



KAUST CIRCULAR
CARBON INITIATIVE

THE
CLIMATE
MAP

Towards the Global Atlas of Nature Based Solutions and Negative Emission Technologies

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²King Abdullah University of Science and Technology, Saudi-Arabia

³THE CLIMATE MAP, USA



Paris Agreement (December 2015)

COP21/CMP11

Paris France



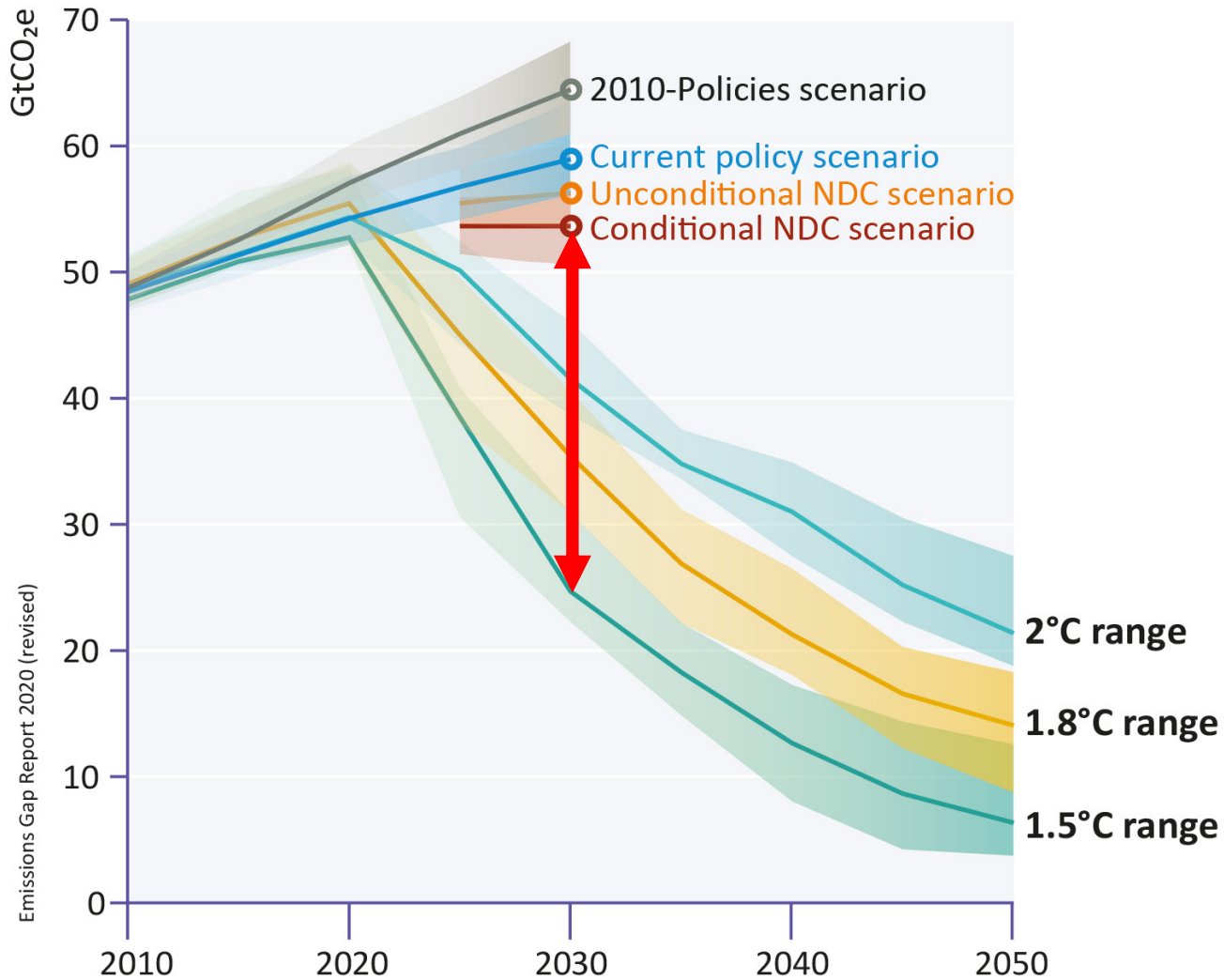
Limit global warming to well below 2°C, if not at 1.5°C and strengthen countries' adaptation capacity

- Prevention of dangerous consequences of climate change

➤ in the context of the UN Sustainability Goals and Nature's Contribution to People



How can our climate goals be realized?



