Broadening the scope of future visions for nature positive futures in Peru

SwissRE resilience summit

Benjamin Black (ETH Zürich)

030.11.2023

Agenda

1. Team
2. Goals
3. Background
4. Workflow
5. Impacts

Team

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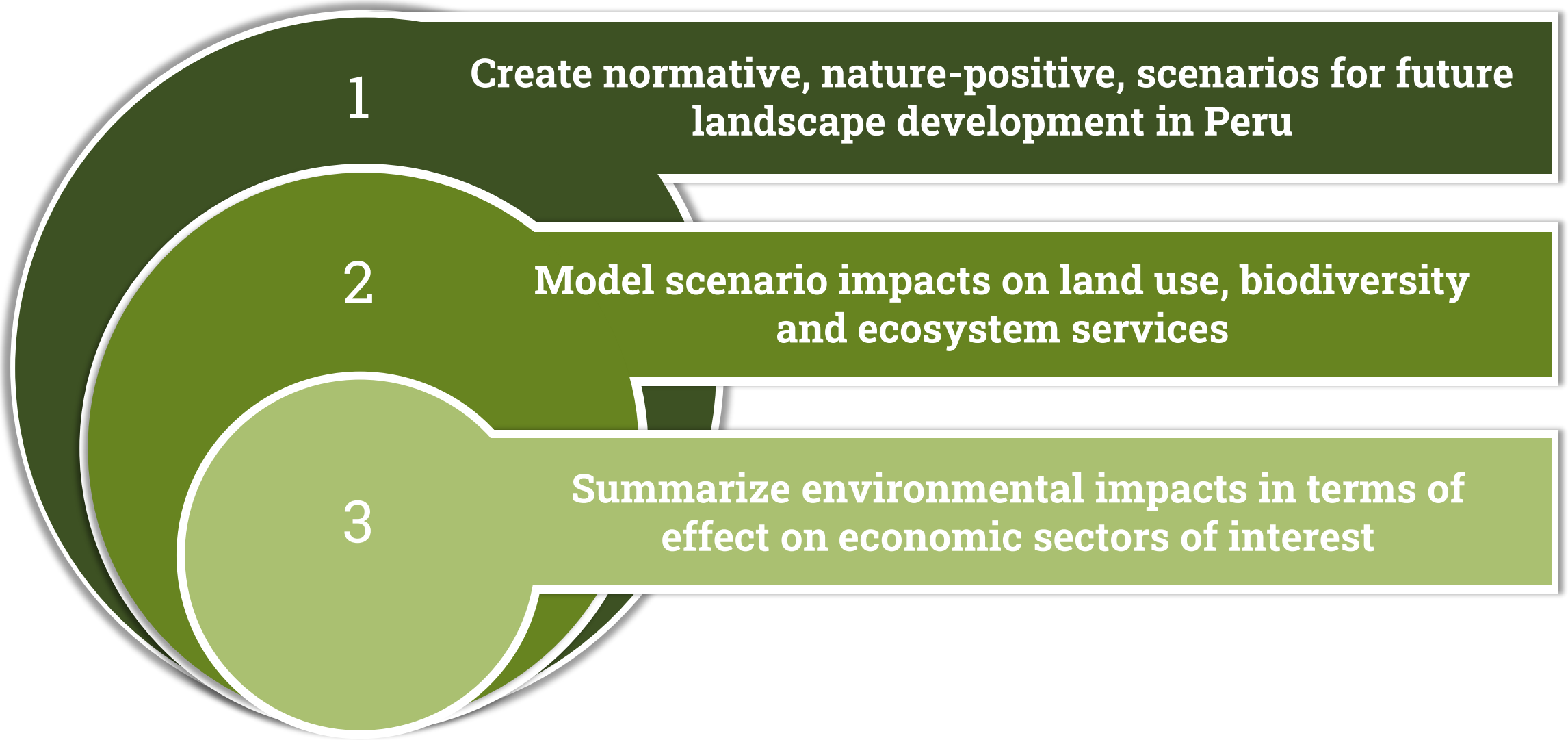
WYSS ACADEMY FOR NATURE

UNIL | Université de Lausanne

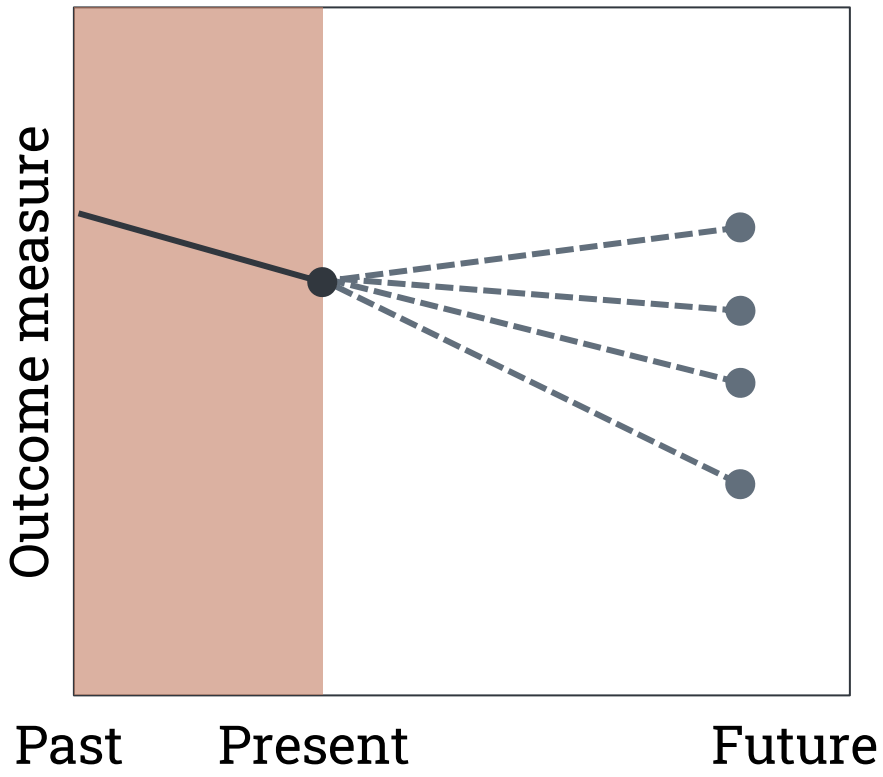
Université Grenoble Alpes

Project goals

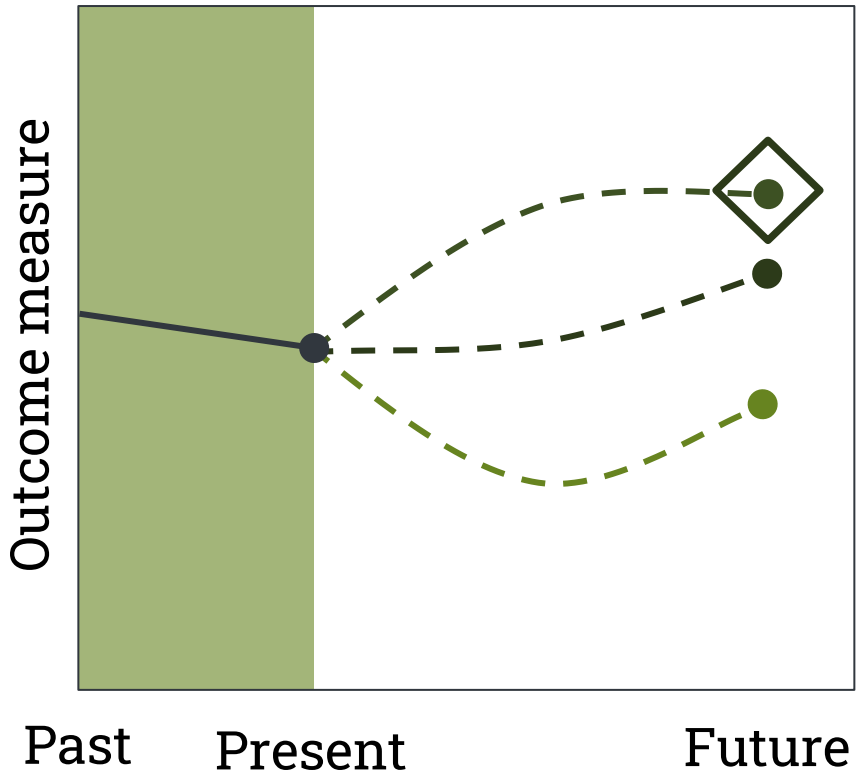


Background

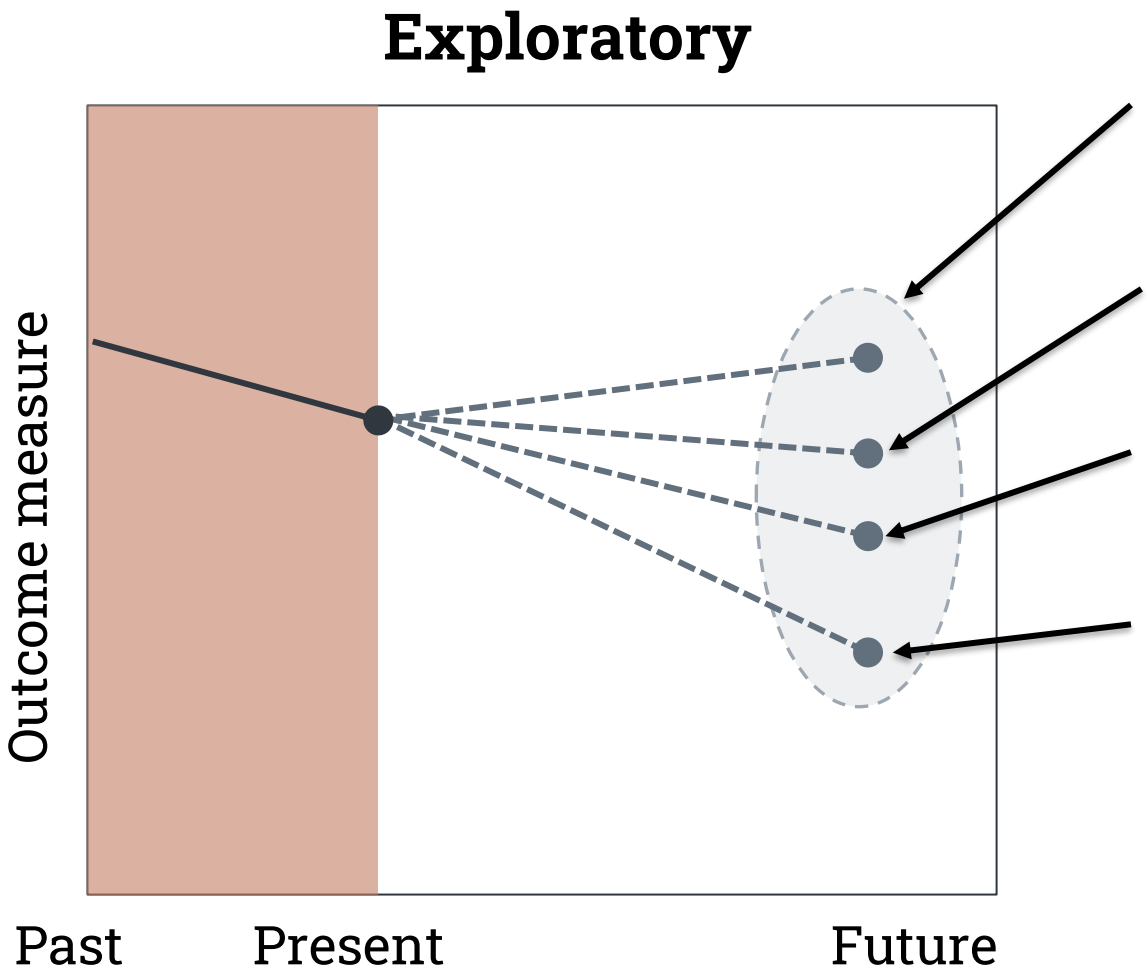
Exploratory



Normative



Background



Range of probable outcomes

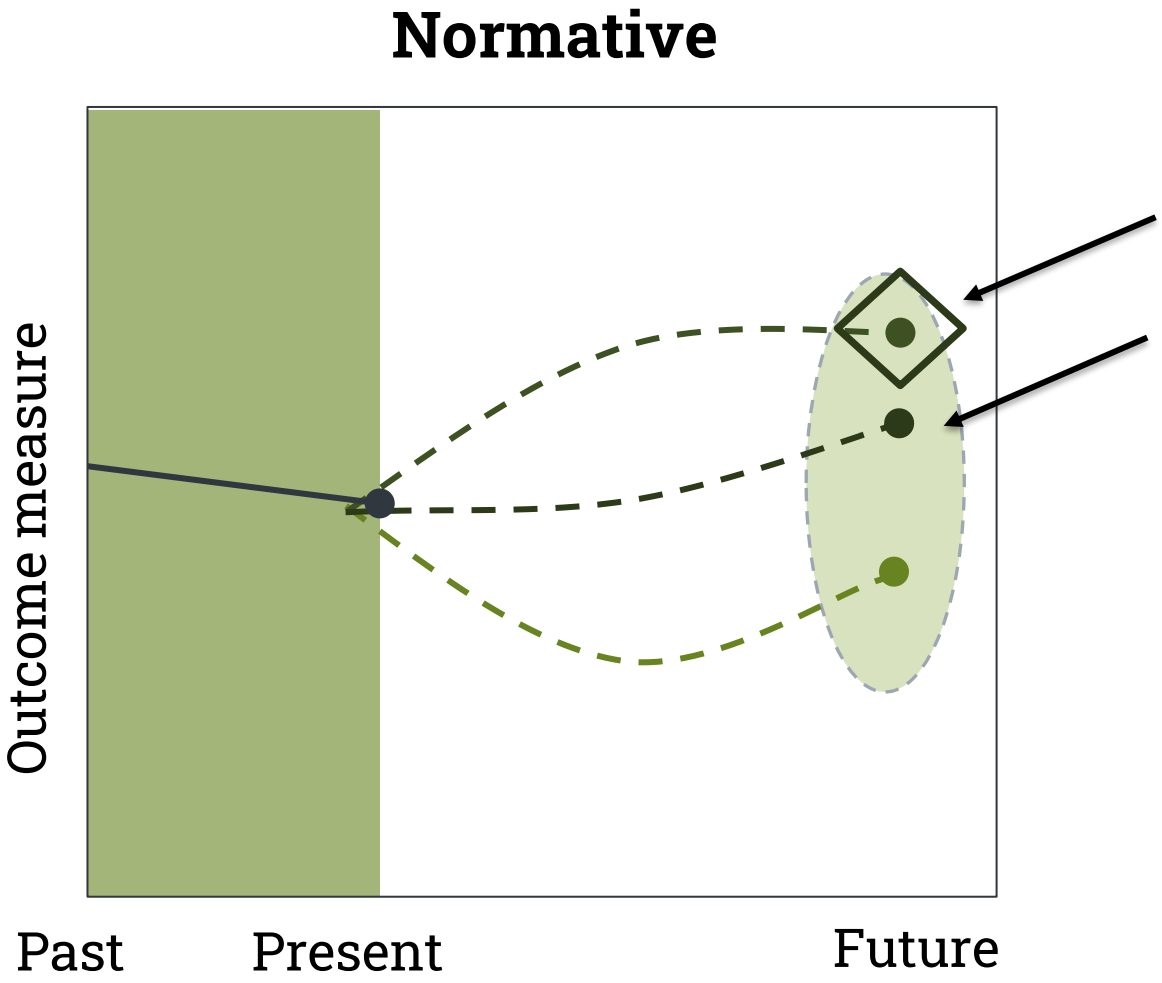
Business as Usual: Extrapolation of current trends

