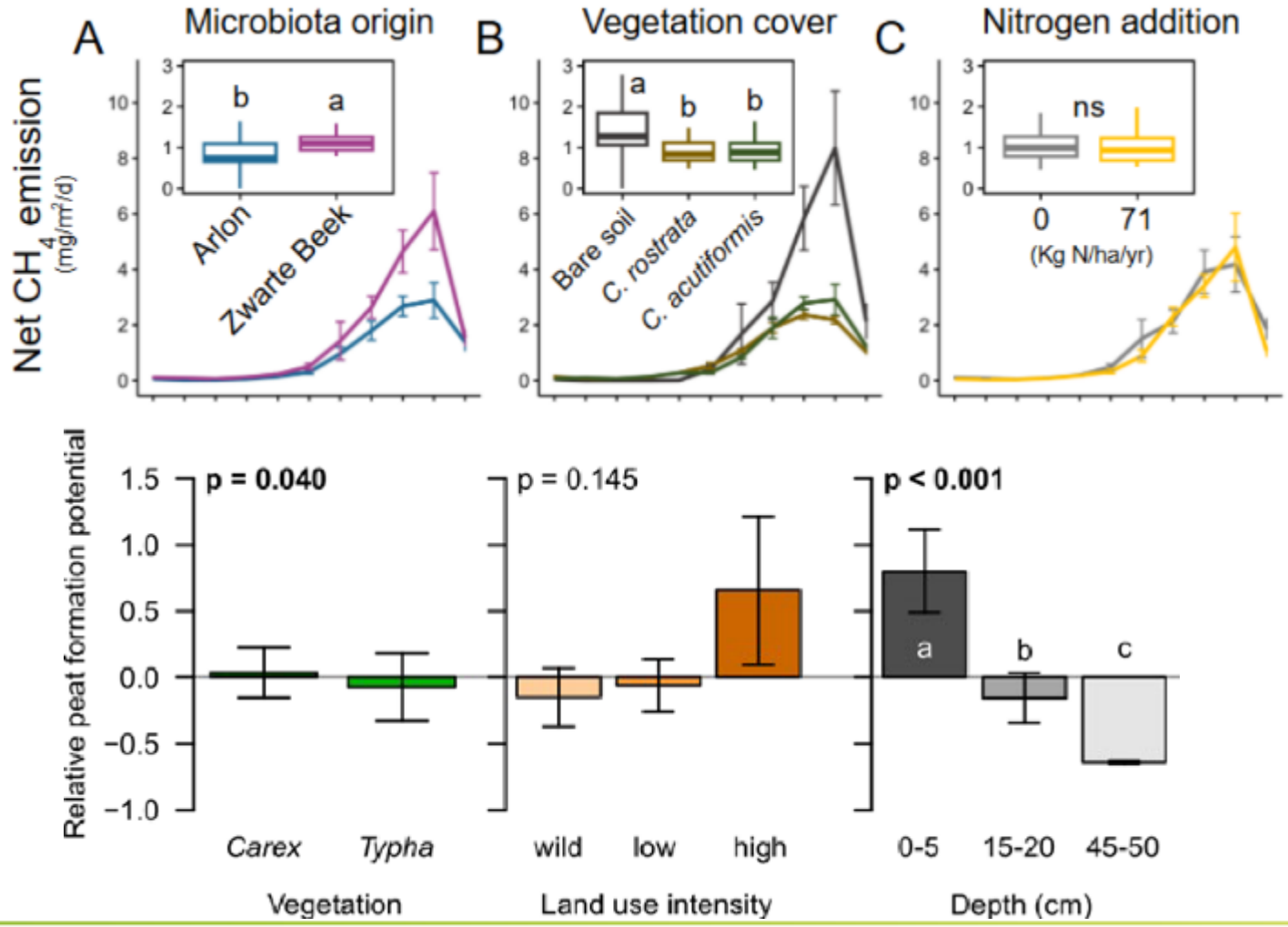
- Hypotheses addressed across 6 Work packages:

		Deeply drained	Rewetted		
Policy objective	**Indicator in PRINCESS**	Conventional agriculture	High-intensity paludiculture	Low-intensity paludiculture	Wet wilderness
Healthy ecosystems	Biodiversity value	−	−	⊙	−
Global warming below 2°C	GHG emission reduction	−	+	+	−
Clean water	NO_3 release reduction	−	⊙	⊙	⊙
Fair income to farmers	Biomass yield	⊙	+	+	⊙
A greener and more sustainable Europe	Positive contribution to national economies	−	⊙	+	−

- (colors indicate effect direction, symbols indicate how N pollution modifies it)