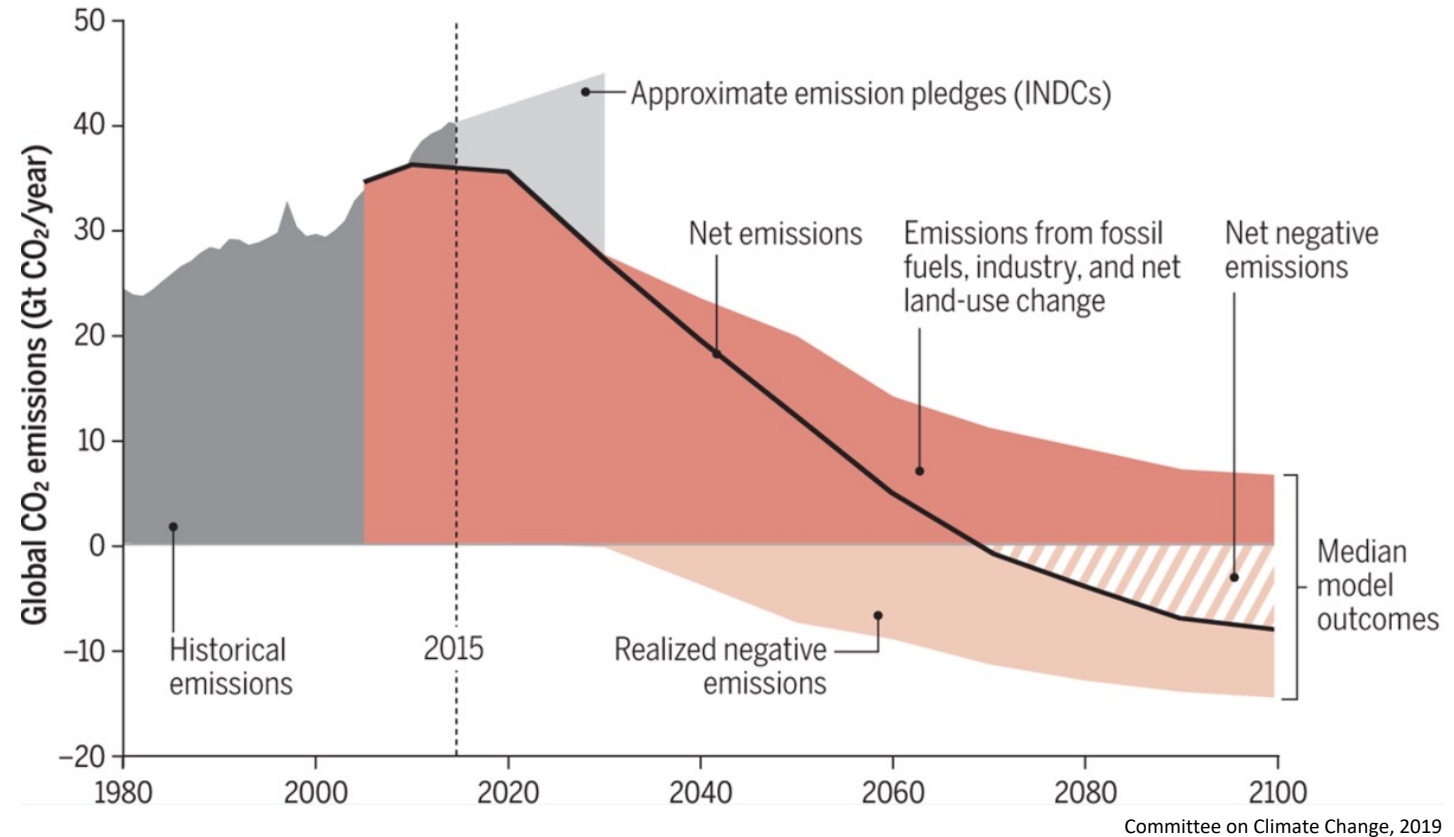
**Imagine you are a decision maker:
How to close the gap?**

- MOTIVATION
- OBJECTIVE
- PILOT STUDY
- PROJECT OBJECTIVES
- TIMELINE
- RESOURCES
- VISION



How can our climate goals be realized?

- Rapid reduction of global GHG
- Net zero emissions required from 2050 (i.e., balance of sources and sinks)
- Removal of CO₂ from the atmosphere already necessary from 2030
- **Negative emissions are necessary to achieve the agreed climate targets**



How can our climate goals be realized?

Reduce CO₂-emissions

Remove CO₂ from
atmosphere

CO₂

Nature Based
Solutions

Technical
Methods

Need for reliable scientific findings on inventories, potentials and costs, risks, trade-offs and co-benefits for **decision-makers** and **economic actors** worldwide

MOTIVATION

OBJECTIVE

PILOT STUDY

PROJECT
OBJECTIVES

RESOURCES

VISION



How can our climate goals be realized?

Reduce CO₂-emissions

Remove CO₂ from
atmosphere

CO₂

Nature Based
Solutions

Technical
Methods

Available information until now:

- Aggregated on a global level
- Focus on individual methods
- Targeted at scientific community
- Mainly text-based
- No spatially differentiated assessment

MOTIVATION

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How can our climate goals be realized?

De-carbonize the atmosphere

Re-carbonize the biosphere

CO₂

Nature Based Solutions

Technical Methods

Initially, we focus on nature-based solutions as

- more cost-effective
 - more scalable
- than technically-based methods

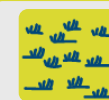
Σ



Reforestation

Σ

Σ



Peatlands

Σ

Σ



Soils

Others

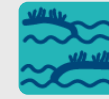


Seagrass Meadows

...