Common alternatives: ‘economic liberalisation ’

Increasingly predict negative outcomes

Often devised without participation = **No indication of societal desirability**

Background



Specify desirable end-points

Space to imagine transformative change

Often devised with stakeholder participation:

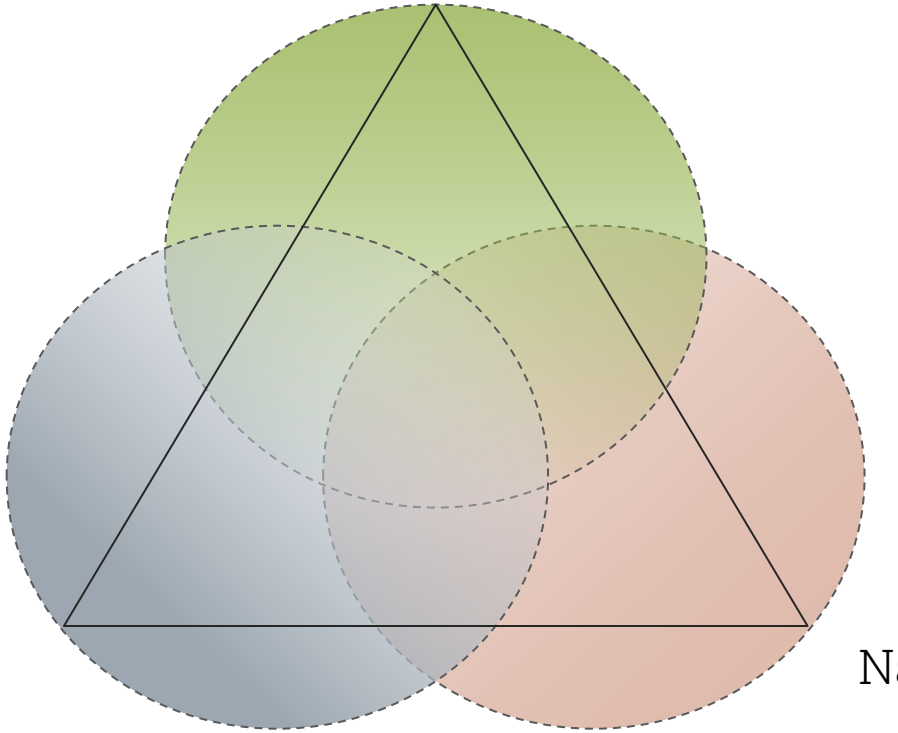
- **Inclusive of different value systems**
- **Mobilise actors and encourage stewardship.**

Nassauer and Corry, 2004; Bennett et al., 2016; McPhearson et al., 2016; Luederitz et al., 2017; Iwaniec et al., 2020

Background

IPBES Nature Futures Framework

Nature for Nature
Intrinsic value of nature
Space allocated for nature



Nature as culture
Living in harmony
People one with nature

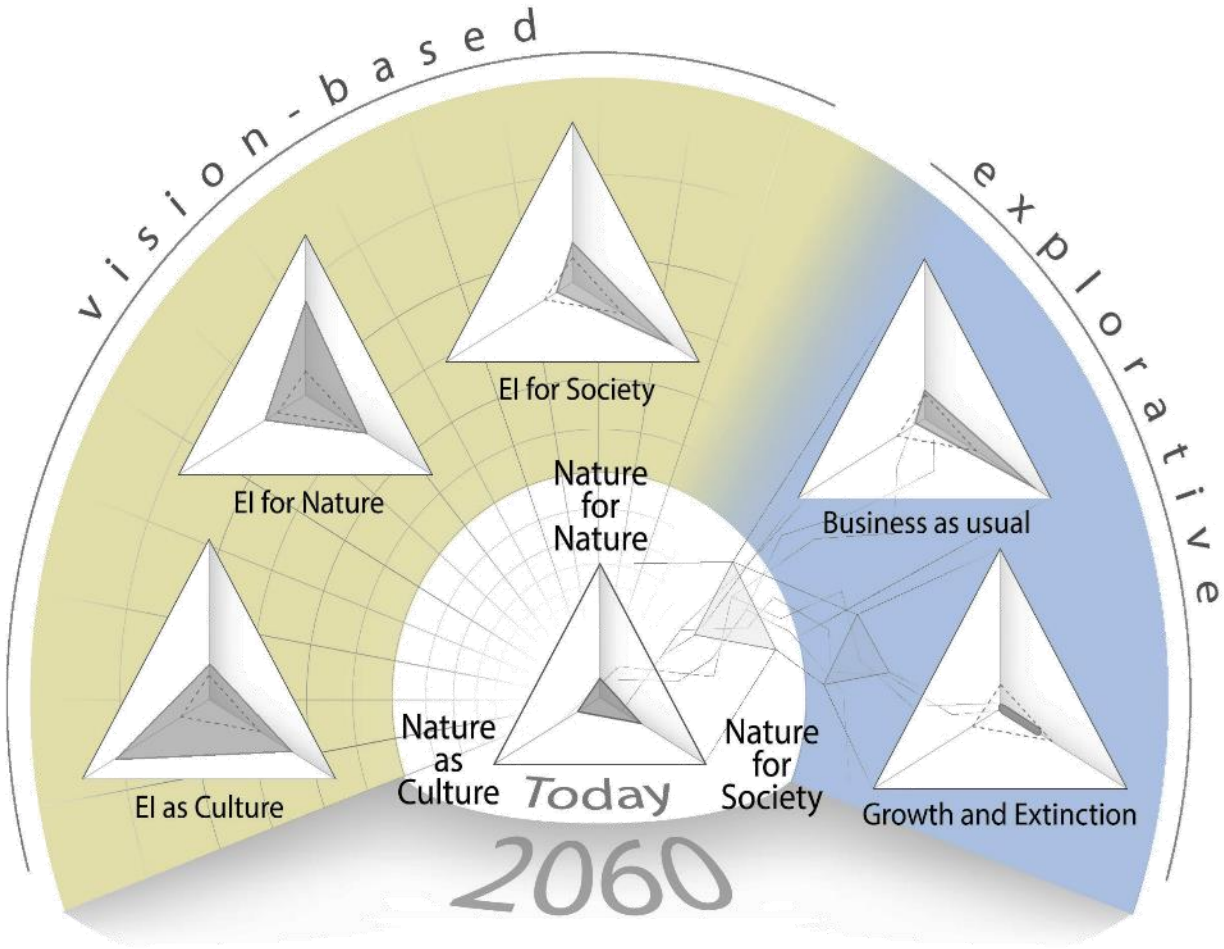
Nature for Society
Nature's benefits to people
Ecosystem services

PBL 2018

Background

Five scenarios of future landscape development in Switzerland between 2020-2060

ValPar.CH



Mayer et al. 2023

Background

ARTICLE OPEN

Check for updates

A future of extreme precipitation and droughts in the Peruvian Andes

Emily R. Potter[1,2,3]✉, Catriona L. Fyffe[4], Andrew Orr[2], Duncan J. Quincey[1], Andrew N. Ross[5], Sally Rangecroft[6,7], Katy Medina[8,9], Helen Burns[5], Alan Llacza[10], Gerardo Jacome[10], Robert Å. Hellström[11], Joshua Castro[12], Alejo Cochachin[13,15], Nilton Montoya[12], Edwin Loarte[8,9] and Francesca Pellicciotti[4,14]

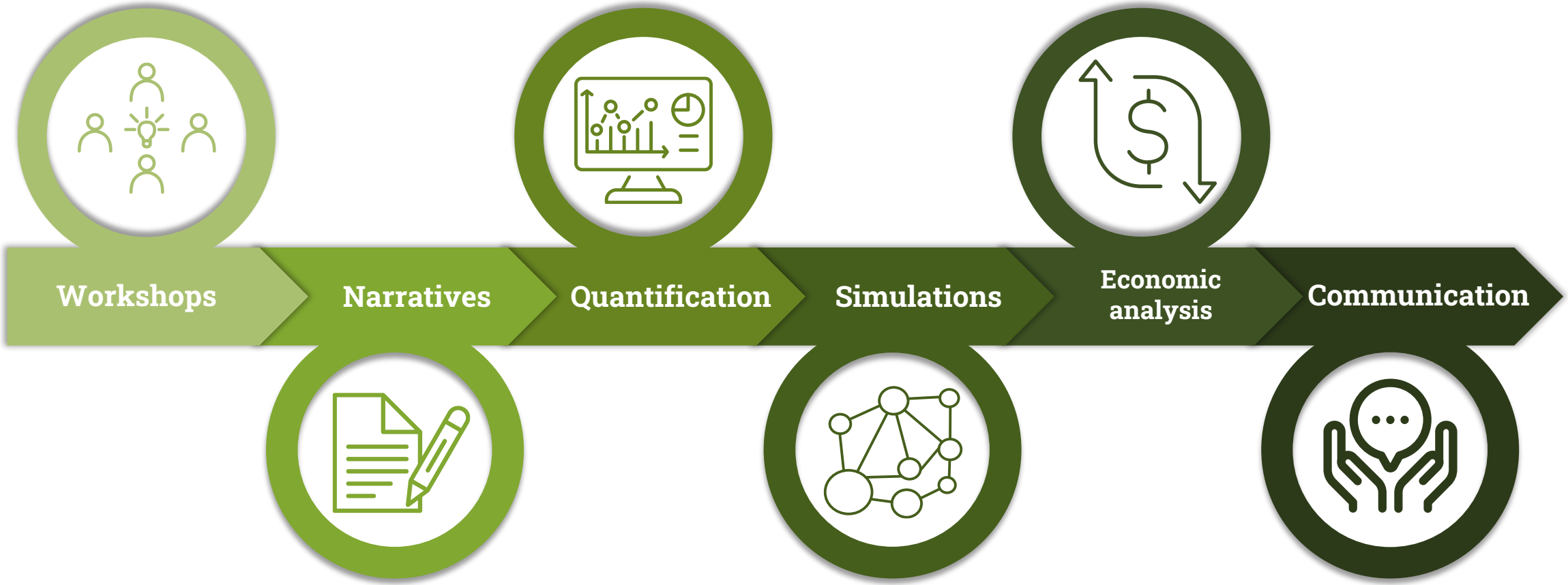
Peru glaciers decimated by climate change - report

By **Marco Aquino**

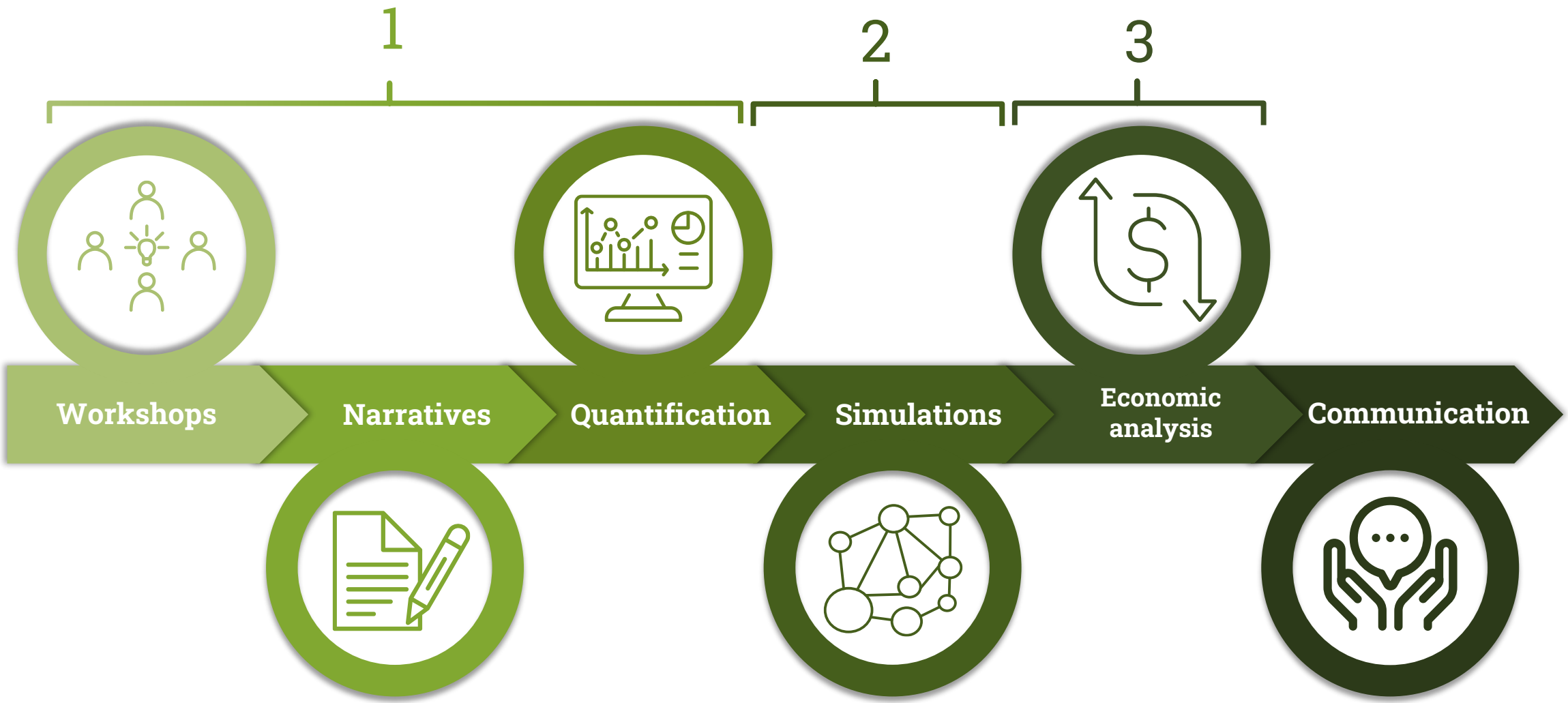
November 24, 2023 5:17 AM GMT+1 · Updated 6 days ago