Scientific results

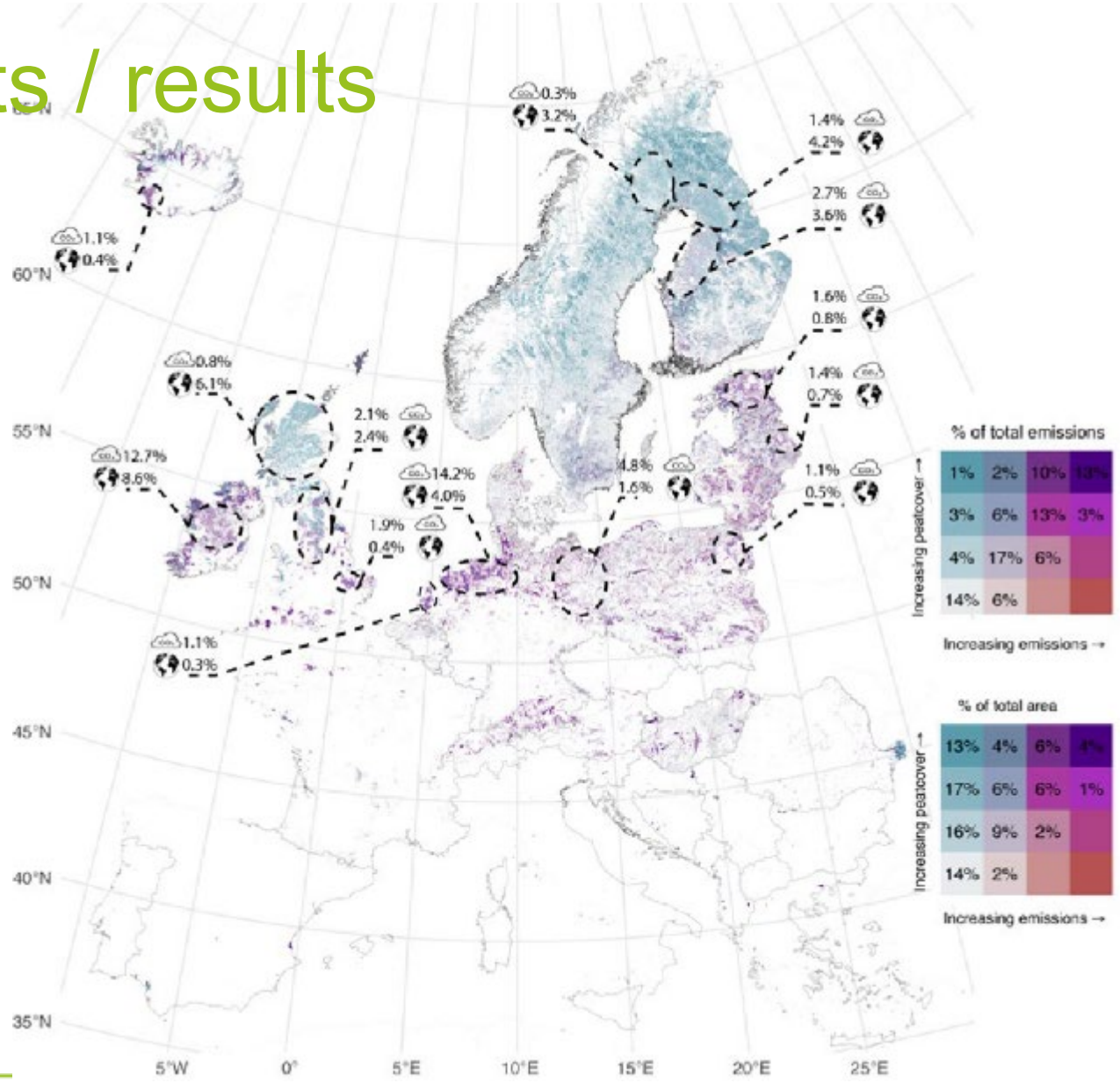
- Fertility (+) and vegetation (-) affect emission of methane, through changing GHG-active microbiomes. Paludiculture did not change total GHG emissions from any of the sample countries
- Peat formation potential unaffected by land use intensities and surprisingly little by high N
- Paludiculture can support biodiversity - specific red listed taxa found in all land use intensities



Policy and societal impacts / results

- Hotspot map of peatlands showing the contribution of regions to the total emissions or area of peatlands in Europe

- Used to derive country-specific policy briefs designed to address challenges at the regional level



Policy and societal impacts / results

- The economic assessment shows that under conversion of arable fields to paludiculture, the required price for carbon tonne (22 €/t CO2e) would be low compared to many other GHG mitigation measures.
- Co-organized biggest peatland conference to date (>500 participants) and facilitated public declaration to preserve and restore peatlands

Acknowledgements

We deeply thank all national funders, as well as Biodiversa + for their contributions! Thanks also goes out to our host-institutes, students and collaborators that made the work possible

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SUSTAIN-COCOA

Sustainable sourcing policies for biodiversity protection, climate mitigation, and improved livelihoods in the cocoa sector

Presented by Patrick Meyfroidt on behalf of the consortium:

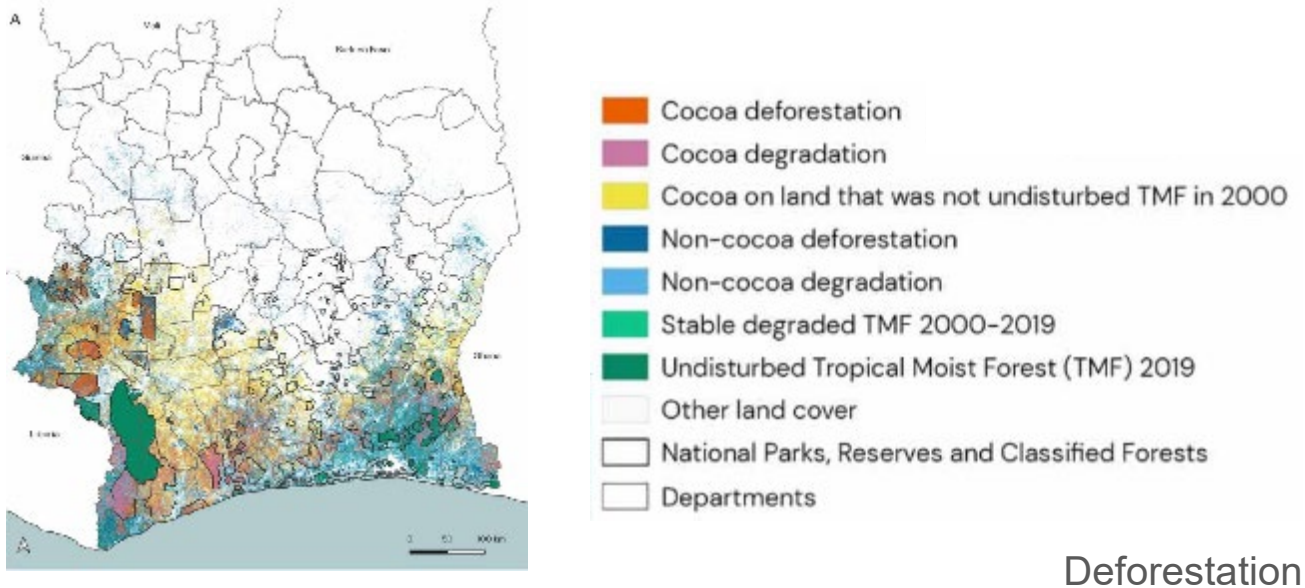
UNIVERSITY OF CAMBRIDGE
CONSERVATION RESEARCH INSTITUTE
CDL Conservation & Development Lab
ETH zürich
SEI Stockholm Environment Institute
Alliance
UNIVERSITY OF OXFORD
UCLouvain
THE UNIVERSITY OF QUEENSLAND AUSTRALIA
Universität Zürich[UZH]
trase
Bioversity International
CIAT

Scientific results - 1. Mapping cocoa plantations and its links with deforestation in Ivory Coast and Ghana

Tradeoffs…: Cocoa drives deforestation and degradation

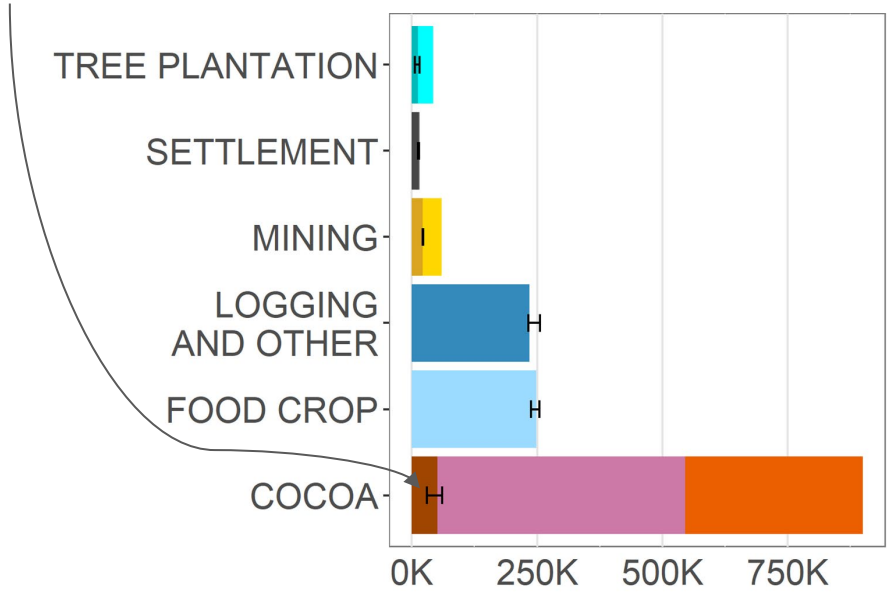
directly

~45% in CIV and **57% in GHA** over 2000-2019
~37% in CIV and **14% in GHA** in protected areas



and indirectly

In GHA, cocoa pressure on land is linked to **15%** of the deforestation for food crops



Deforestation and degradation of tropical moist forest in Ghana, 2000-2019 (ha)