Σ

Σ



Saltmarshes

Σ

Σ



Mangroves

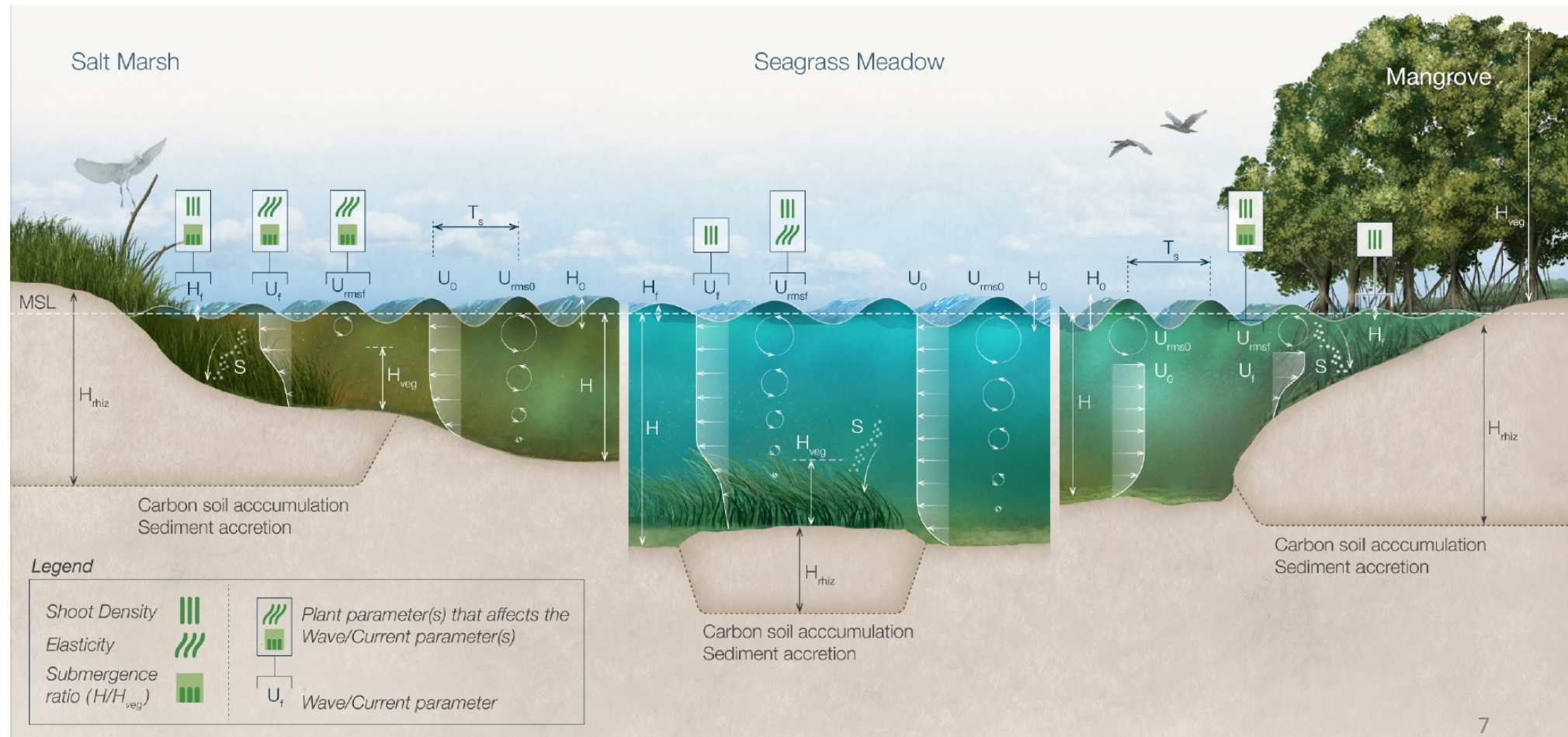
Σ



How can our adaptation goals be realized?

Nature based solutions for climate adaptation

Avoiding the impacts of sea level rise



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How can our climate goals be realized?

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Remove CO₂ from atmosphere

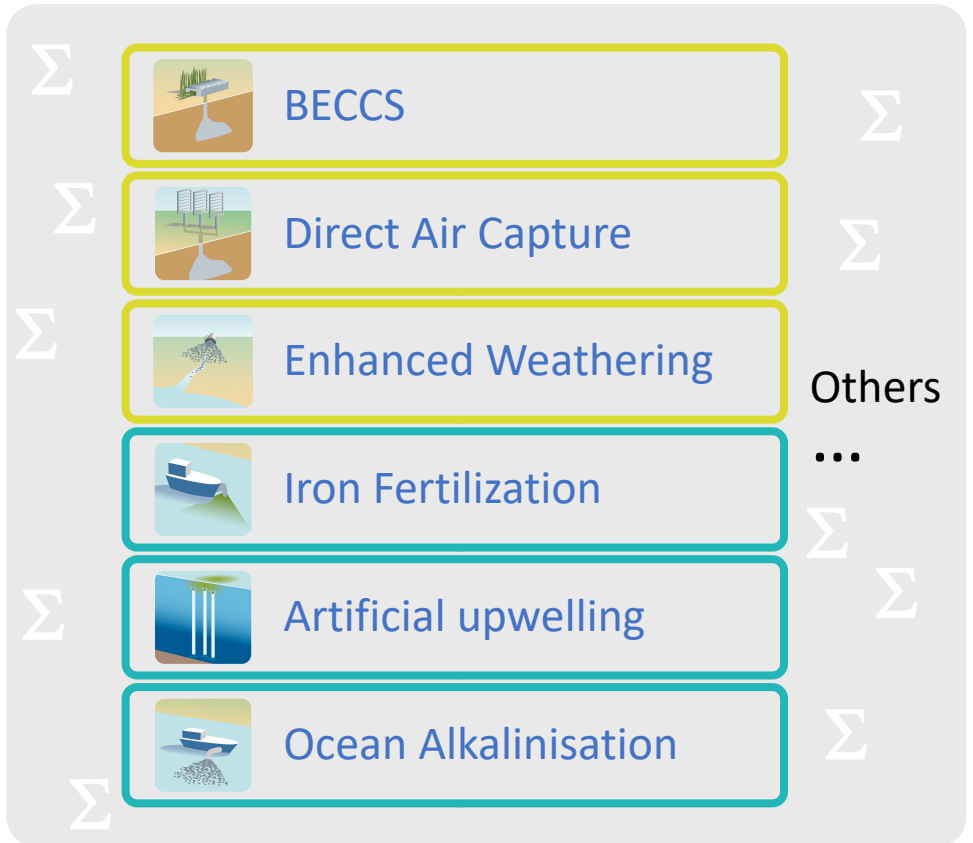
...and store it somewhere else

CO₂

Nature Based Solutions

Technical Methods

We also integrate technically-based methods (NETs) by transferring reliable scientific findings and by synthesizing these with geospatial data layers in order to identify 'potential' deployment sites





Objective

Synthesis and geospatial visualizations of robust scientific findings on mitigation (and adaptation) potentials as well as risks, trade-offs and co-benefits of NBS+NETs on a global to local level in a web-based, interactive atlas.