Peru: Fifth highest rate of deforestation in the world in 2022

Workflow


Workshops
Narratives
Quantification
Simulations
Economic analysis
Communication

Workflow


1
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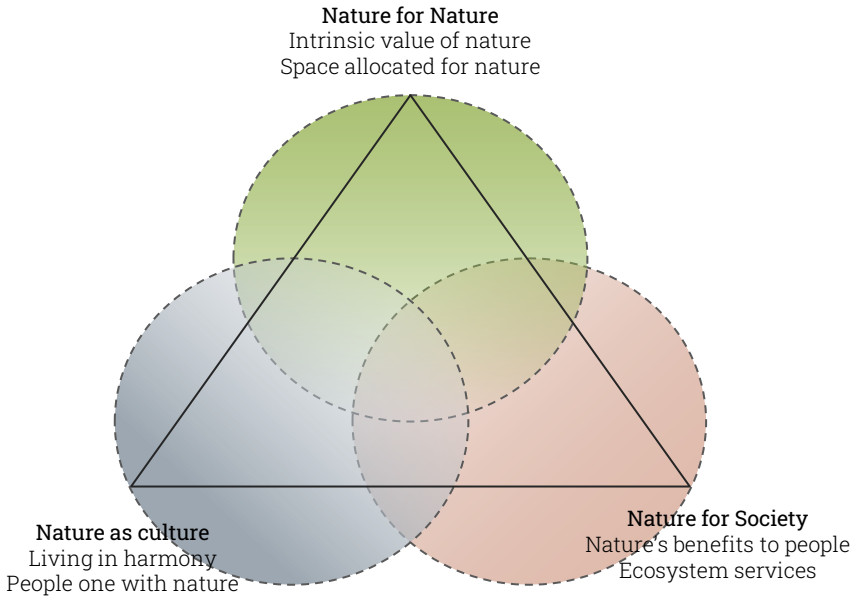
Workflow

- Division of Peru into regions for scenario differentiation
- Cross-section of stakeholders
- Stages of participatory process:
    1. Scenario co-creation
    2. Validation of scenario narratives and quantification
    3. Validation/presentation of results

Minam 2017

Workflow

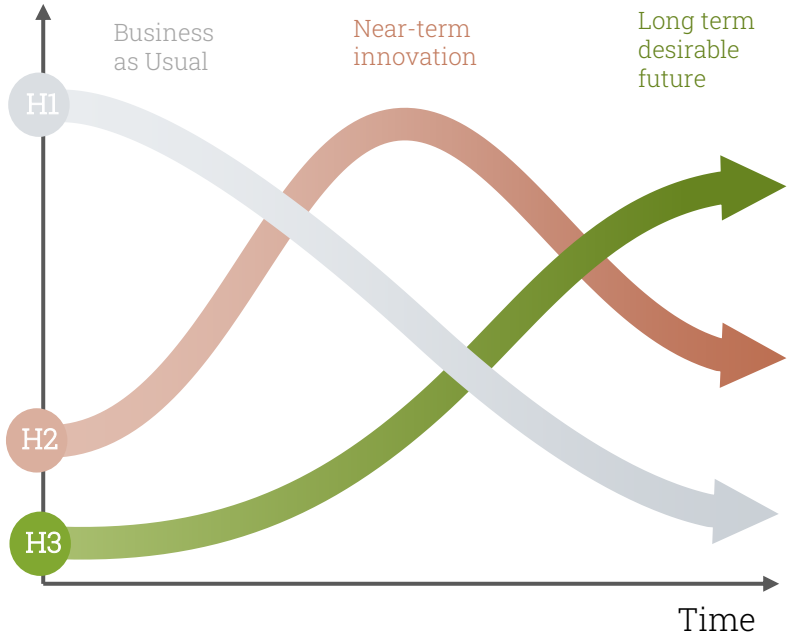
Nature Futures Framework



PBL 2018

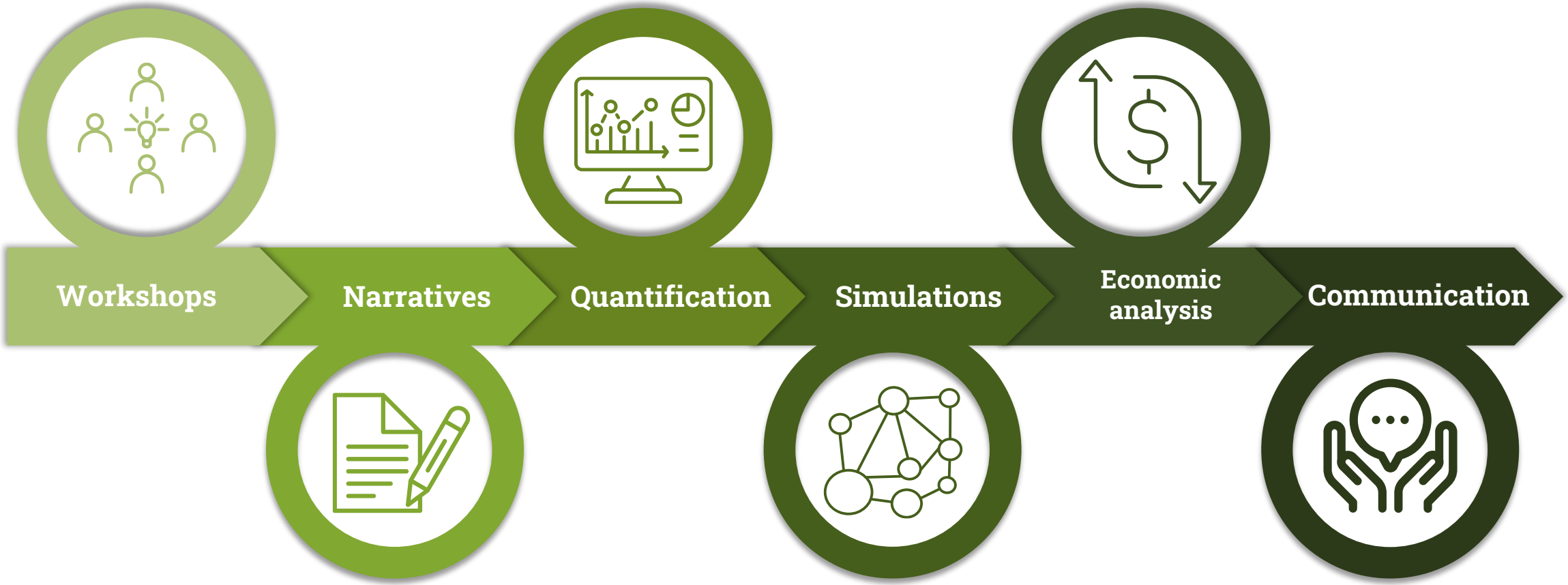
+

Three Horizons framework



Sharpe et al. 2016

Workflow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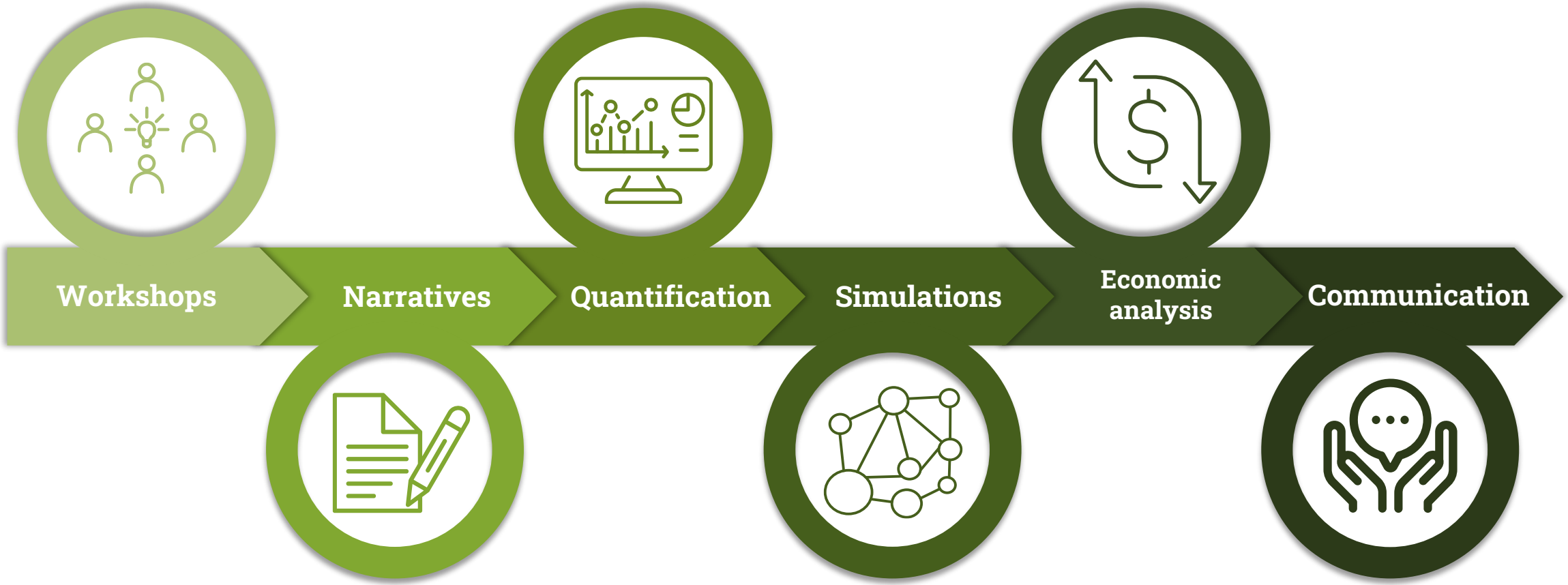
Workflow

- **Descriptions of key drivers**: Economic development, agricultural policy, energy mix, tourism, population change
- **Linked to global scenarios**: SSP/RCPs
- **National processes**: Protected area targets, Department developmental plans

Driver	Nature for Nature	Nature for Society	Nature as Culture	Business as Usual	Growth and Extinction
	+1.4°C RCP 2.6	+2.3°C RCP 4.5	+1.4°C RCP 2.6	+2.3°C RCP 4.5	+3.1°C RCP 8.5
	Low 9.5M	Reference 10.5M	Reference 10.5M	Reference 10.5M	High 11.5M
	22% (2030) 30% (2060)	17% (2030) 22% (2060)	17% (2030) 25% (2060)	15% (2030) 20% (2060)	15% (2030) 0% (2060)
	SSP 1 Green Road	SSP 2 Middle of the road	SSP 1 Green Road	SSP 2 Middle of the road	SSP 3 Rocky Road

Workflow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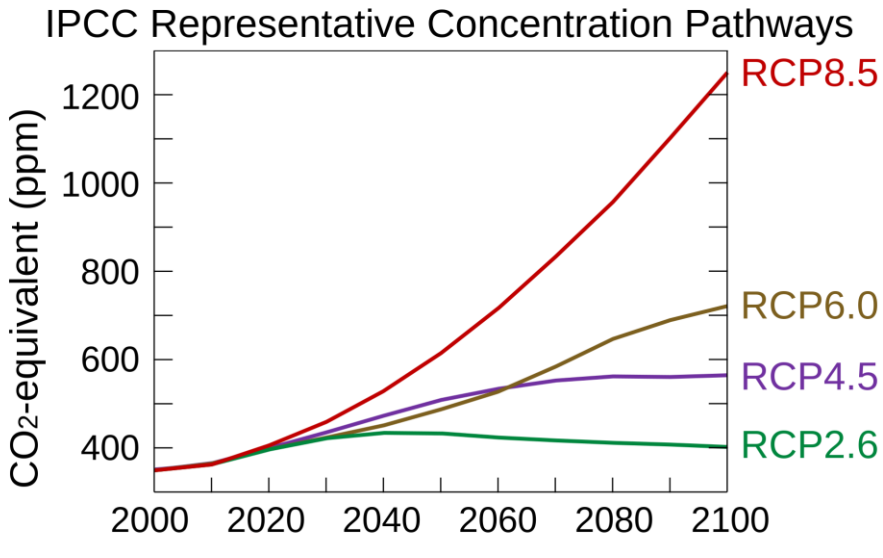
Workflow

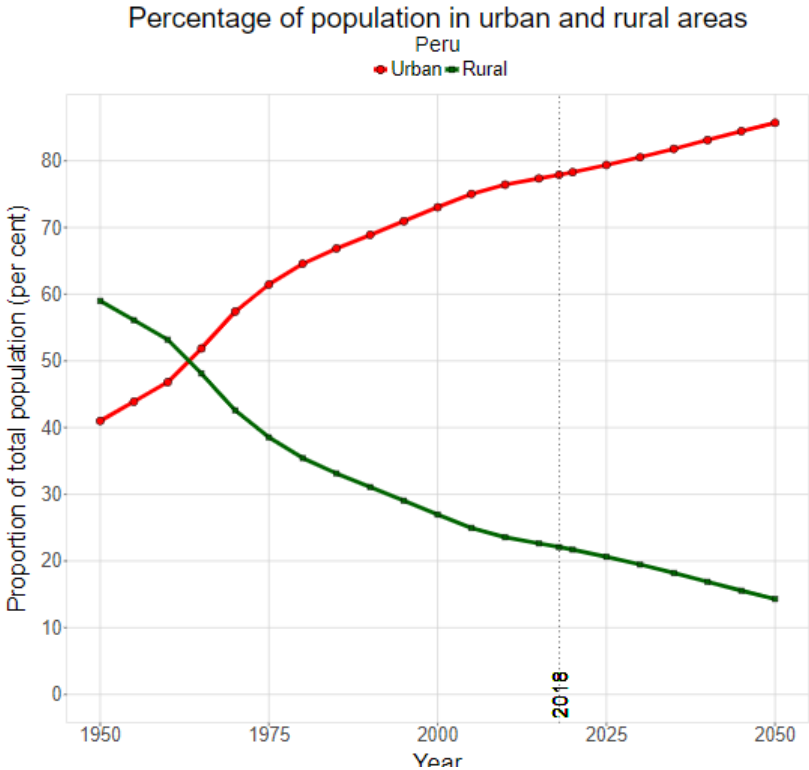
Dynamic drivers

Spatial trends and interventions

Rates of LULC change

Quantification





Potter et al. 2023

Workflow

Dynamic drivers

Spatial trends and interventions

Rates of LULC change

Quantification

Scenario narrative: "Protected area coverage increased to 30% prioritizing areas for…."