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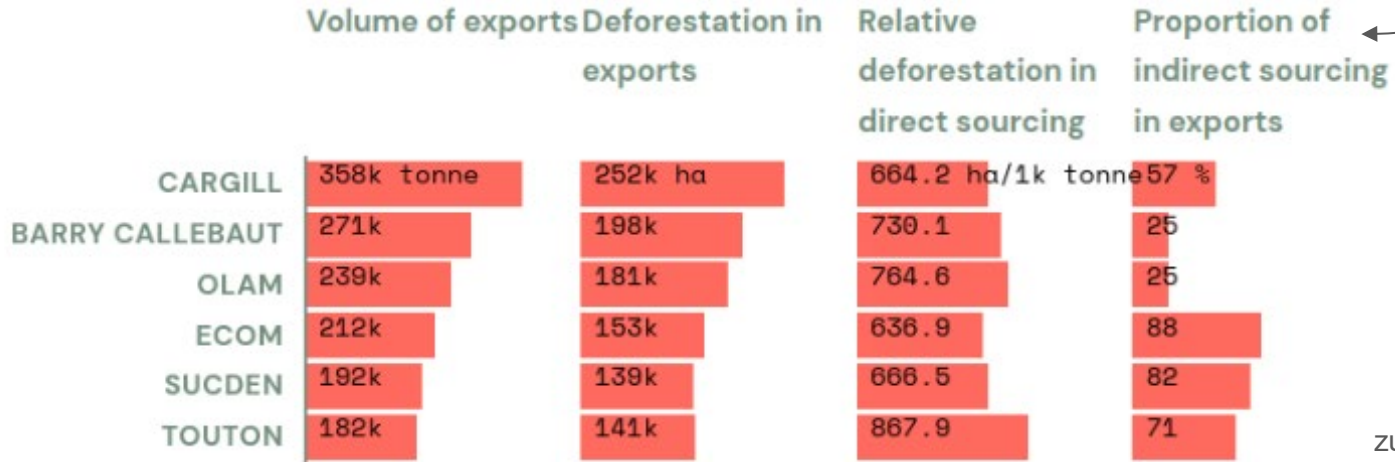
Kalischek et al. (2023) *Nature Food*
Renier et al. (2023) *ERL*
Renier et al. (2025) *ERFS*

Scientific results - 2. Cocoa supply chains structure & deforestation exposure

1- Transnational trading is **concentrated**: for CIV, 6 largest traders handle >75% of volumes

2- All traders and consumers of Ivorian cocoa are **exposed to deforestation**, though some more than others

3– A large share of the supply chain is **indirect or untransparent**: 60% in CIV, more in GHA



Tonnes of cocoa exported from Côte d'Ivoire by trading company and associated deforestation exposure, 2021 (Source: Trase).

trase.earth

zu Ermgassen et al. (2022) Sci Adv
Renier et al. (2023) ERL
Guye et al. (2024) Trase
https://doi.org/10.48650/E5CN-FH18

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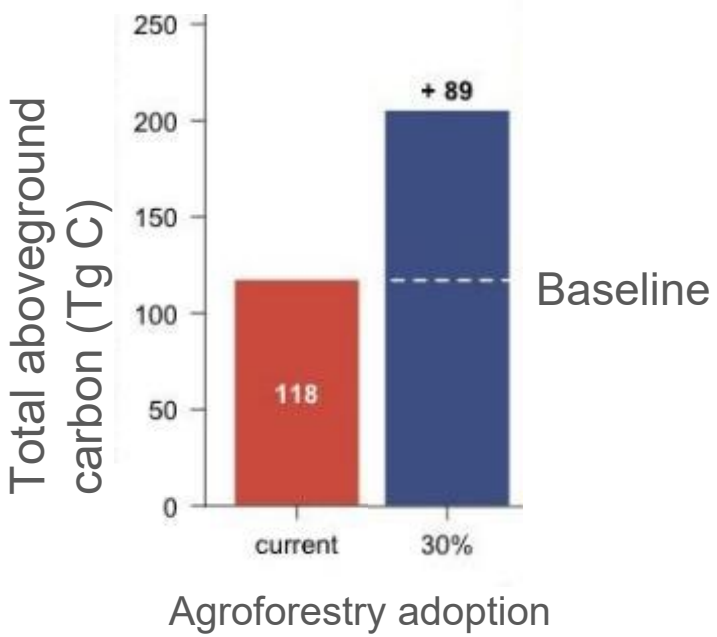
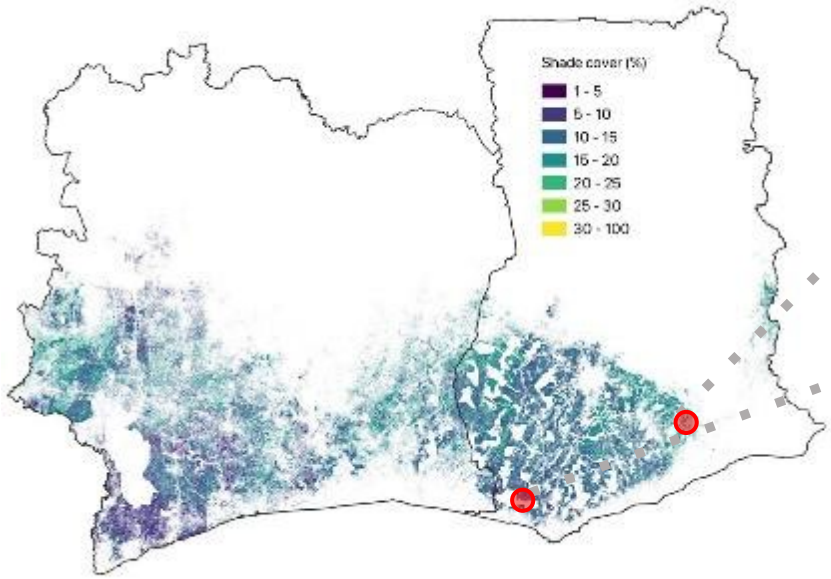
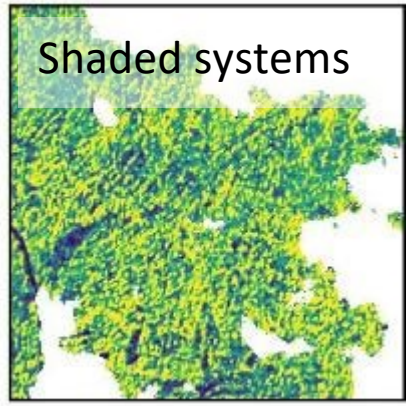
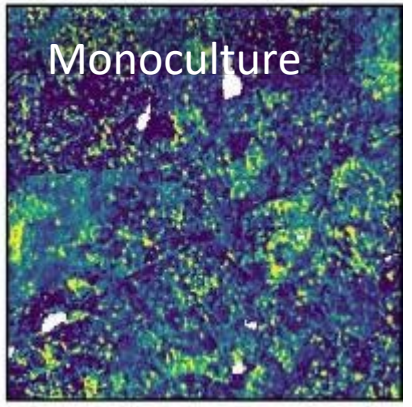
Scientific results - 3. Mapping shade tree cover and biomass in cocoa plantations in CIV and GHA