Target groups:

- Governmental Institutions, International Organizations, NGOs
Industry/Corporations (and Insurance Sector)

Benefits:

- Meet National Determined Contributions, verifiable compensation options
- Adaptation strategies to reduce damage costs and protect bio-economies

Basic Modules

- Map layers of NBS and NETs (global to local)
- Concise information texts with links to relevant publications
- Links to existing platforms
- Global overview of relevant projects and best practice examples

Impact

Provide a necessary decision-support platform that enables spatially differentiated assessments of NBS and NETs in the context of the Paris Agreement (Art. 4 & 6)



NBS - Prototype

Global NBS+NETs Atlas

Global NBS Atlas

Marine Ecosystems

Terrestrial Ecosystems

MOTIVATION

OBJECTIVE

PILOT STUDY

PROJECT MEASURES

TIMELINE

RESOURCES

VISION

OCEAN SALT MARSHES

KEY MESSAGES

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Global

Area
54,496 km² / 21,041 mi²

Carbon stocks
XXXX

Carbon storage
13,000,000 tC / year

Social cost of carbon
2,321,000,000 USD / year

Data source
UNEP

[Data description \(link\)](#)



LAYER & LEGEND

BACKGROUND INFORMATION

prototype 2020: global distribution of saltmarshes



NBS - Prototype

OCEAN
SALT MARSHES

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Netherlands

Area
151.55 km² // 58.51 mi²

Carbon stocks
xxxx

Carbon storage
37,129.75 tC / year

Social cost of carbon
148,283.51 USD / year

Data source
Wageningen University & Research (WUR)

[Data description \(link\)](#)





LAYER & LEGEND


FURTHER INFORMATION


- MOTIVATION
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NBS - Prototype









 Marine Ecosystems



 Terrestrial Ecosystems



 MOTIVATION



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OCEAN

SALT MARSHES

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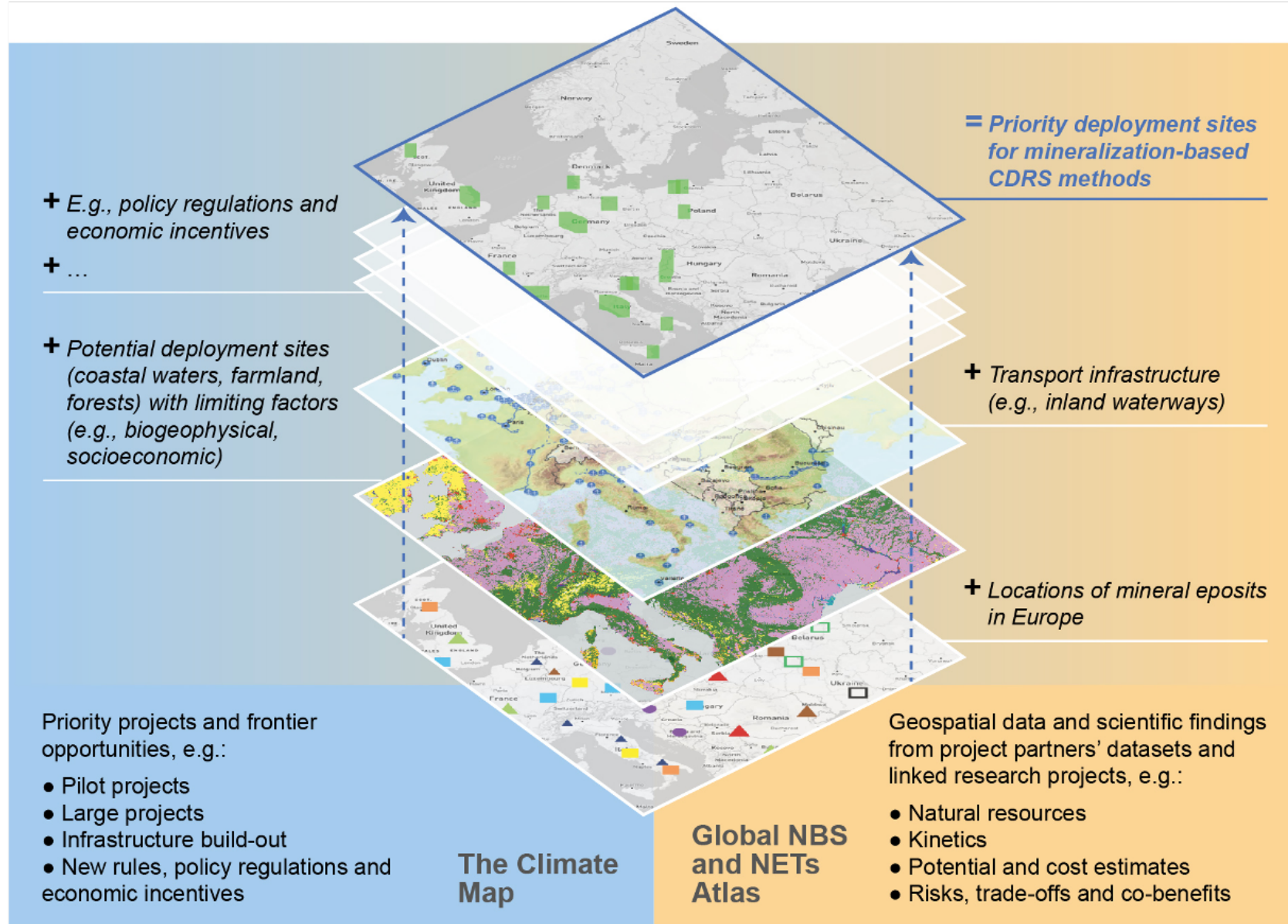
LAYER & LEGEND