Mechanism: Introduce new hypothetical PAs over simulation time steps, reduce the conversion of natural and semi-natural land to artificial LULC

Workflow

Quantification

Dynamic drivers

Spatial trends and interventions

Rates of LULC change

LandSHIFT model

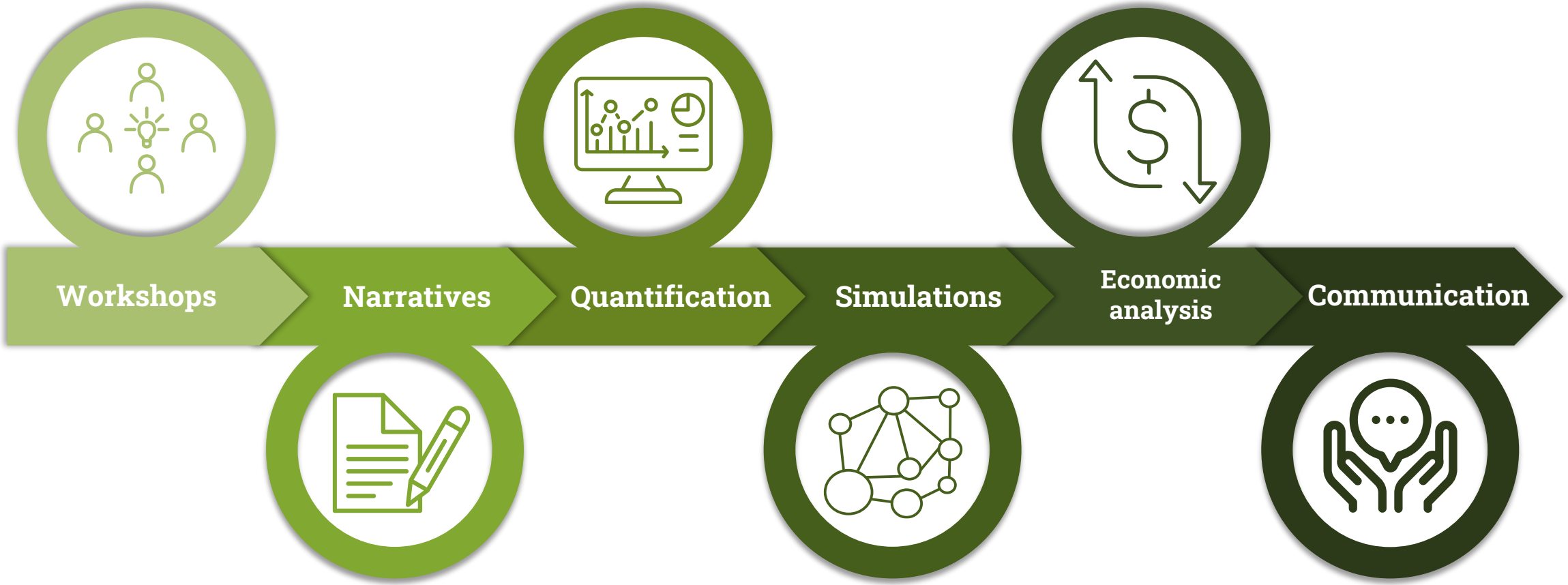
Expert elicitation

Scenario specific quantified trends in drivers:

- GDP
- Population
- Production of crops, herd size or demand for meat/animal products

- Are rates realistic under each scenario?
- Non-linearity of trends?

Workflow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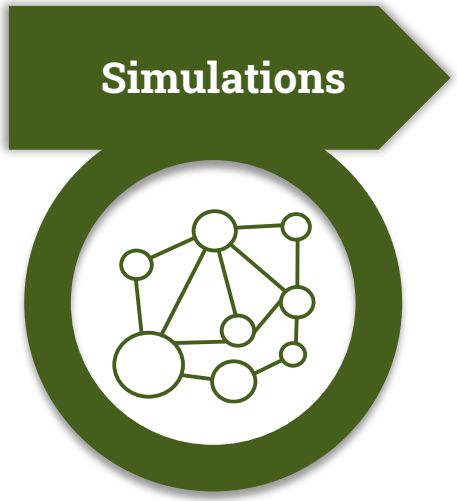
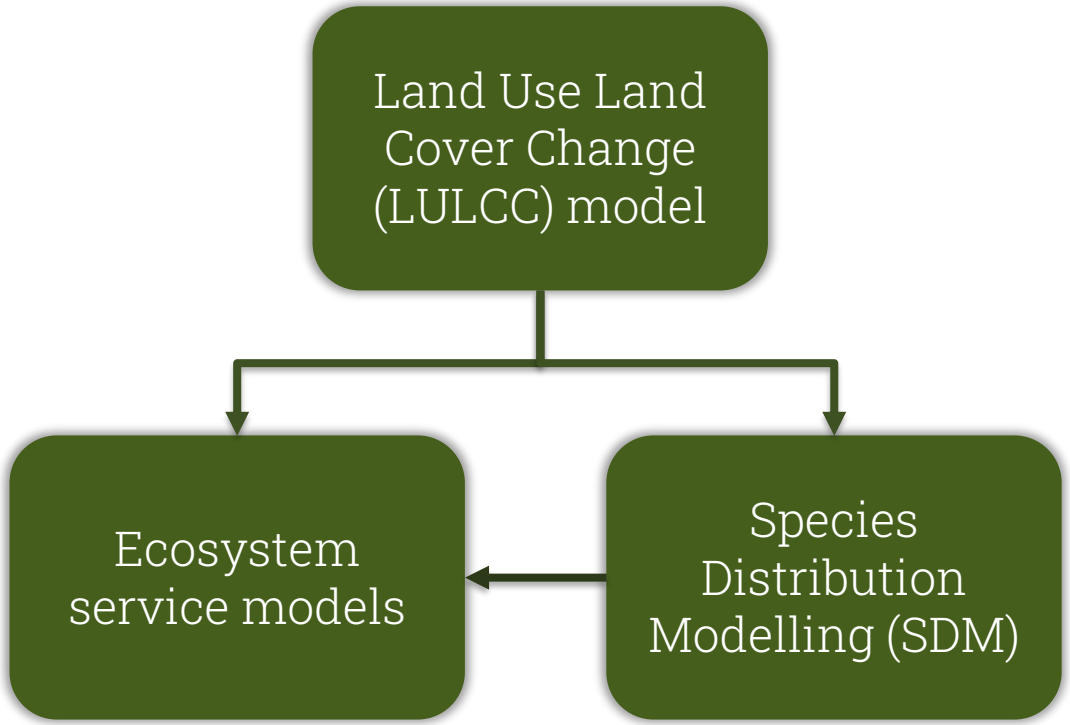
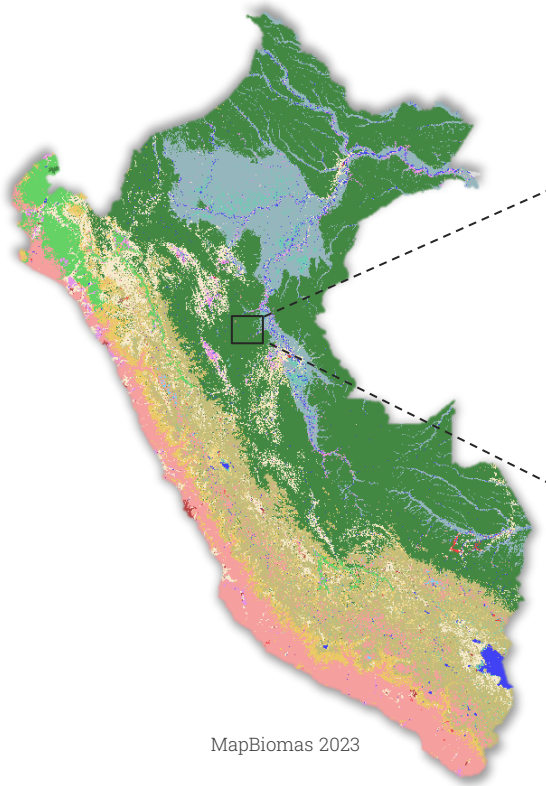
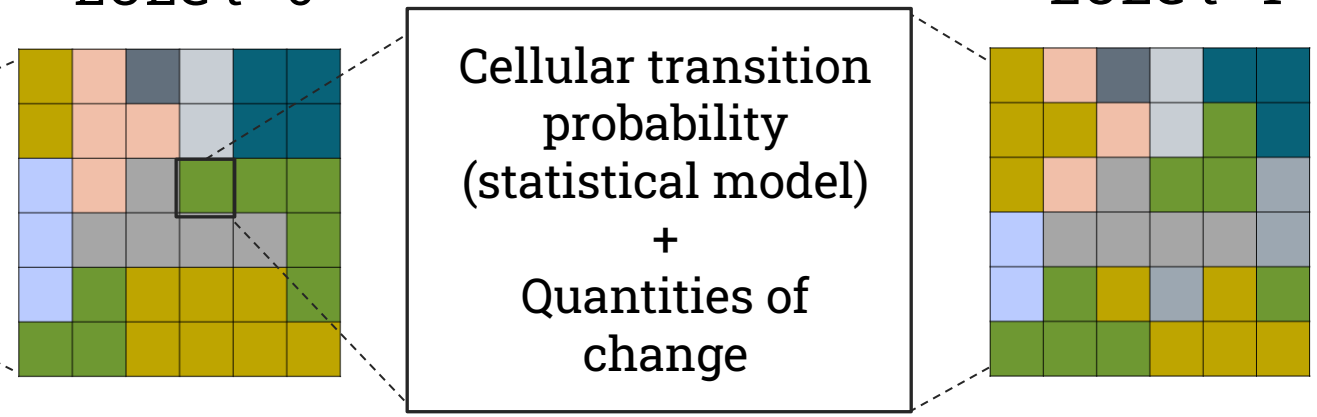

Simulations


Land Use Land Cover Change (LULCC) model
Ecosystem service models
Species Distribution Modelling (SDM)

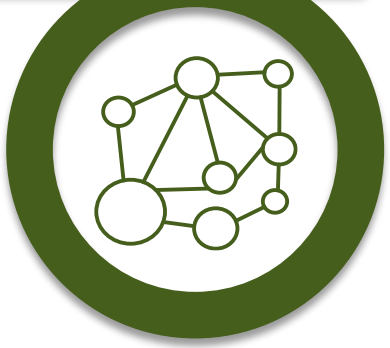
Workflow

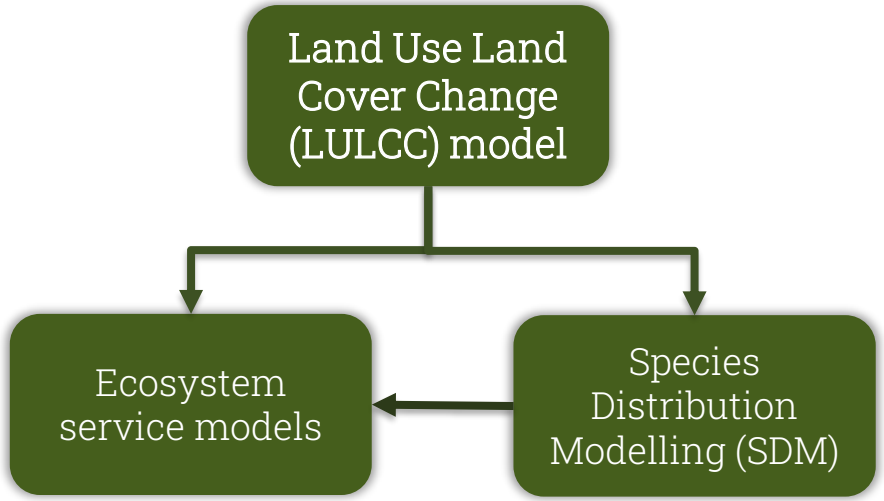


MapBiomas 2023



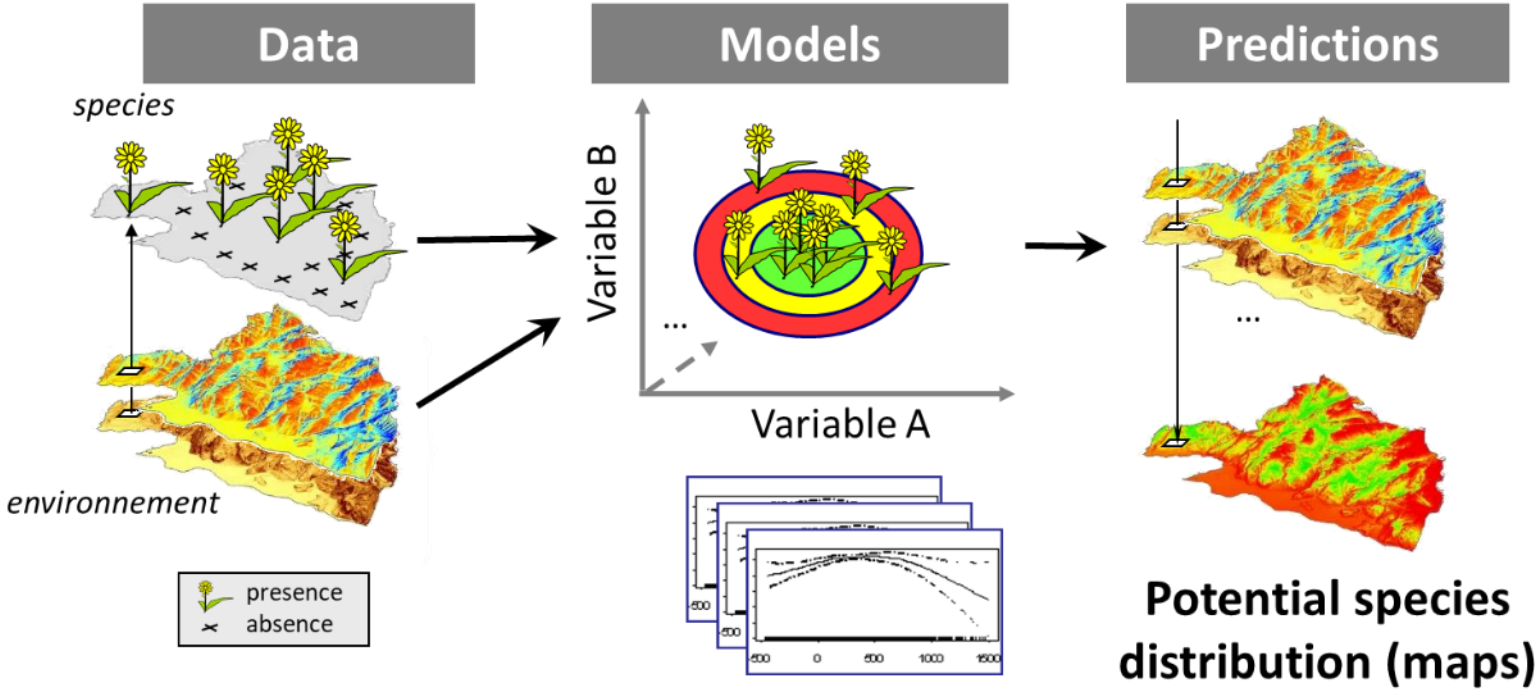
Simulations



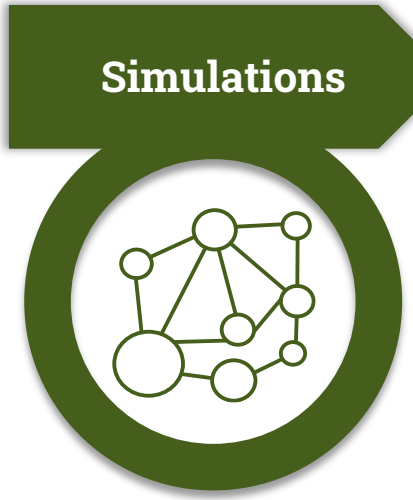


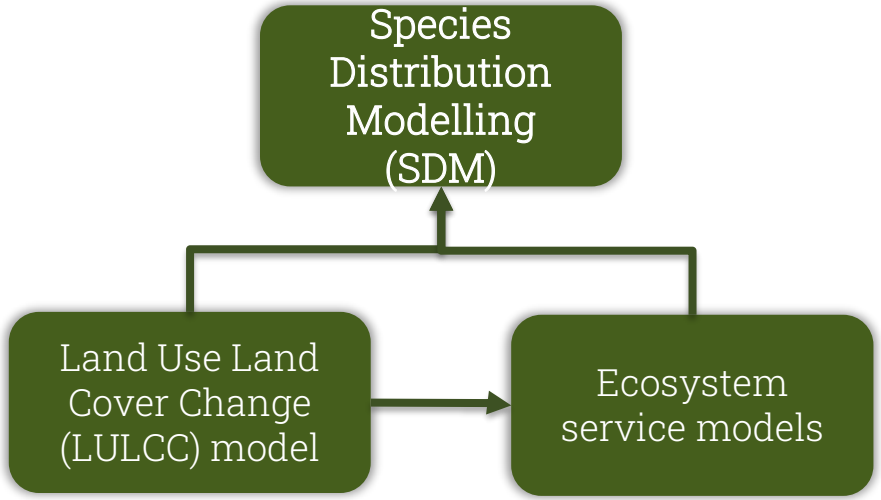
Workflow

Guisan & Zimmermann (2000); Guisan & Thuiller (2005); Ecol. Lett., Guisan et al. (2017)