Synergies…: Only 5.6 % of cocoa area under agroforestry (> 30%)
>> Agroforestry can enhance C storage: Raising shade cover to 30% = ~89 Tg C, ~11 $MtCO_2e$ annually (10% of both countries' GHG emissions)







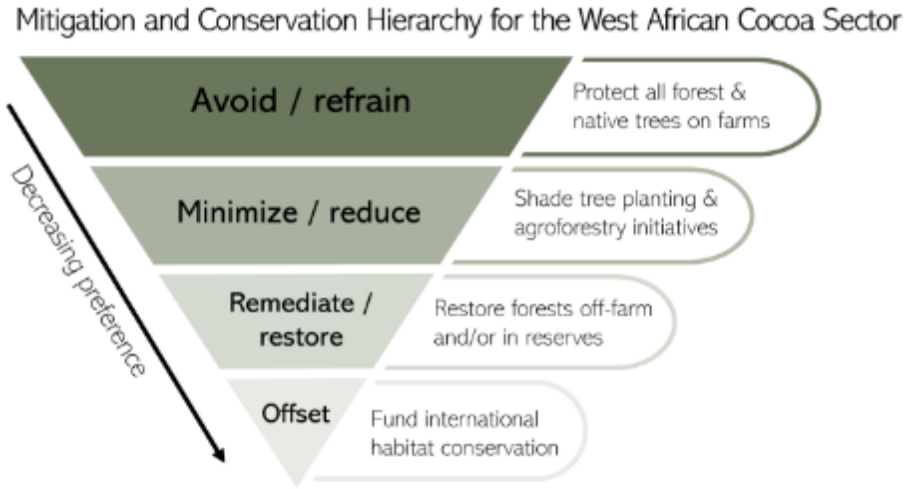


Shade tree cover in 2022. original map at 10m resolution, re-clustered for visualisation

Becker et al. (2024) Preprint

Scientific results - 4. Analysing forest focused sustainability policies

Challenge 1. Conflation of deforestation reduction and agroforestry goals
Challenge 2. Insufficient scale
Challenge 3. Landscape-level approaches could address these limitations but also face inherent challenges
>> A Mitigation and Conservation Hierarchy to integrate agroforestry and conservation initiatives
>> Proposing a supply shed approach



Thompson et al., (2022)
Renier et al. (2023)
Parra-Paitan et al. (2024)
Addoah et al. (2025)
Cammelli et al. (in preparation)

Scientific results - 5. Assessing Challenges, Risks & Uncertainties, and Opportunities of EUDR

⚠️ Data Access & Use:
⚠️ Justice & Equity:
⚠️ Agroforestry impact:
⚠️ Other Risks: leakage, biases

-> Transparency & Accountability
-> Value Creation
-> Incentives for Better Practices

Bunn, Schmidt, et al.

Policy and societal impacts / results: Engagement

- Stakeholders informing project design & implementation.
- Multiple in person and online workshops and meetings, throughout all the steps, with multiple stakeholders
- Government authorities (local, national, EU...); Local communities and land users; Supply chain actors and companies (local & international traders, manufacturers, retailers); NGOs, activists... (local and international); Research communities...
- >1000 people reached directly through presentations, discussions and engagement
- Strong dissemination activities, locally as well as online (web platforms, issue & policy briefs, etc), including through the Trase initiative trase.earth, moving onwards the debate in companies, scientific, public spheres, from local to global.
- One extension agent's quote: *"This research will go a long way to change farmers' perception on cocoa sustainability."*

Policy and societal impacts / results: Insights

>> Interventions need to go beyond:

- Direct deforestation >> **account for indirect land use change**
- Direct drivers >> **address structural issues and the rest of the economy**
- Direct supply chains >> **address indirect sourcing**
- Voluntary and ad hoc commitments >> **Accountability Framework I. and other standards**

>> **Supporting agroforestry** can enhance C storage, without reducing yields at 30-50% shade, but should not override conservation

>> Adopting a **Mitigation and Conservation Hierarchy**

>> Exploring **supply sheds approach**

>> Leveraging **data**

>> Strengthening **collaboration**

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https://www.sustain-cocoa.earth/
https://landsystems-lab.earth/project/sustaincocoa/

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Cécile Renier
Konrad Schindler
Paul Schmidt
William Thompson …..