FURTHER INFORMATION



NETs - Prototype

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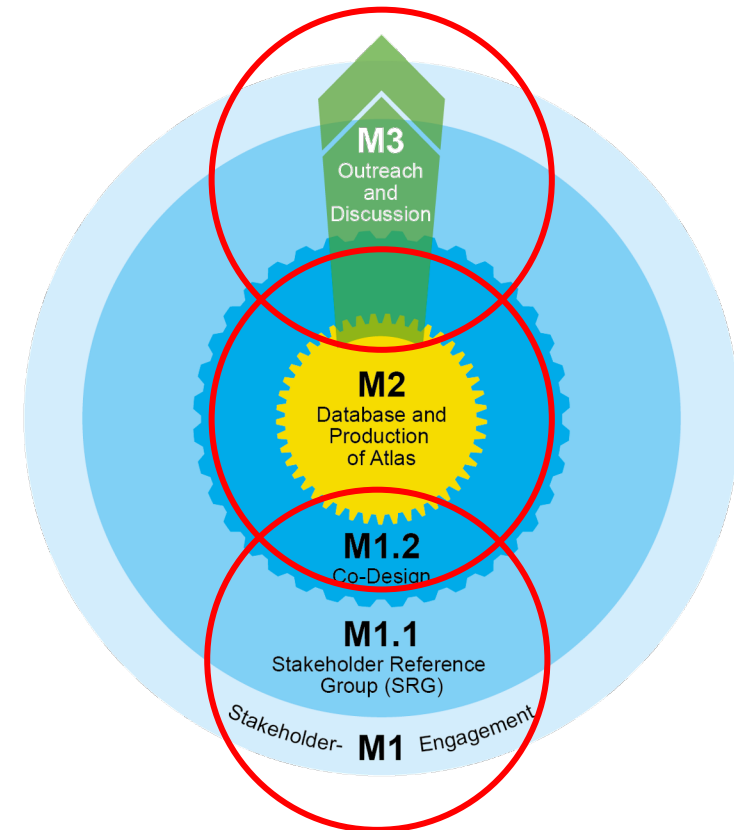


Project objectives

O3. Increase project scope and attract further data providers

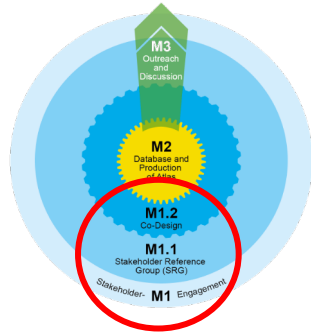
O2. Implementation of a robust, transparent and up-to-date global data infrastructure & Applied visualization of robust and up-to-date scientific findings

O1. Development of user-oriented web platform in Co-Design with stakeholders





Stakeholder Engagement



NBS-Atlas-Stakeholder

2. Data provider

KAUST

- Pushing the boundaries of NBS: From local to global opportunities

GEOMAR

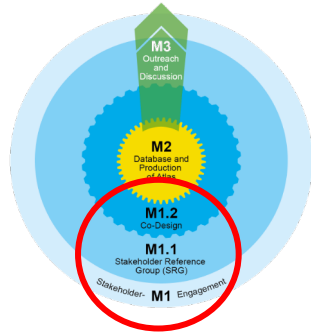
- OceanNETs (LANDMARC and NEGEM)
- CDRmare
- CDRSynTra
- SeaStore