Simulations

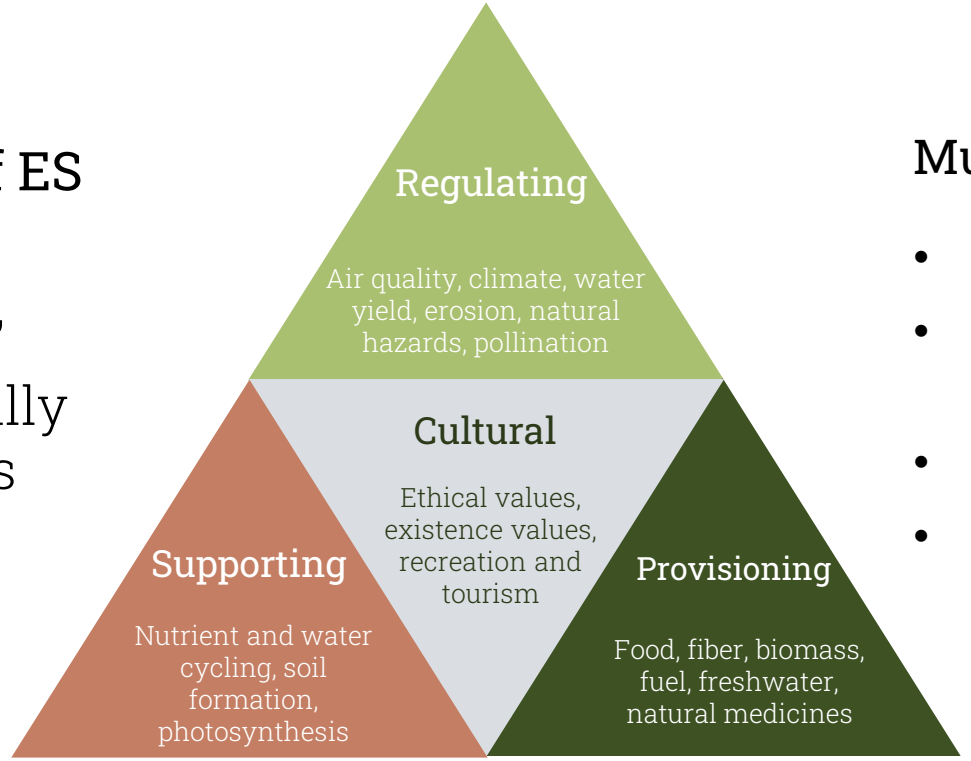




Workflow

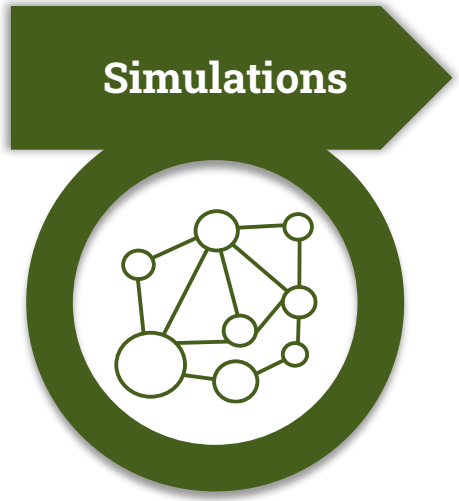
Select indicators of ES provision:

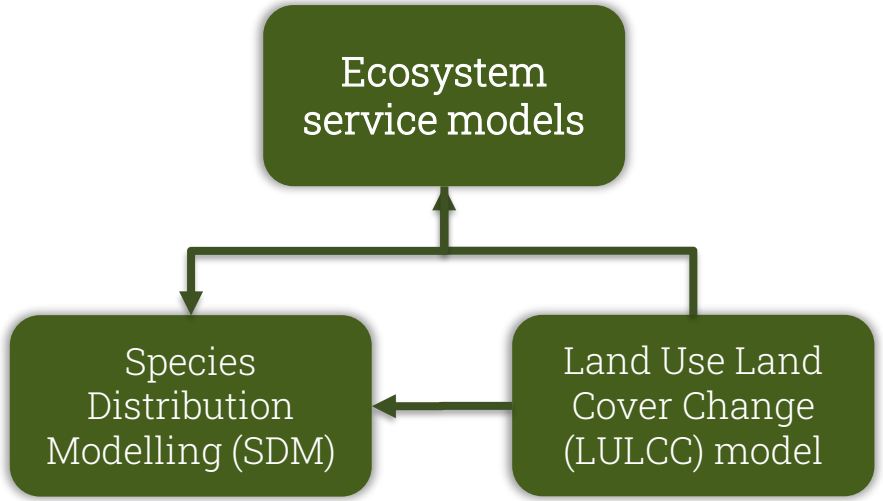
Cover ‘common’ examples and locally relevant services



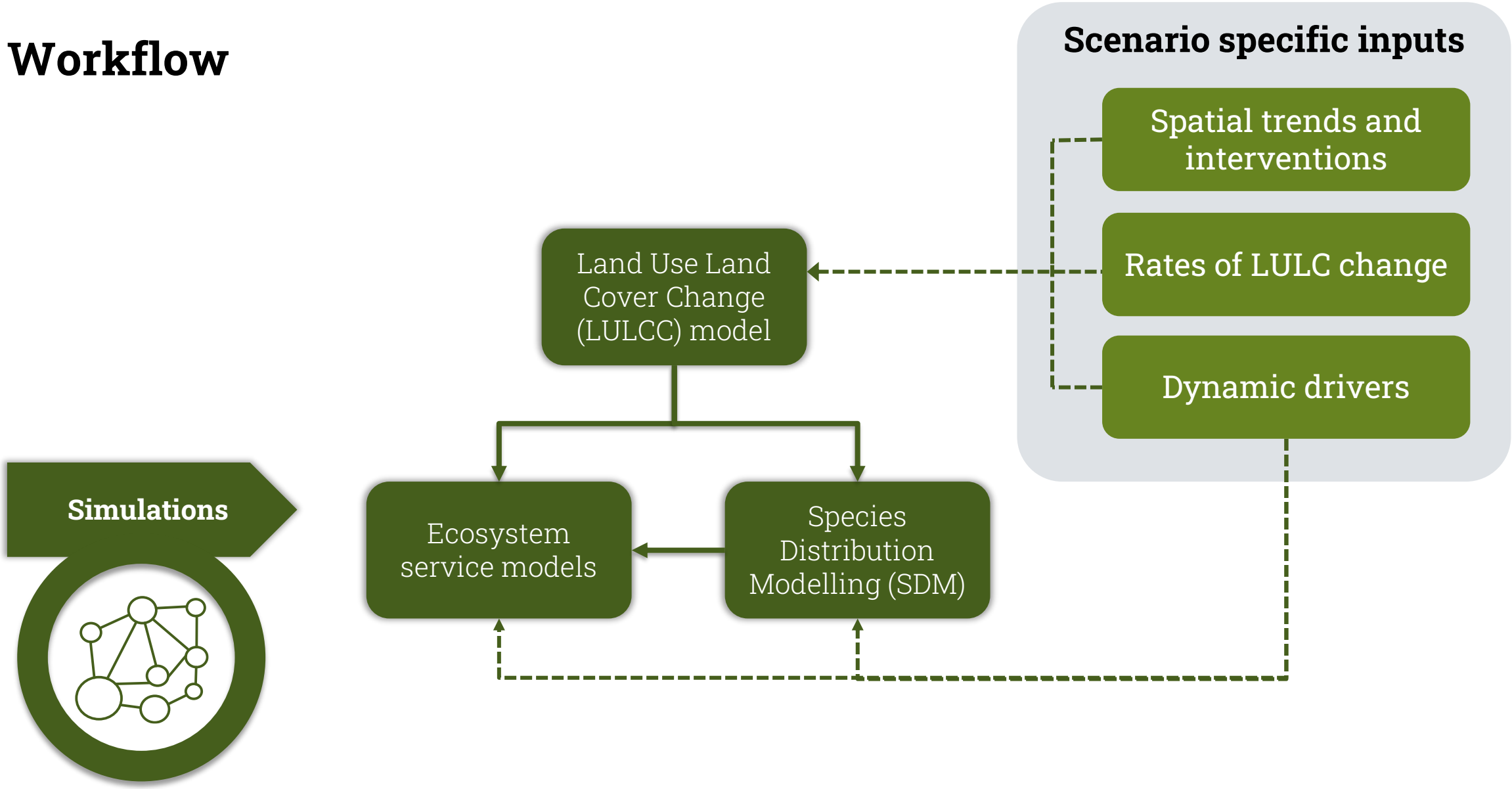
Multiple methods:

- Data extrapolation
- Process-based models
- Expert consultation
- Lookup-up tables





Workflow


Scenario specific inputs
Spatial trends and interventions
Rates of LULC change
Dynamic drivers
Land Use Land Cover Change (LULCC) model
Ecosystem service models
Species Distribution Modelling (SDM)
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Workflow

Simulations

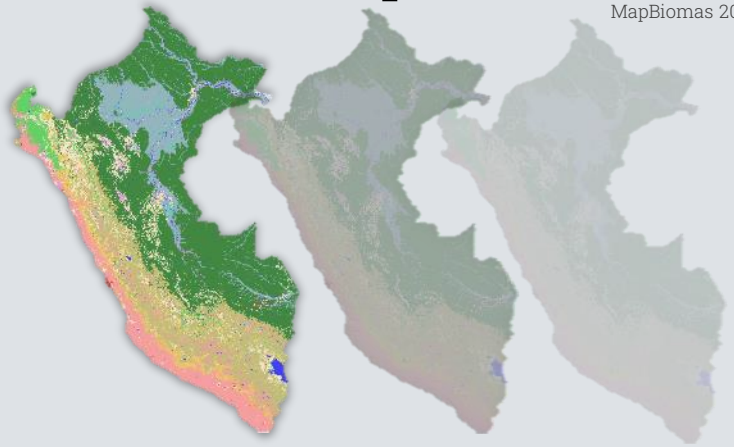
Land Use Land Cover Change (LULCC) model

Ecosystem service models

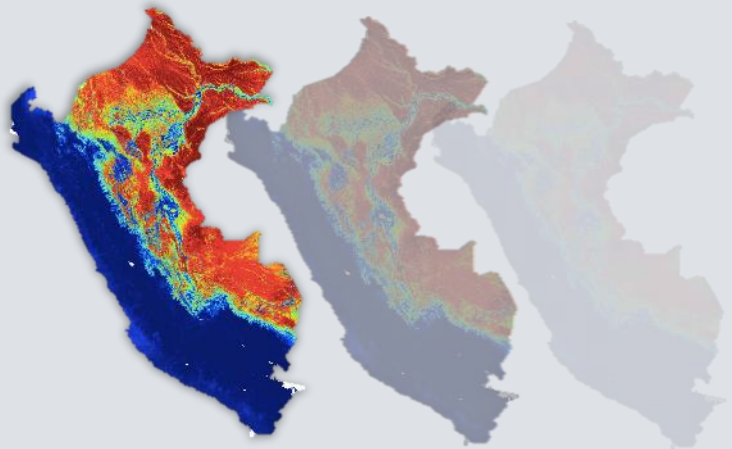
Species Distribution Modelling (SDM)

