

# Exploring adaptive management options under climate change in a biosphere reserve

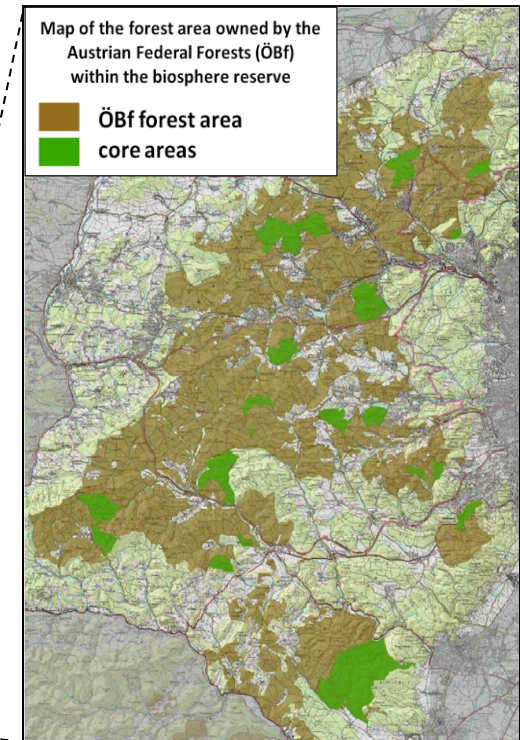
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# Background

- Study area: within UNESCO biosphere reserve “Biosphärenpark Wienerwald”
- Part of the biosphere reserve owned by the Austrian Federal Forests (ÖBf)
- Key features in a biosphere reserve as background for multifunctional forest management
  - Protection of ecosystems and landscapes, biological and cultural diversity
  - Developing and promoting of sustainable forms of land use
  - Supporting research, monitoring and education



Study area: 32.000ha

Total area: 105.000ha

# to get an impression ...





# Objectives

- **Develop and apply a vulnerability concept to assess the need of adaptive measures under climate change**
- **Explore adaptive management options**

furthermore ...

- Using a simulation based approach
- Covering the entire study region
- Considering stand and site specific characteristics
- Stakeholder involvement (internal, external)



# Process design

## Stakeholder workshop III



**Information and discussion about results**  
further analysis

now



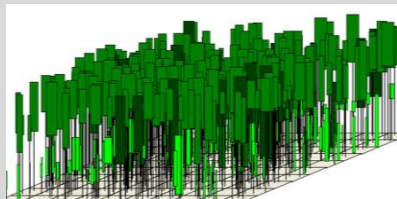
## Development and analysis of adaptive management options

- with internal stakeholders core team
- AM1, AM2



## Analysis of climate change impacts

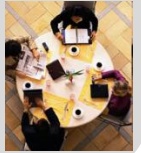
- Simulation approach
- vulnerability assessment



## Setting the frame

Together with internal stakeholder core team

- define objectives
- prearrange stakeholder process
- prepare indicator set



## Stakeholder workshop I



## Define indicator set

define and weight a set of indicators to get a feasible definition of vulnerability