THE CLIMATE MAP

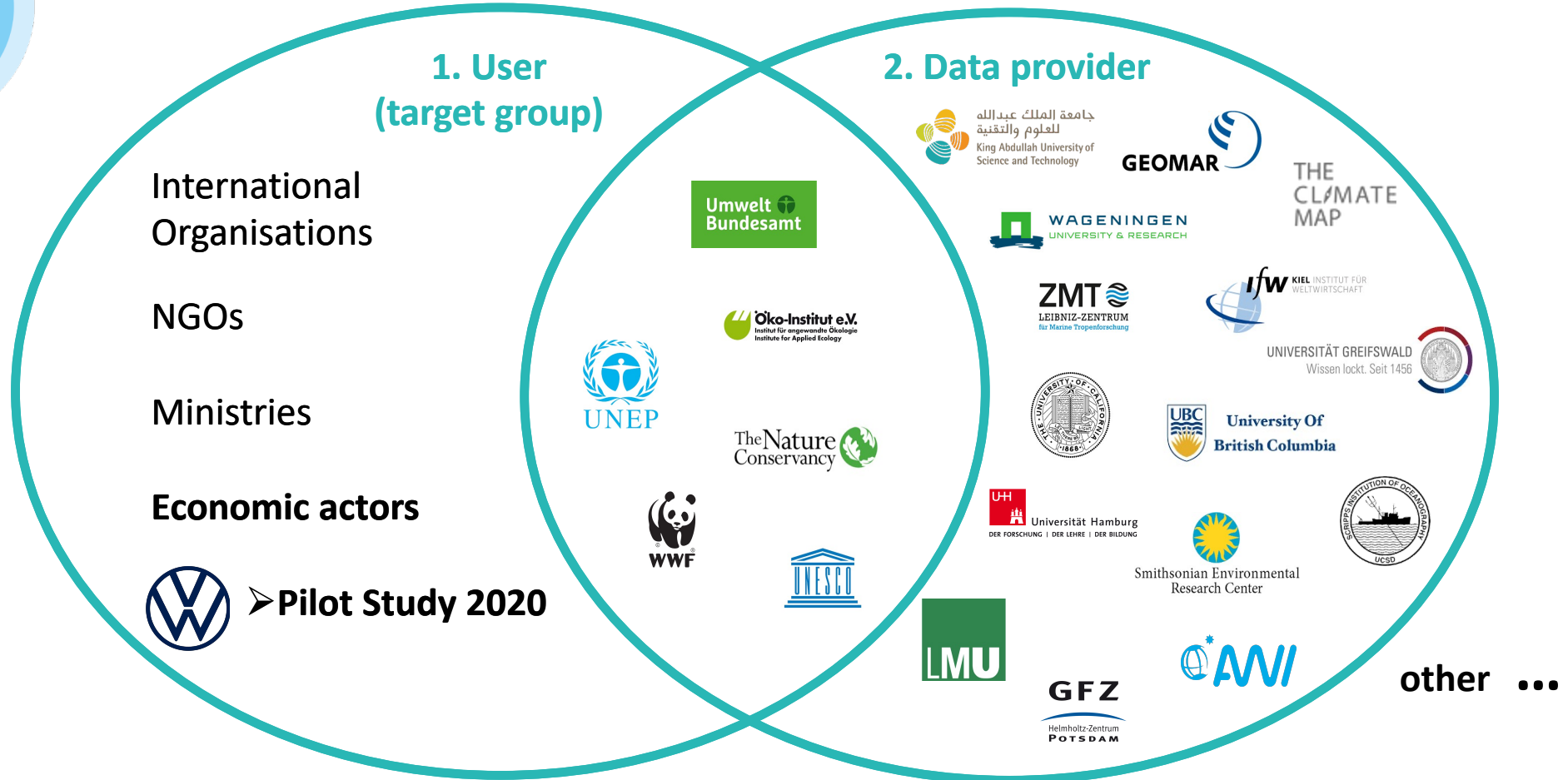




Stakeholder Engagement



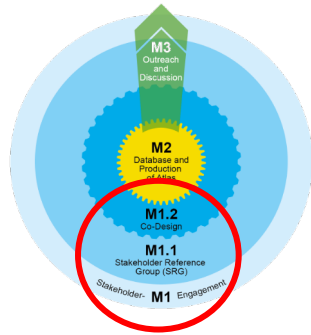
Stakeholder Reference Group (intents)





Global
NBS+NETS
Atlas

Co-Design Process with Stakeholder Reference Group



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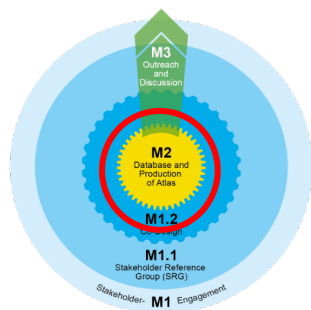
LAYER & LEGEND

BACKGROUND INFORMATION

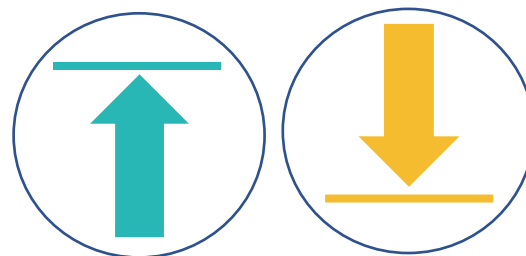
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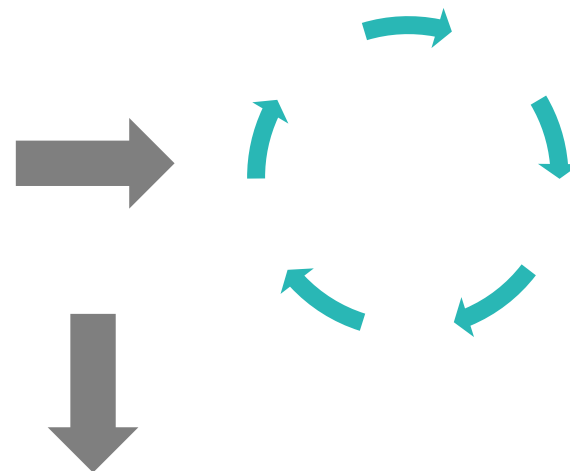
Technical implementation