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Panel discussion - Session 4

Moderated by ***James Lloyd***, *Strategy and advocacy lead at Nature4Climate*

→ Which strategies have you found to be the most effective in sharing and disseminating your findings with policy makers, and what impact have these had on policy decisions and outcomes?

→ What synergies and trade-offs have you observed across different policy areas, and in what ways can communications and advocacy amplify the effectiveness of your findings?

→ What innovative formats or methods have you introduced in your project to engage stakeholders, and what actions could be taken to enhance the future policy impact of your efforts?

→ How can communications and advocacy further support your findings, and what changes or next steps could be considered to increase the policy impacts of your work?

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BiodivClim issue briefs

By Julie de Bouville, Biodiversa+ Communication WP Leader

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Fund transnational research

Create accessible briefs

Connect science with decision-makers

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Three New Issue Briefs Coming

- Brief 1: Forest and climate change.
- Brief 2: Nature-Based Solutions
- Brief 3: Soils and climate change

Key Objectives of Our Briefs

- Inform decision-makers
- Support advocacy
- Raise public awareness
- Guide cross-sector discussions

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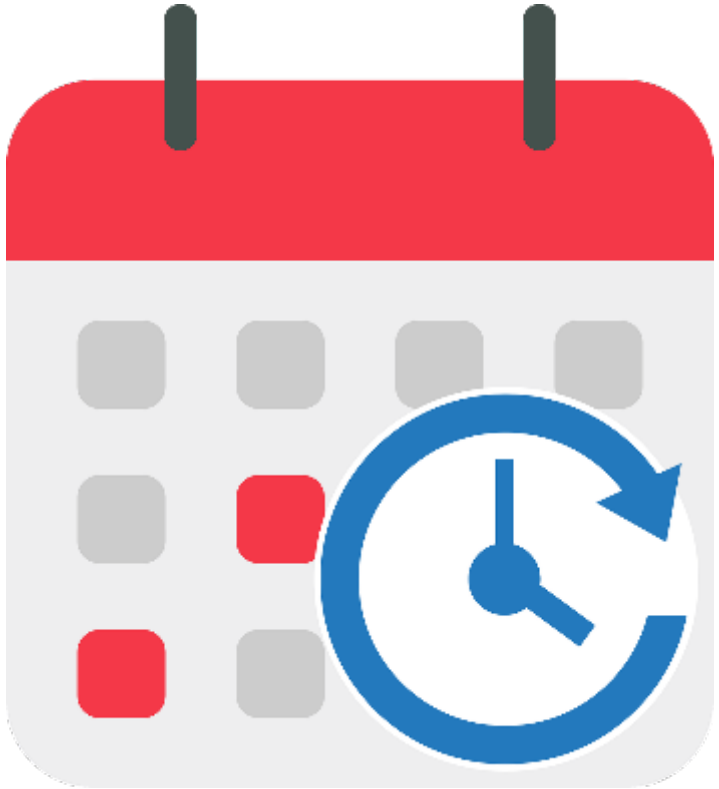

Timeline

1 **Final BiodivClim Projects**

Research completion

2 **Brief Development**

Currently in progress

3 **September Release**

Public availability

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Find all our briefs on: https://www.biodiversa.eu/actionable-knowledge/policy-briefs/

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Concluding words

By Ron Winkler, Biodiversa+ co-chair

Presentation of the BiodivClim Comics

by David Maddox, TNOC

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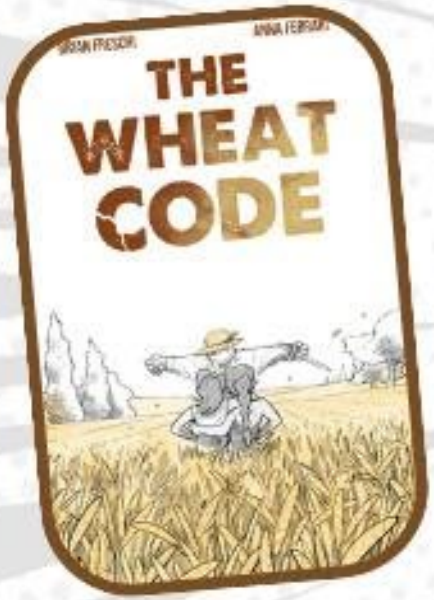
science 2 Story

NBS COMICS



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Change minds by spreading knowledge in intelligent and engaging ways

Try to propel for NbS some of the social movement juice that climate change & biodiversity now (sort of) have

Maybe we might learn something? Telling science stories in novel ways might even change us inside our own disciplines

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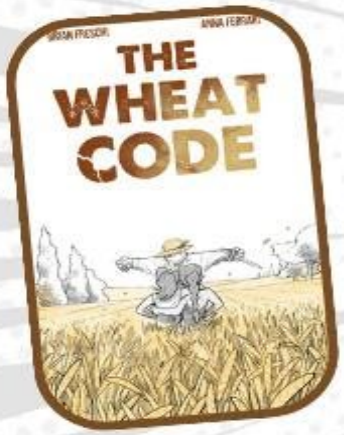
science 2 Story