## Stakeholder workshop II



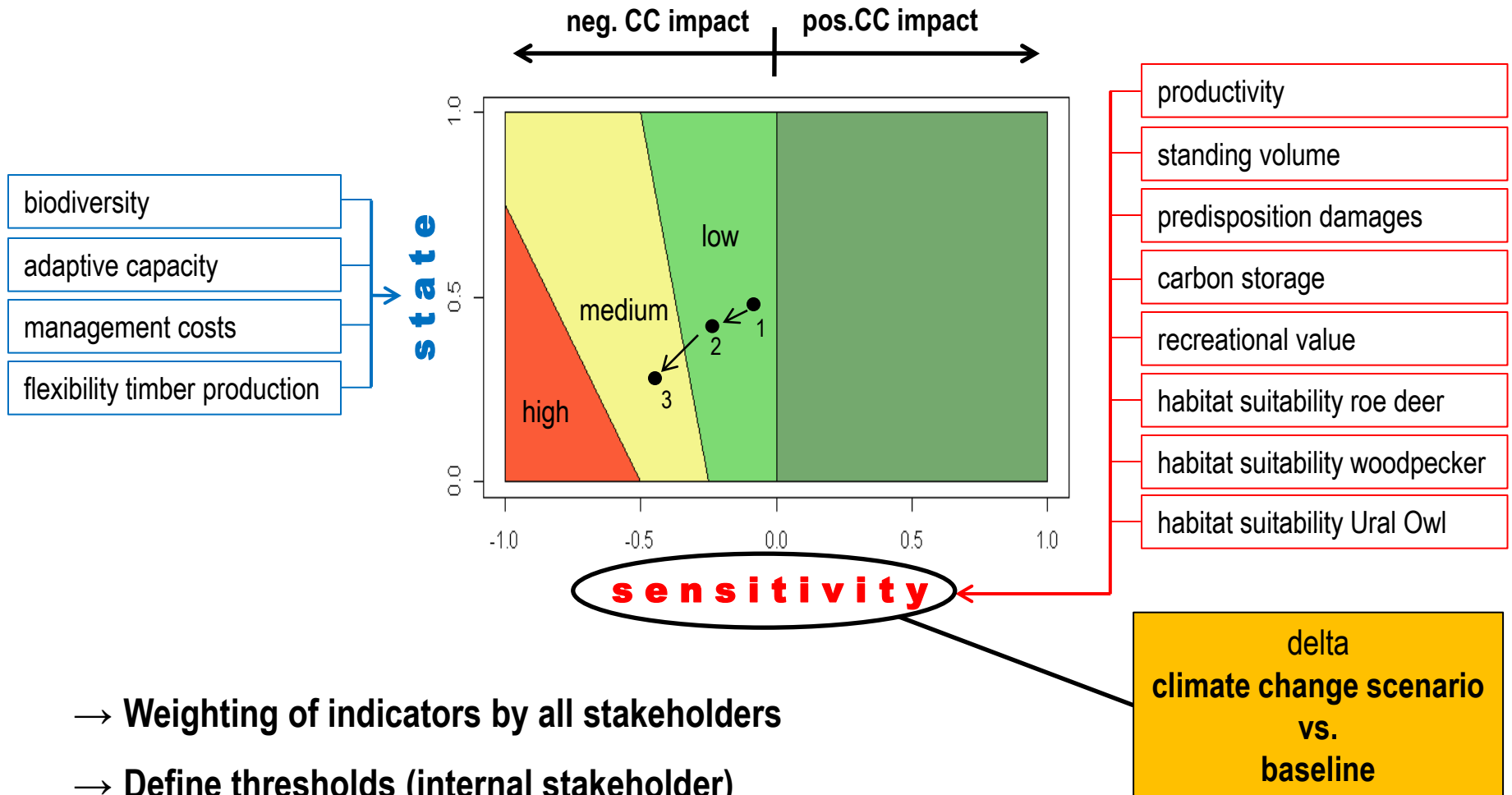
## Identification of BAU management

Together with internal stakeholders



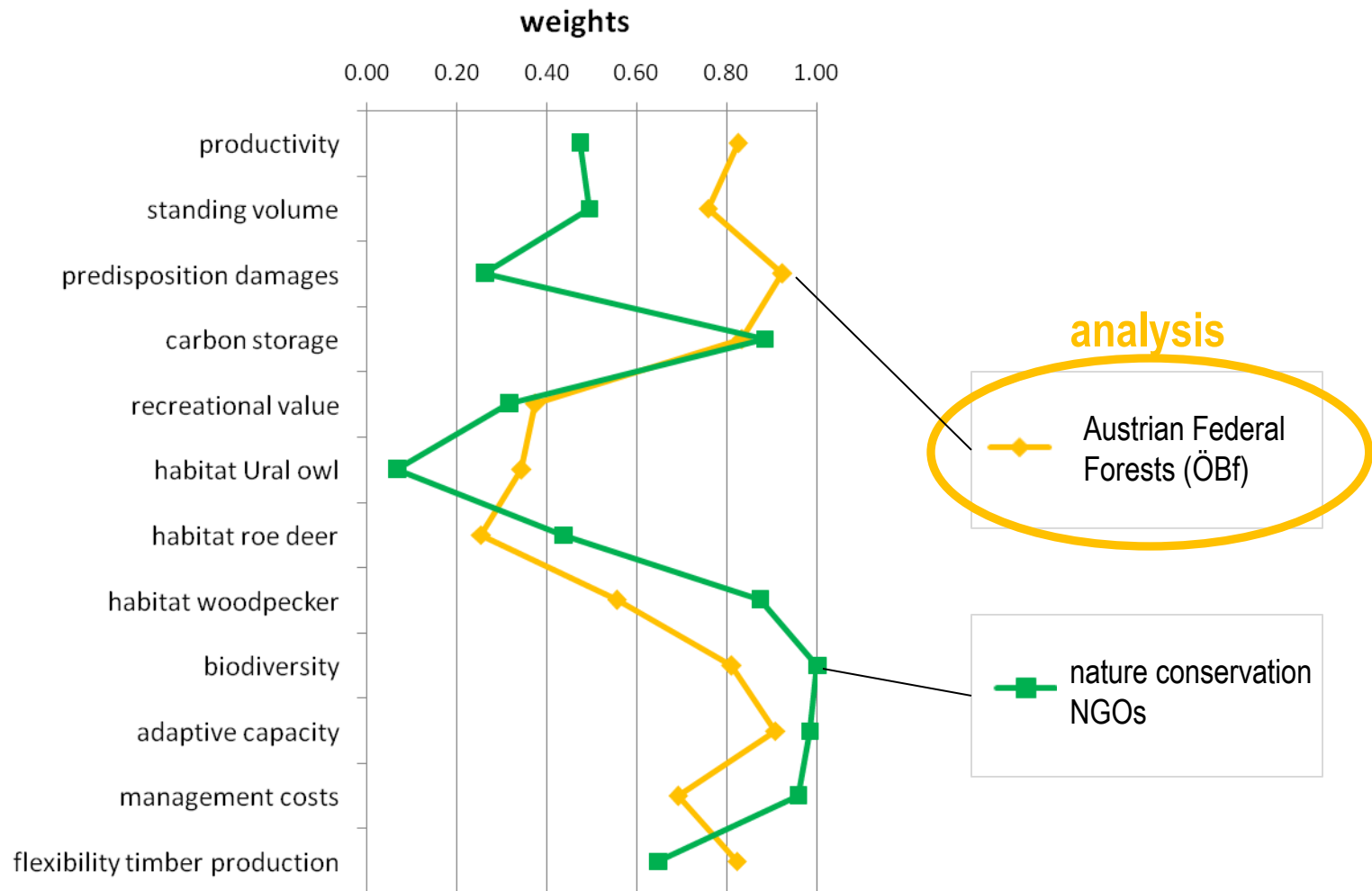