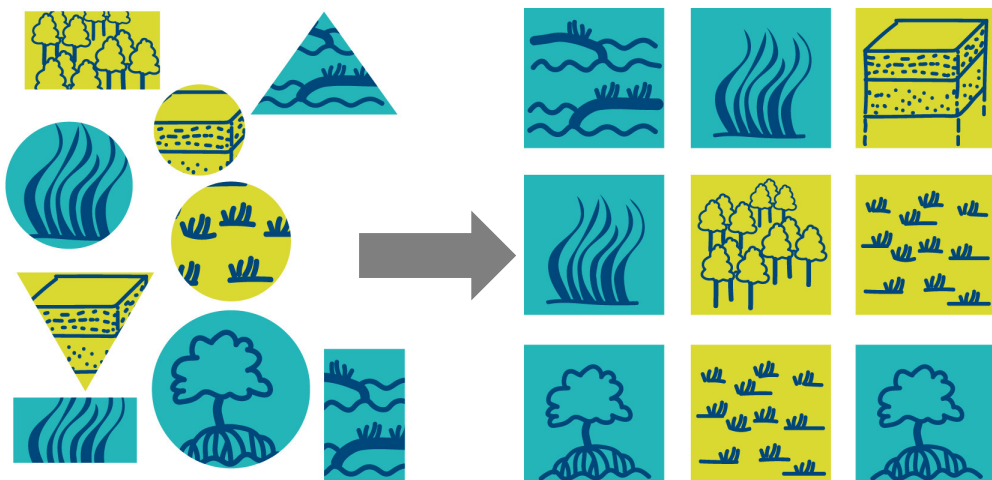
Controlled Up-/Download



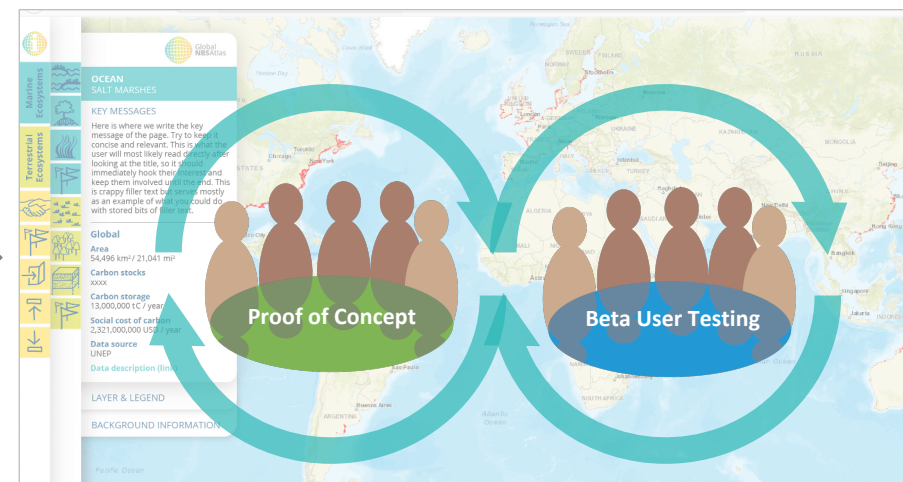
Life-Cycle Management



Data Harmonization

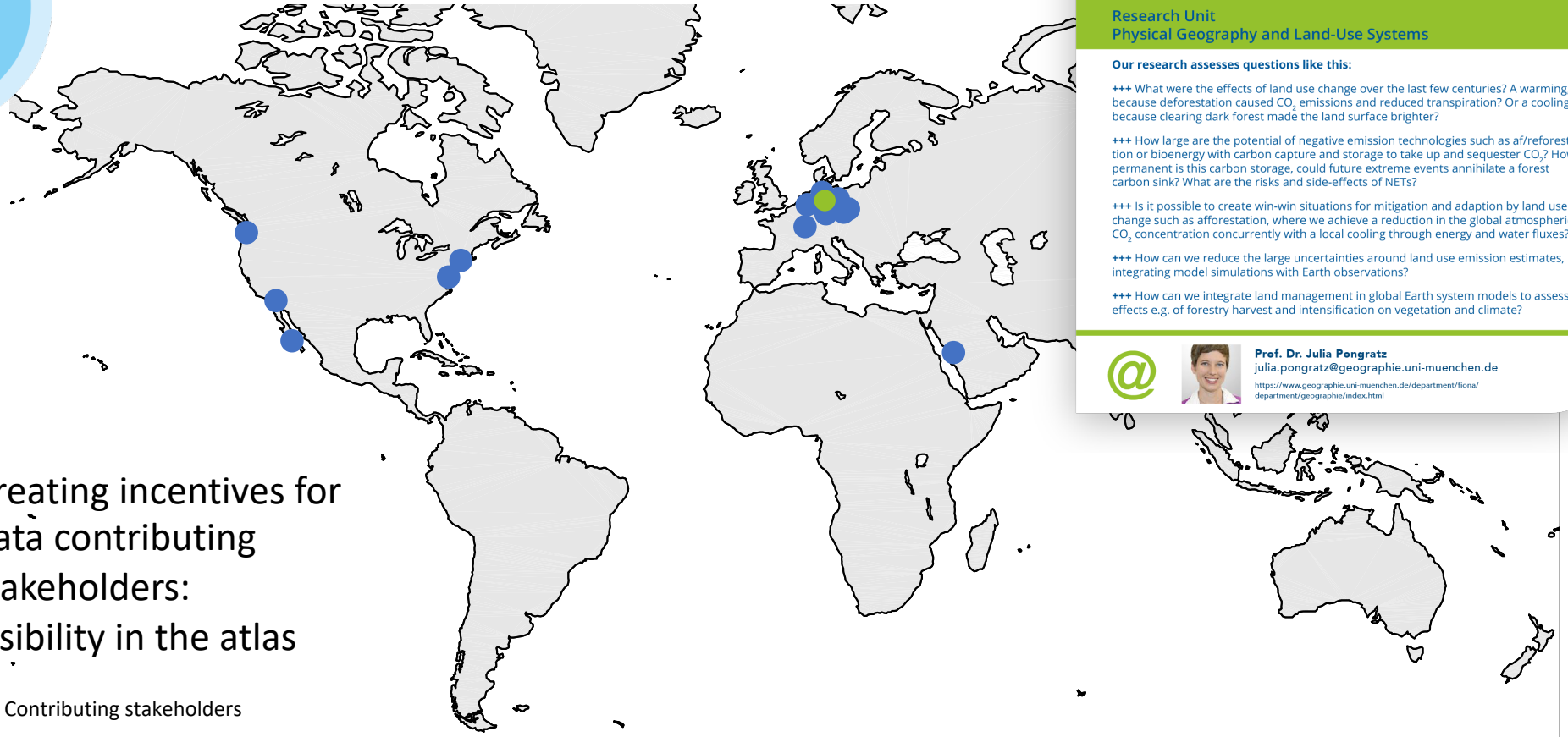
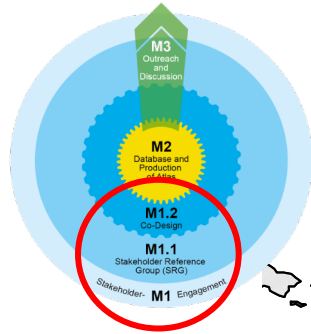


Production of Atlas





Visibility of data contributing stakeholders



Creating incentives for data contributing stakeholders: visibility in the atlas

● Contributing stakeholders



Our research assesses questions like this:

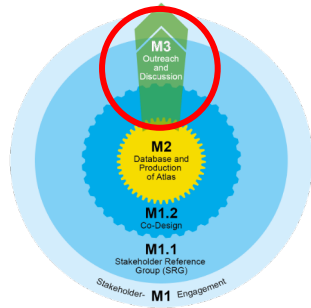
- +++ What were the effects of land use change over the last few centuries? A warming, because deforestation caused CO₂ emissions and reduced transpiration? Or a cooling, because clearing dark forest made the land surface brighter?
- +++ How large are the potential of negative emission technologies such as afforestation or bioenergy with carbon capture and storage to take up and sequester CO₂? How permanent is this carbon storage, could future extreme events annihilate a forest carbon sink? What are the risks and side-effects of NETs?
- +++ Is it possible to create win-win situations for mitigation and adaptation by land use change such as afforestation, where we achieve a reduction in the global atmospheric CO₂ concentration concurrently with a local cooling through energy and water fluxes?
- +++ How can we reduce the large uncertainties around land use emission estimates, integrating model simulations with Earth observations?
- +++ How can we integrate land management in global Earth system models to assess effects e.g. of forestry harvest and intensification on vegetation and climate?