Outputs

MapBiomas 2023

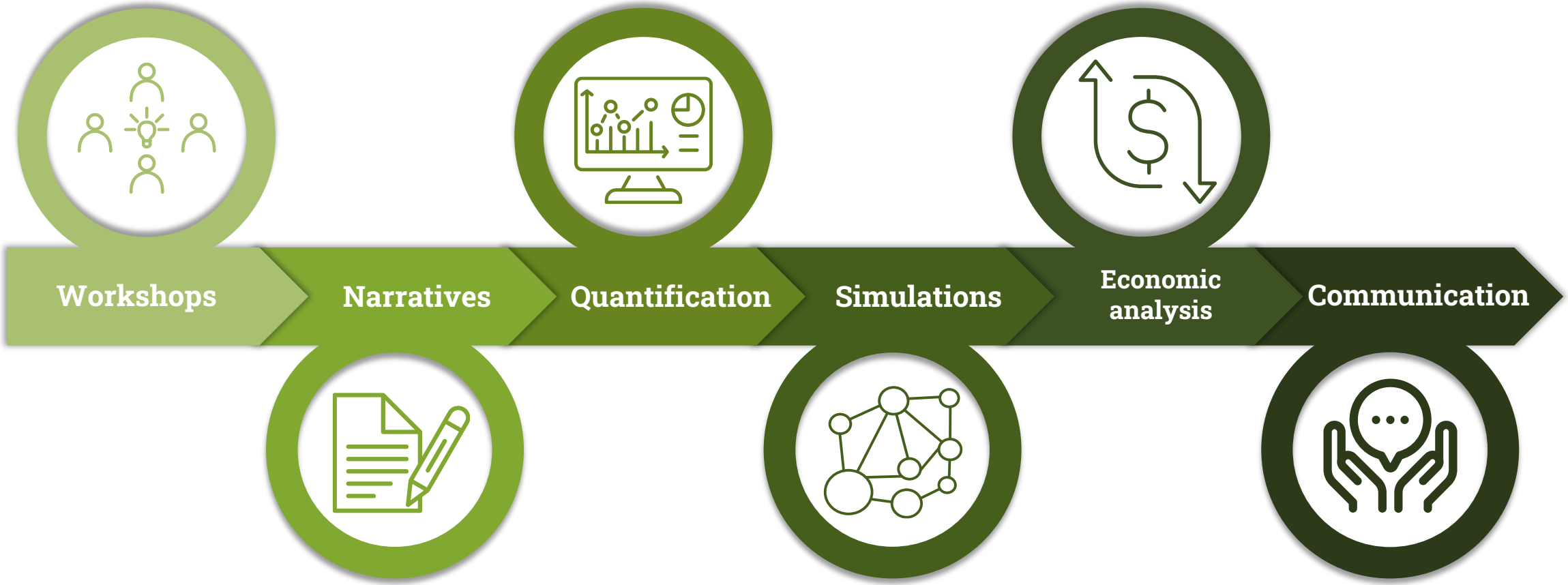


Time series maps at national scale between 2020-2060



Asner et al. 2014

Workflow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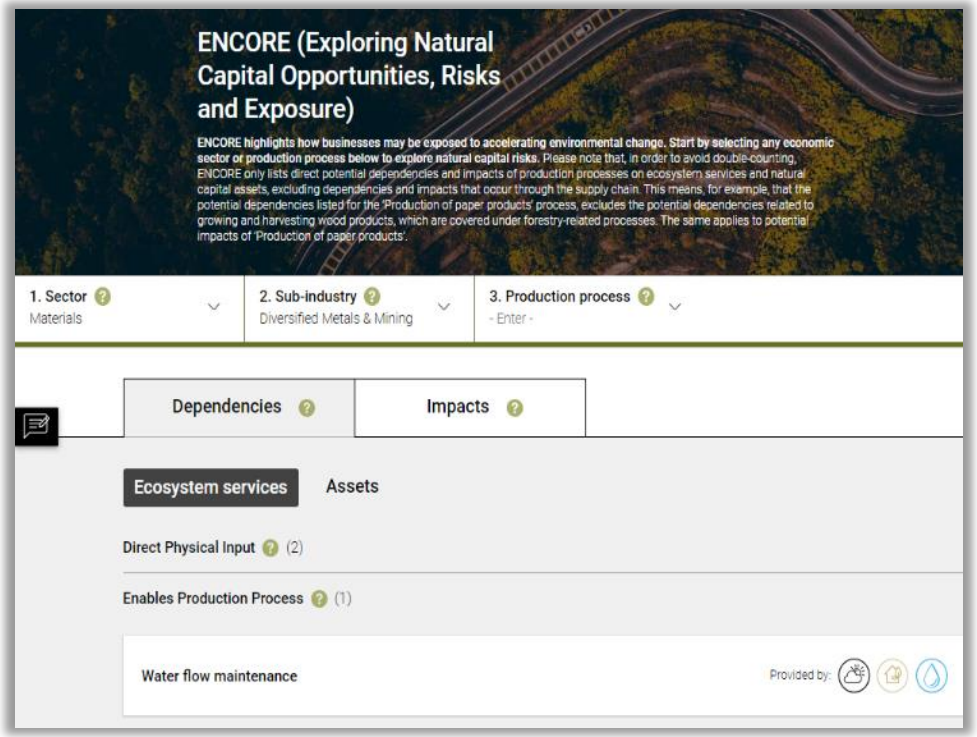
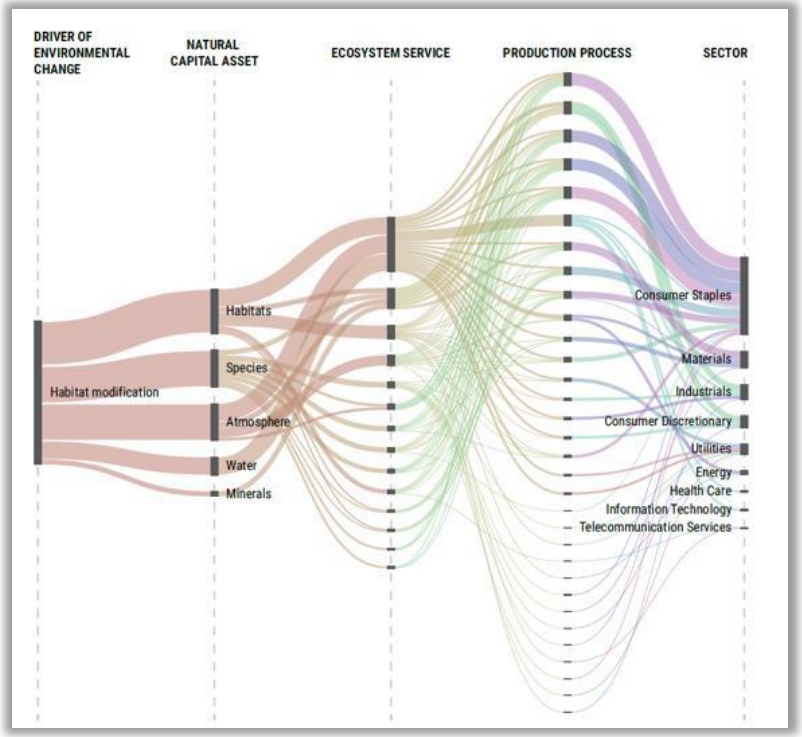
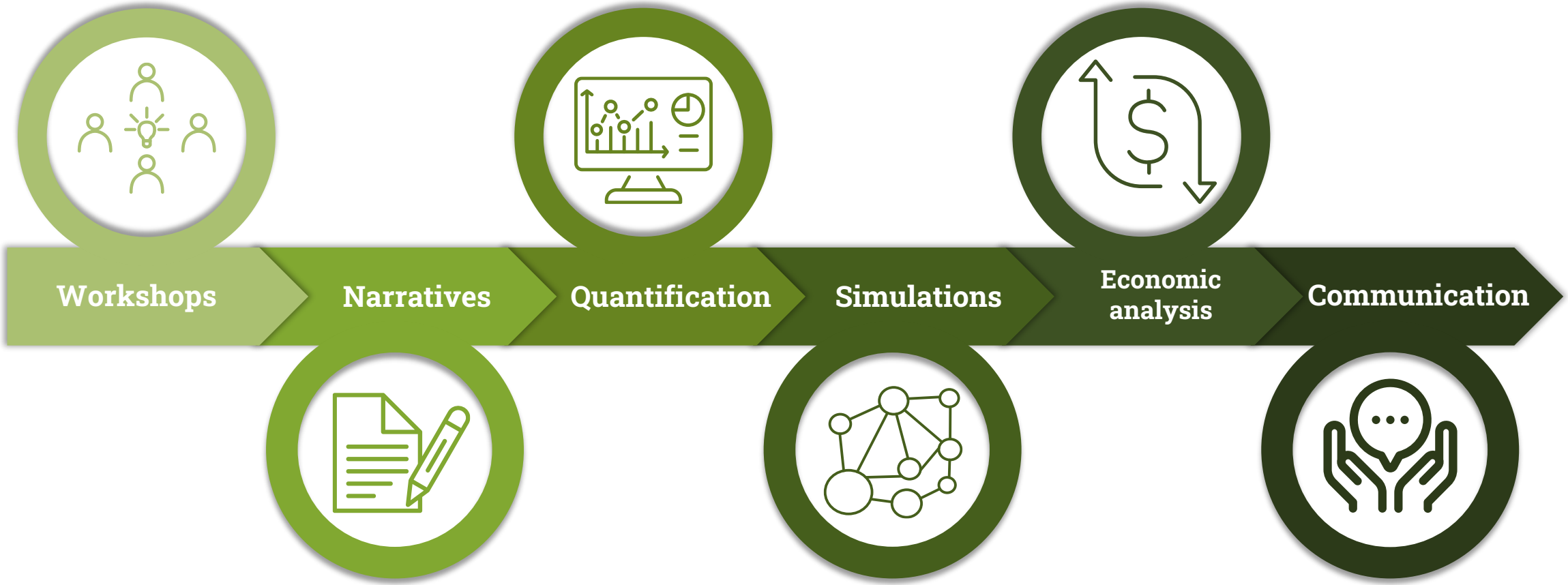




- ENCORE database (Global Canopy, UNEP FI and UNEP-WCMC) links economic sectors to ecosystem service dependencies.
- Qualitative analysis of which sectors experience greatest impacts (due to change in ES provision and LULCC) under scenarios.

Workflow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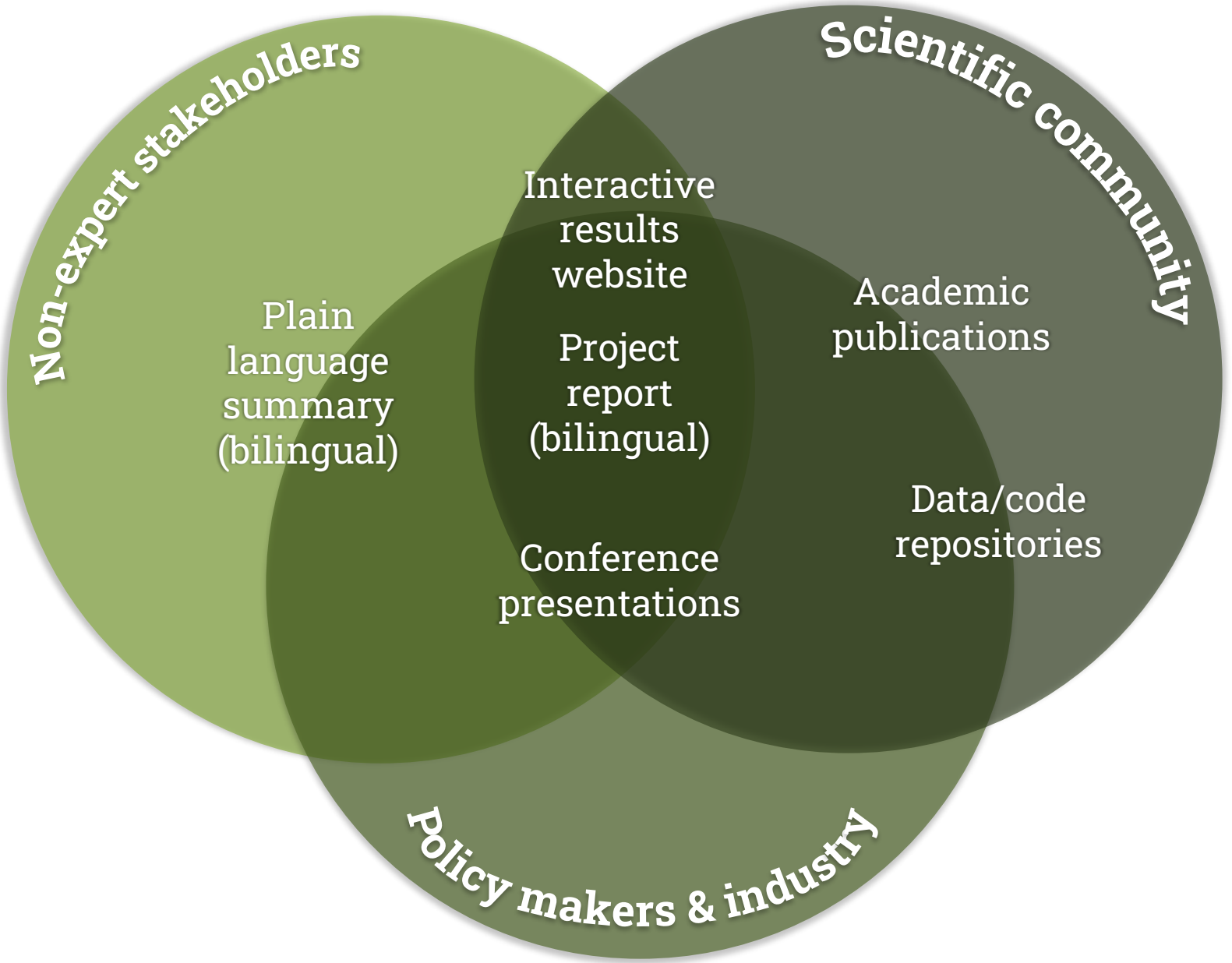
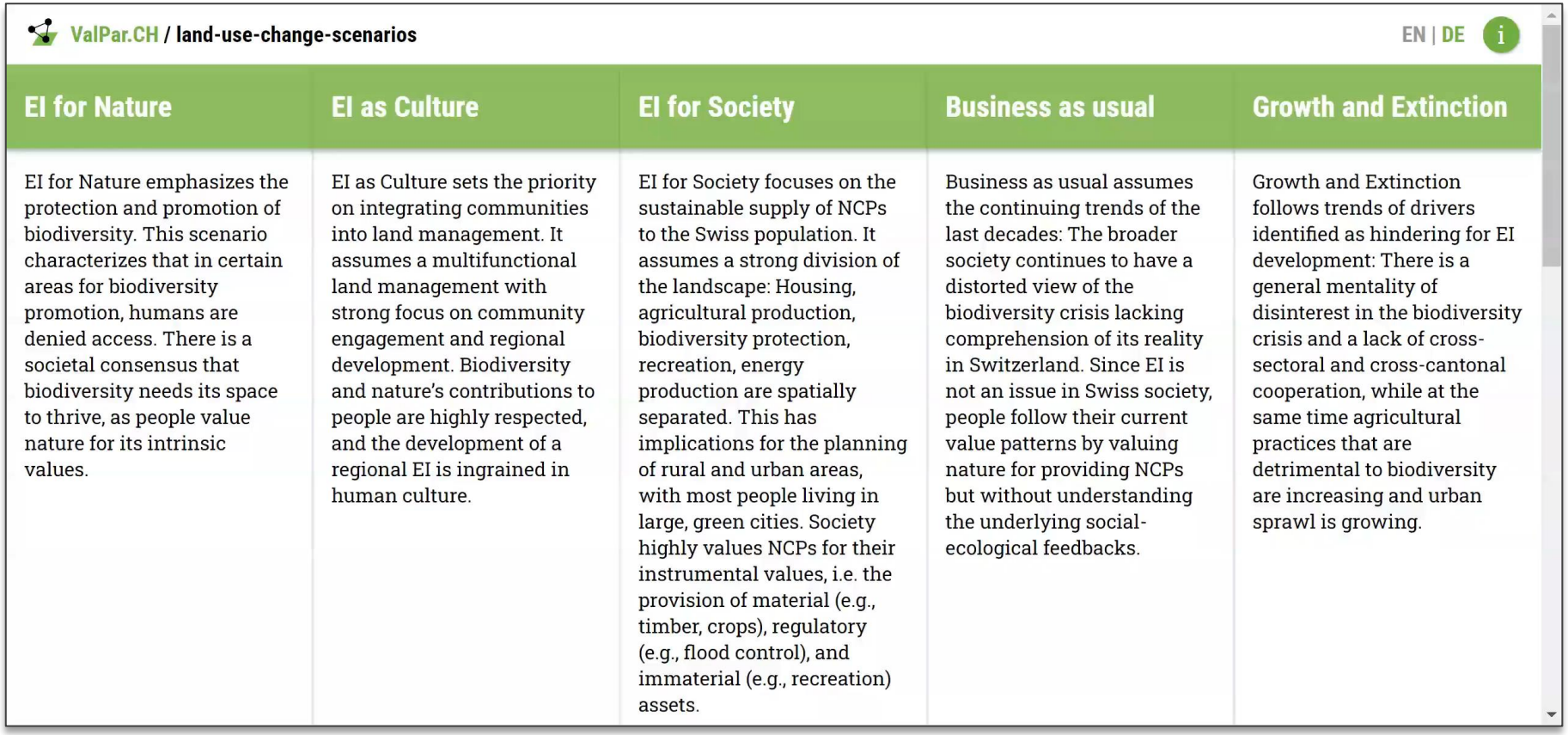
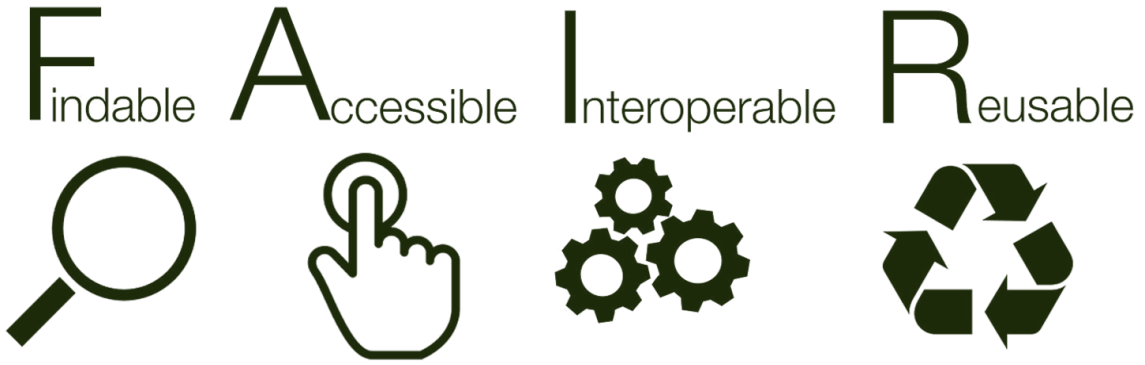