NBS comics



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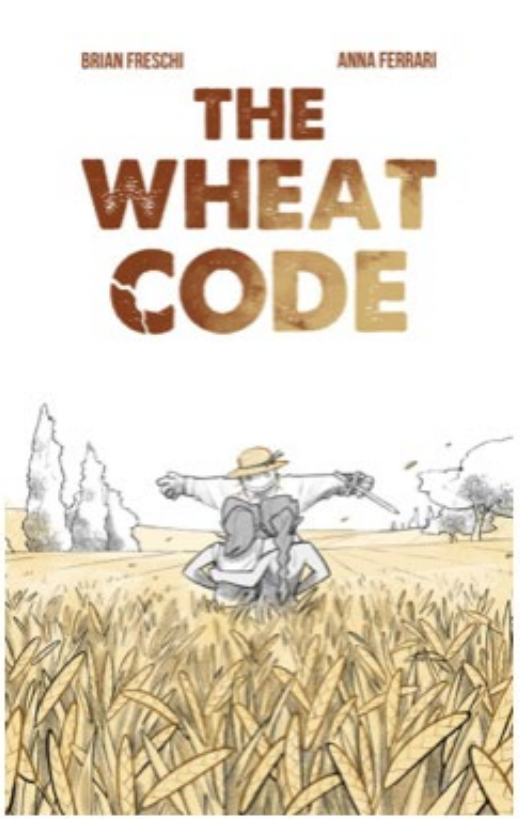
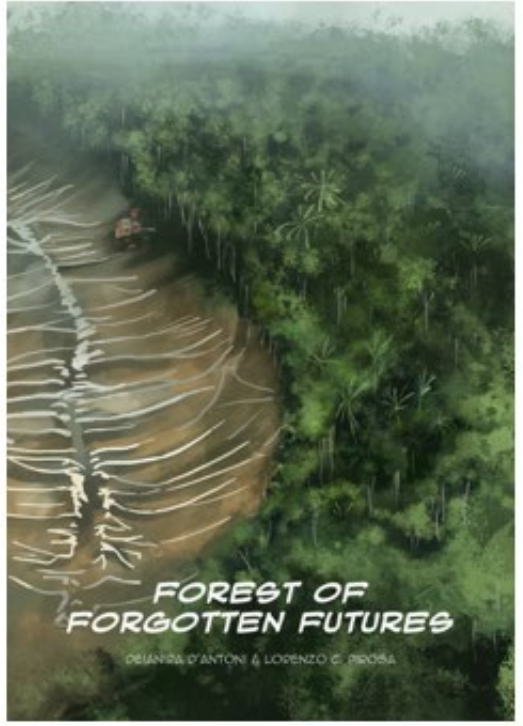
PRODUCED BY the nature of cities

- 21 BiodivClim projects
- 3 original human-scale and emotion-laden stories
- Elements of action and plot that connect to all 21 projects
- QR codes built into the art that links to ideas and deeper connection to the projects

Human-scale, emotional-laden, beautiful … grounded in science



A relentless drought threatens Esperanza's farm, her wheat crumbling to dust. Is there a solution hidden in the soil? Can her sister Clara put aside her differences and help revitalize the family farm?



Leo, a wandering musician, devotes his life to walking beneath trees from the Amazon to Sweden. Decades later, Leo vanishes into the forest, becoming part of the land he loved. His journey lives on in art, memory, and an interconnected forest world.

A young Costa Rican girl and a Nordic scientist connect through shared climate struggles. Guided by community and science, they restore mangroves and Baltic ecosystems, showing how land and sea are deeply intertwined.

Over 1 million virtual readers

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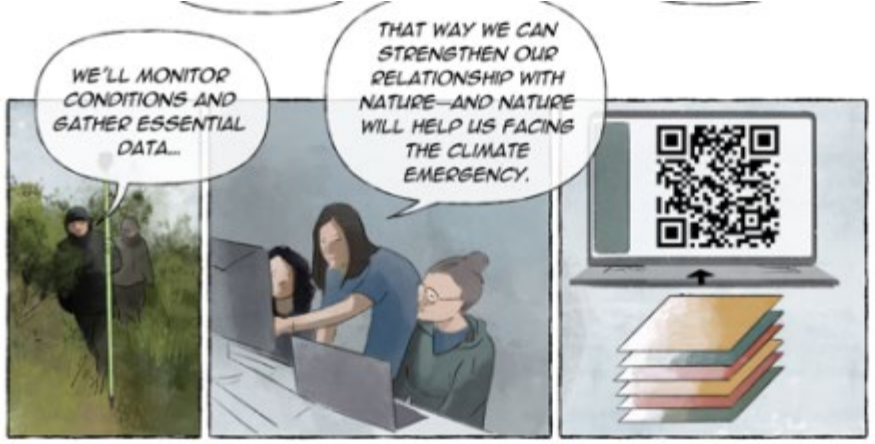
Language accessibility