Prof. Dr. Julia Pongratz
 julia.pongratz@geographie.uni-muenchen.de
<https://www.geographie.uni-muenchen.de/departement/fiona/departement/geographie/index.html>



Outreach & Discussion



Objectives

Increase scope of NBS-Atlas and attract further data providers

Activities

- PR & social media presence, policy briefs
- Networking and use of existing communication channels
- Presentation of NBS-Atlas
- Scientific publication(s)



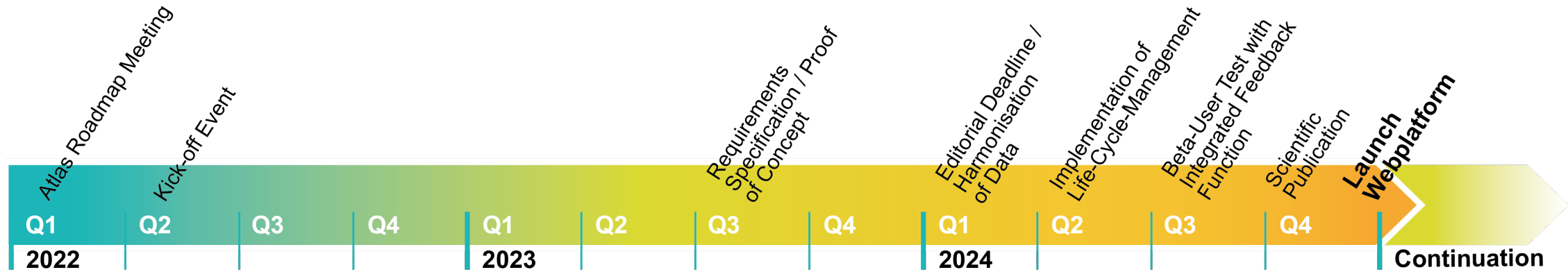
Success indicators

	Indicator	Target value
Quantitative	Participating research institutes, NGOs etc. (Stakeholder Reference Group)	25 – 35
	Data contributions from non-participating data providers: <ul style="list-style-type: none"> • Result maps for potential and cost estimates of NBS, mapping data for the spatial distribution of NBS, • Field / measurement data • Model results on potential and costs • Information on research projects, best practice examples etc. 	> 35 / year (after launch of atlas)
	Targeted number of visitors per year after launch of the atlas	> 20 000
	Use of standardized interface for Up- / Downloads	> 35 / year (after Launch of atlas)
	Scientific publications during project	1 – 2
	Development and establishment of a social media presence (e.g. newsletter, Instagram, Twitter)	> 5 000 Follower during project
Qualitative	Data Harmonization Guide	Q1 / 2024
	Integration Life-Cycle-Management	Q2 / 2024
	Establishment of a transdisciplinary network	Q1 / 2022, ongoing
	Definition of specific stakeholder competencies	Q1 / 2022, ongoing



Timeline and Milestones

Project duration: Beginning of 2022 until end of 2024 ...



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Resources needed

Total

Description	Excl. Overhead	Incl. 38% Overhead
Total estimated costs	689,122 €	950,988 €

Base funding

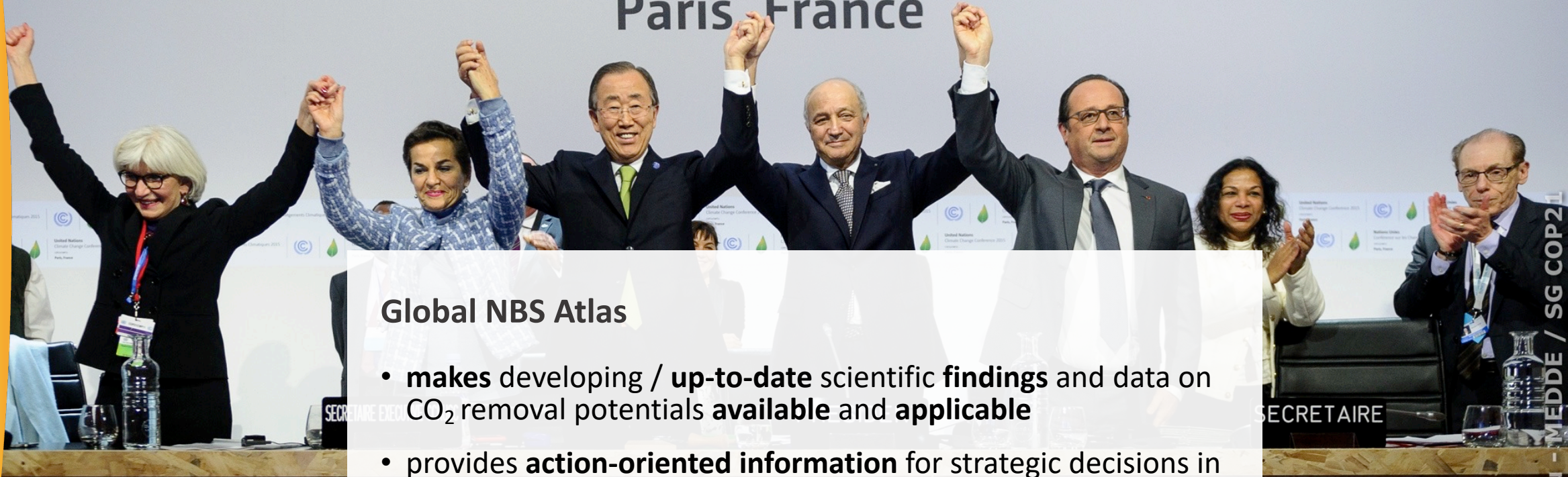
Description	Excl. Overhead	Incl. 38% Overhead
Personnel costs Dr. Fabian Reith: Scientific-Technical Coordinator Data Manager	186,482 € / year	257,345 € / year



Our Vision

COP21/CMP11

Paris France



Global NBS Atlas

- **makes developing / up-to-date scientific findings and data on CO₂ removal potentials available and applicable**
 - **provides action-oriented information for strategic decisions in the context of the agreed Paris climate targets**
- **Important contribution to viable climate protection strategies**

Contact



freith@geomar.de

Thank you for your attention!



Marine Ecosystems



Terrestrial Ecosystems



Global NBSAtlas

OCEAN SALT MARSHES

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