Workflow

Website for interactive exploration of ouputs and gathering feedback (Spanish/English translation)



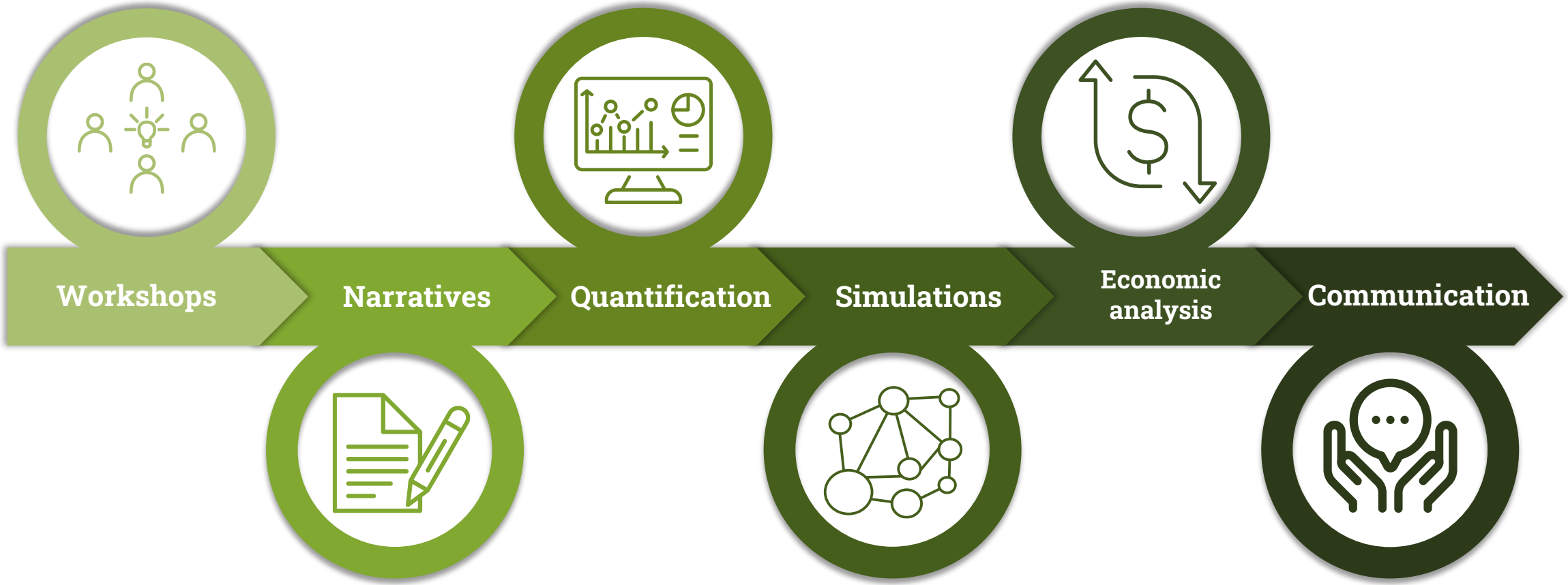
Workflow



Communication

zenodo

Workflow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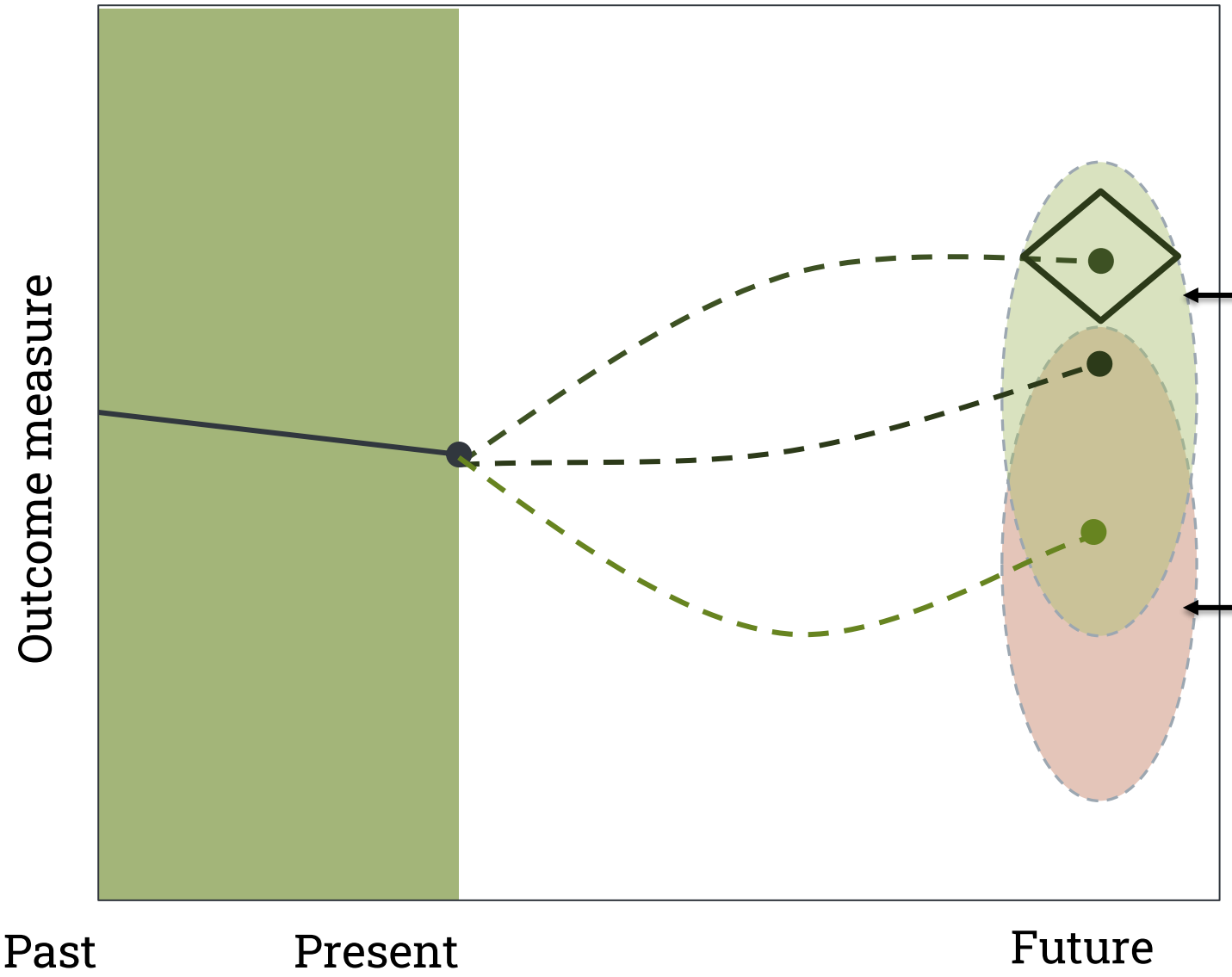
Impacts

Normative scenario analysis

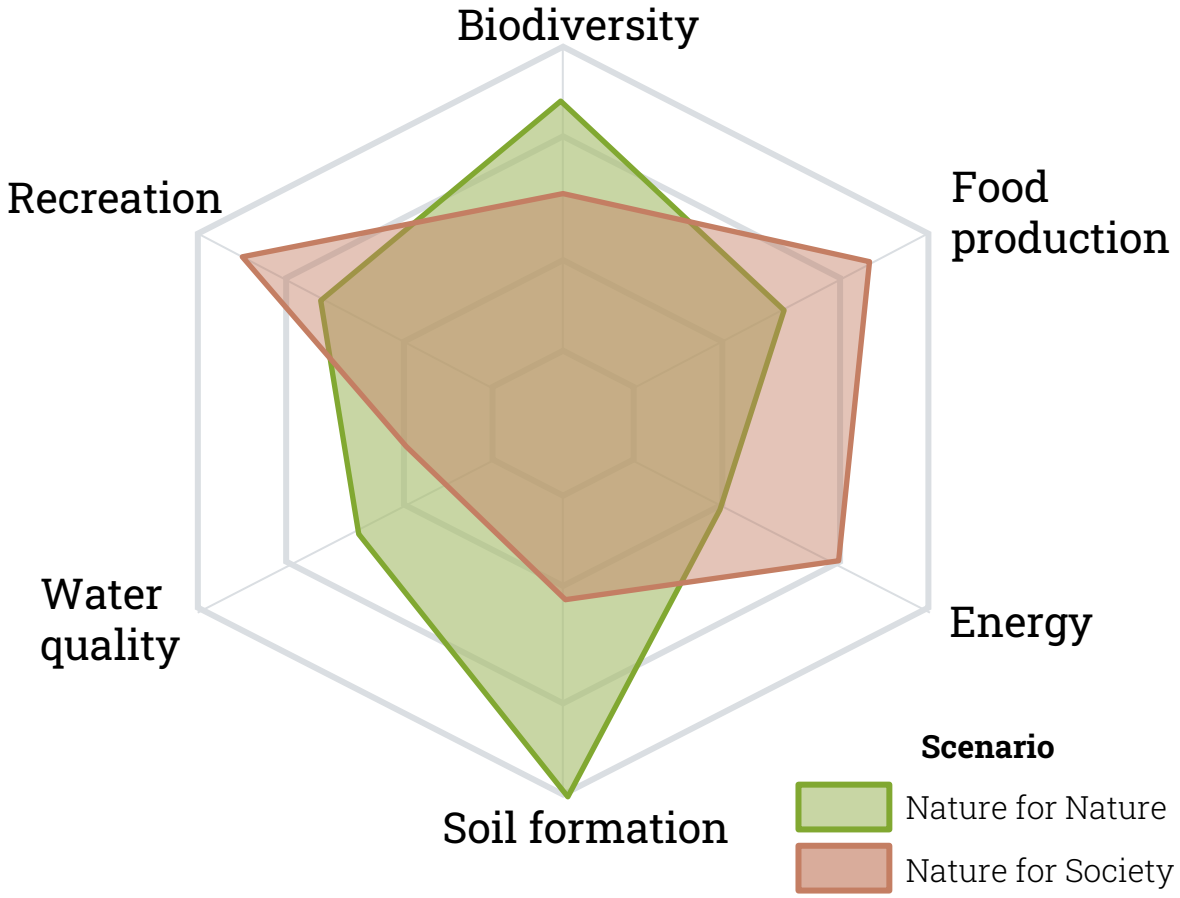


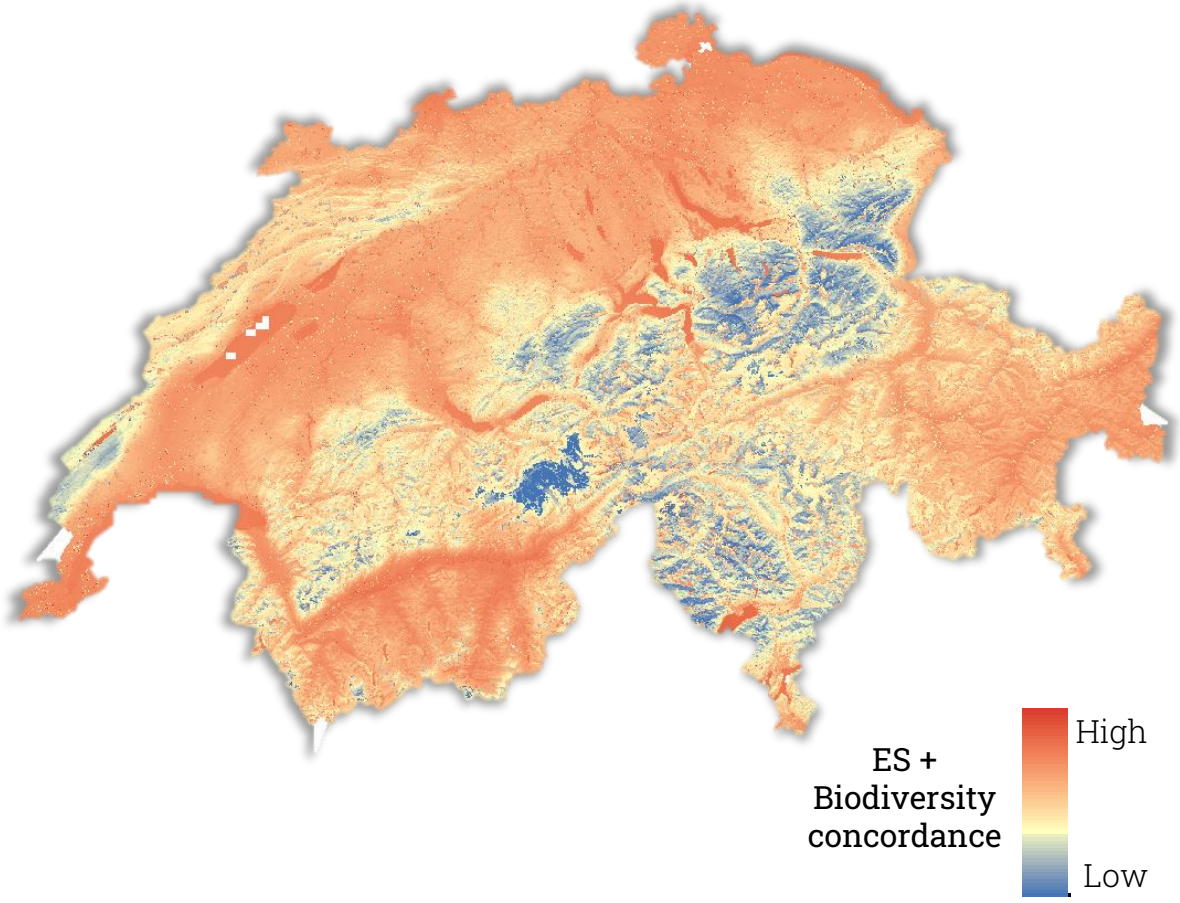
What are the desired outcomes for future landscape developments in Peru