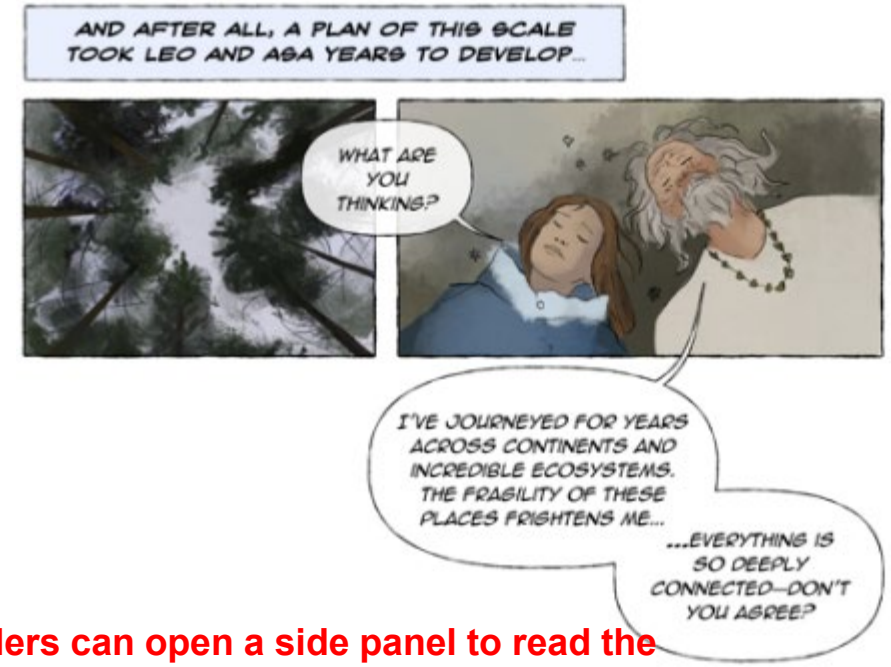


Nous mettrons en place une stratégie d'adaptation pour faire face aux défis futurs.

Préserver les voies de migration traditionnelles et les pâturages est essentiel pour l'avenir des rennes.

Nous surveillerons les conditions et recueillerons des données essentielles...

Ainsi, nous pourrons renforcer notre lien avec la nature, et la nature nous aidera à faire face à l'urgence climatique.



Après tout, un plan d'une telle envergure a pris des années à Leo et Asa...

Qu'en pensez-vous ?

J'ai voyagé pendant des années à travers des continents et des écosystèmes incroyables. La fragilité de ces lieux m'effraie...

...Tout est si étroitement lié, n'êtes-vous pas d'accord ?

Meu nome é Leo. Eu caminho por onde as árvores me levam. Procuro lugares onde as florestas ainda lutam — onde ainda tentam se curar.

Aqui na Amazônia, a floresta luta para sobreviver. Mas há tanto a fazer. Muitas árvores estão sendo cortadas e os incêndios estão se tornando cada vez mais frequentes...

...Os animais não conseguem mais se mover ou viver. E as pessoas que pertencem a esta floresta estão sendo expulsas.

Mas vocês estão aqui para ajudá-la a sobreviver.

Lutamos ao lado dela. Mas a floresta está se desintegrando. Está começando a parecer um esqueleto de peixe.

Estas são as batalhas sobre as quais canto. Para manter a esperança viva.

Então, fique. Precisamos de canções que nos lembrem pelo que estamos lutando.

Readers can open a side panel to read the script in any Google Translate language.

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Going sideways

Tides EASMO

EASMO will investigate for the first time the impact of climate change on the distribution of reef fish throughout the Eastern Tropical Pacific Ocean (ETP) considering cascading effects on biodiversity, ecosystem function, reefs' contributions to people, climate feedbacks, and socio-economic well-being.
Read more about the project here

IN THE COMIC >

In Tides of Change, Mateo and Sophia are using information from EASMO's findings on fish movements across the world to help figure out what they need to do to restore their habitats. In this case, they are planting mangroves to create natural habitats for ocean fish to live and thrive.

Species are on the move throughout the planet escaping hostile climatic conditions. These movements have advanced four times faster in the ocean than on land, causing dramatic ecosystem changes and redistributing resources across borders. The ecological, food security, and governance implications are obvious. Yet, two persistent gaps hinder our capacity to effectively manage coastal social-ecological systems to safeguard both fisheries and human wellbeing in the face of such challenges: i) regional studies documenting recent species redistributions have not quantified the societal repercussions, and ii) future projections have mapped expected catches and metrics of socio-economic impact (e.g., fisheries revenue) globally and at coarse resolutions, unfitting to support local or regional decision-making.

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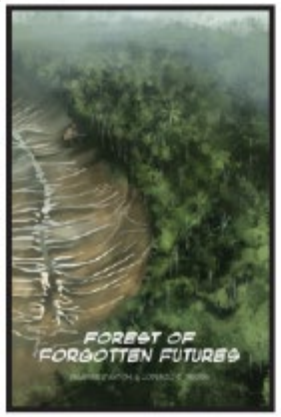
Meet people where they are

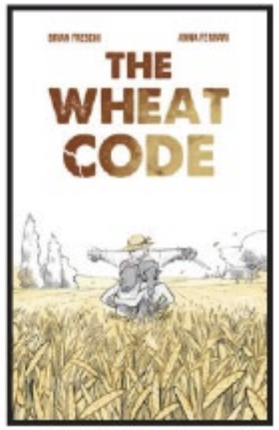
Thank you

science 2 story

NBS COMICS

the nature of cities





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Thank you for your attention!