What is the balance between the desirability and plausibility of these outcomes

Impacts

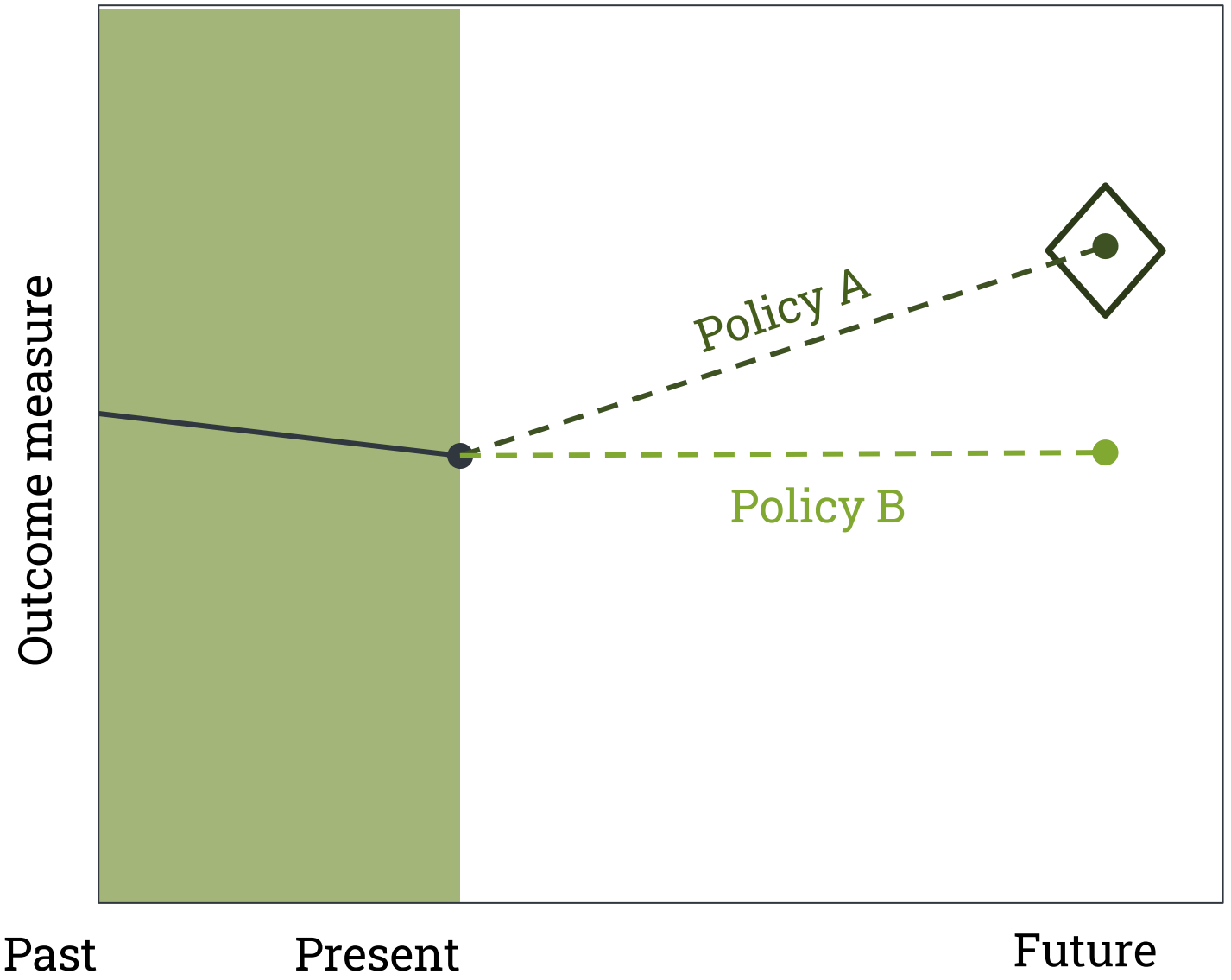
Identify trade offs and synergies between Ecosystem Services and Biodiversity between scenarios





Impacts

Normative scenario analysis



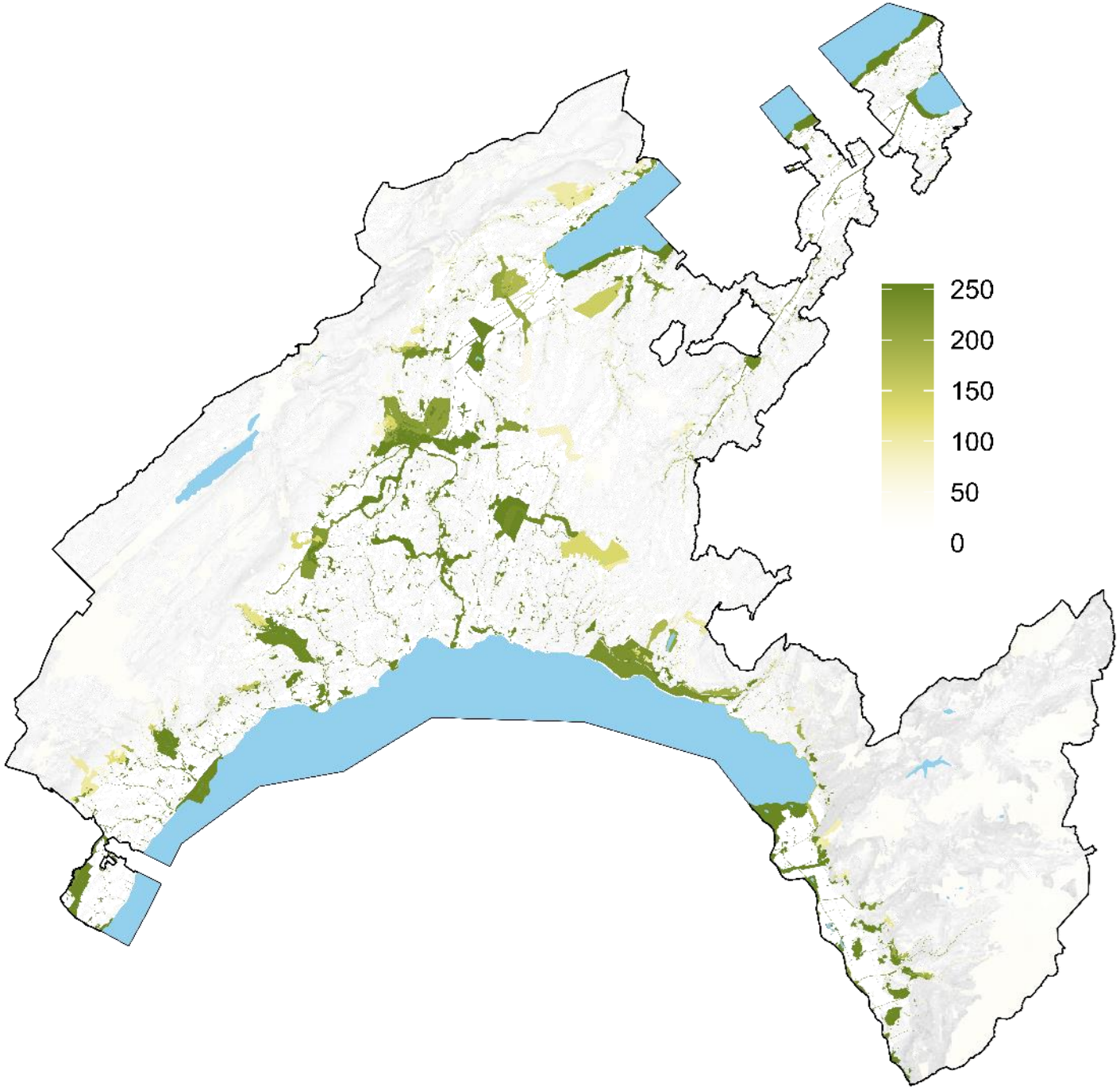
Test policies or interventions to determine whether they help achieve the desired end point

Impacts

‘Stress-testing’ protected area siting:

- Are planned location robust to changes in land use and climatic change.

- Difference in Habitat suitability between 2020-2060 in Canton Vaud PAs under BAU



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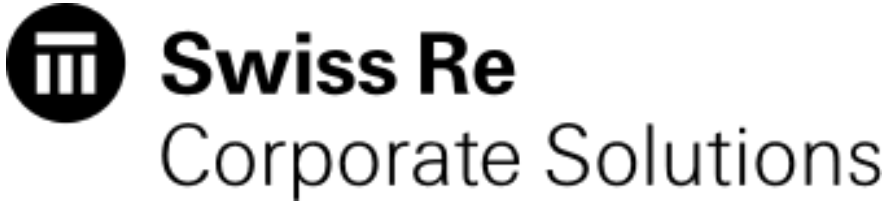

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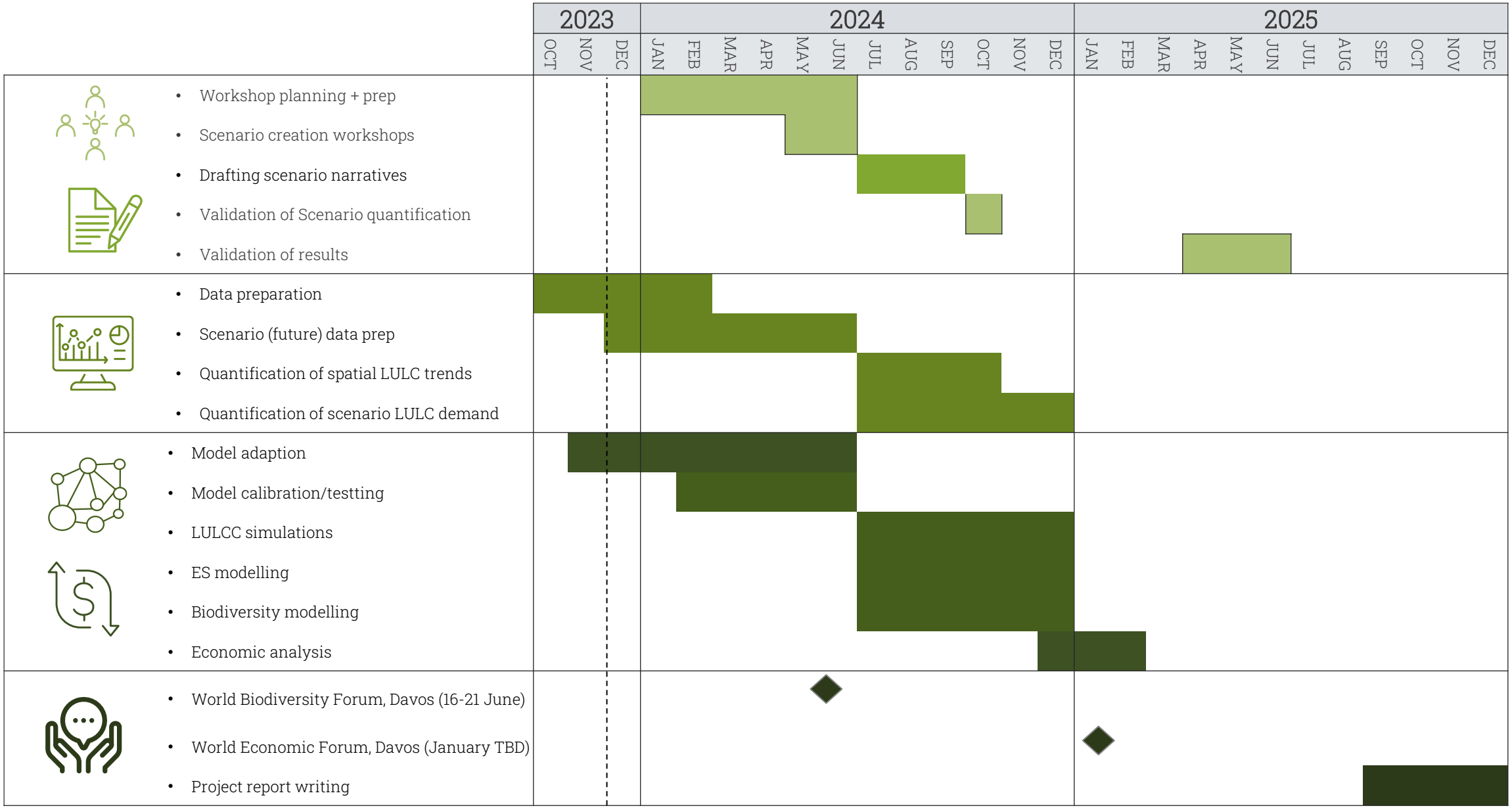
Thank you for listening

I will now take any questions.

Timeline


2023
2024
2025
OCT NOV DEC JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC
• Workshop planning + prep
• Scenario creation workshops
• Drafting scenario narratives
• Validation of Scenario quantification
• Validation of results
• Data preparation
• Scenario (future) data prep
• Quantification of spatial LULC trends
• Quantification of scenario LULC demand
• Model adaption
• Model calibration/testting
• LULCC simulations
• ES modelling
• Biodiversity modelling
• Economic analysis
• World Biodiversity Forum, Davos (16-21 June)
• World Economic Forum, Davos (January TBD)
• Project report writing