# Vulnerability concept

Luers 2005, Seidl et al. 2011

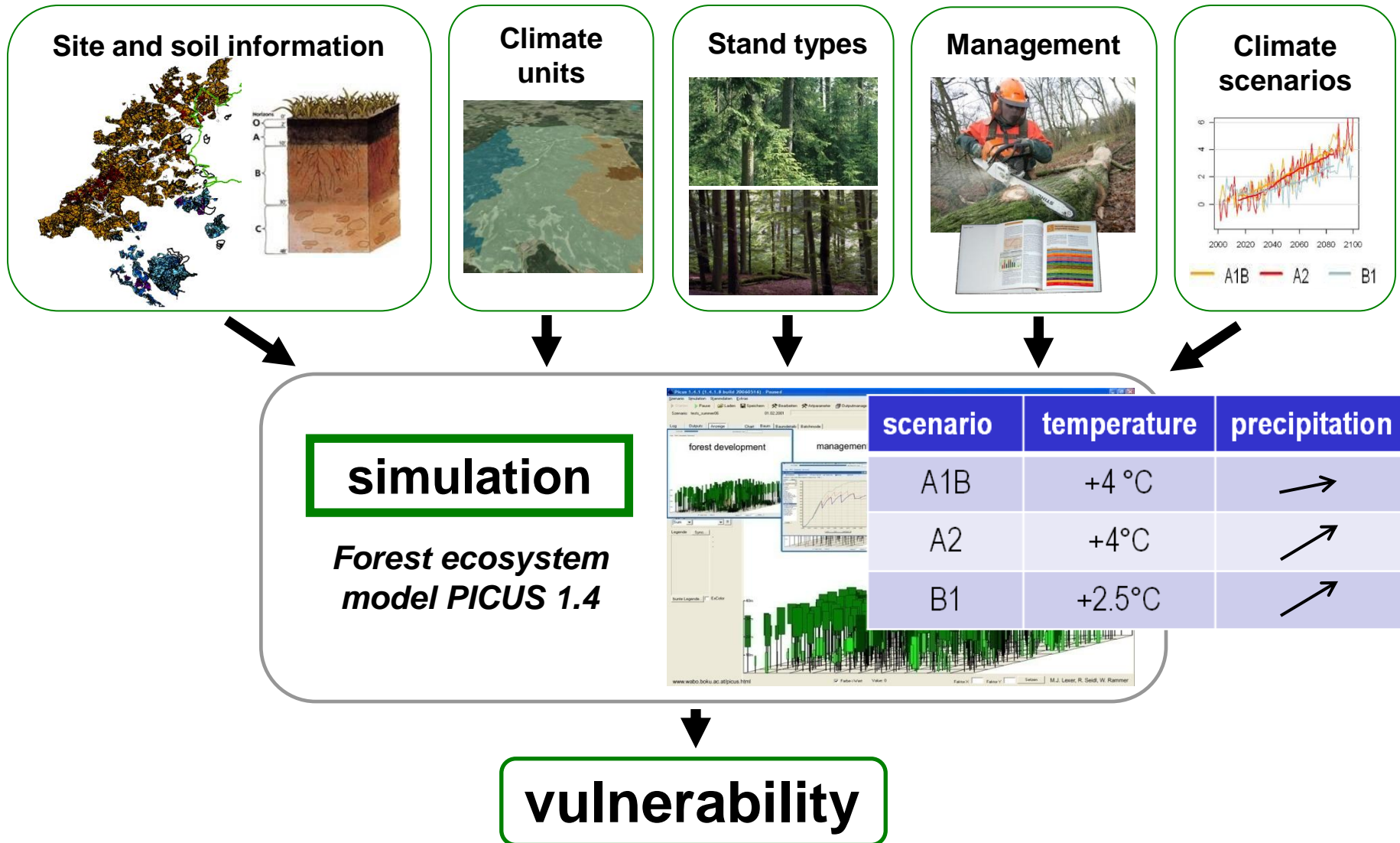


# Indicator weights

## ■ Result of 1<sup>st</sup> stakeholder workshop



# Data and tools

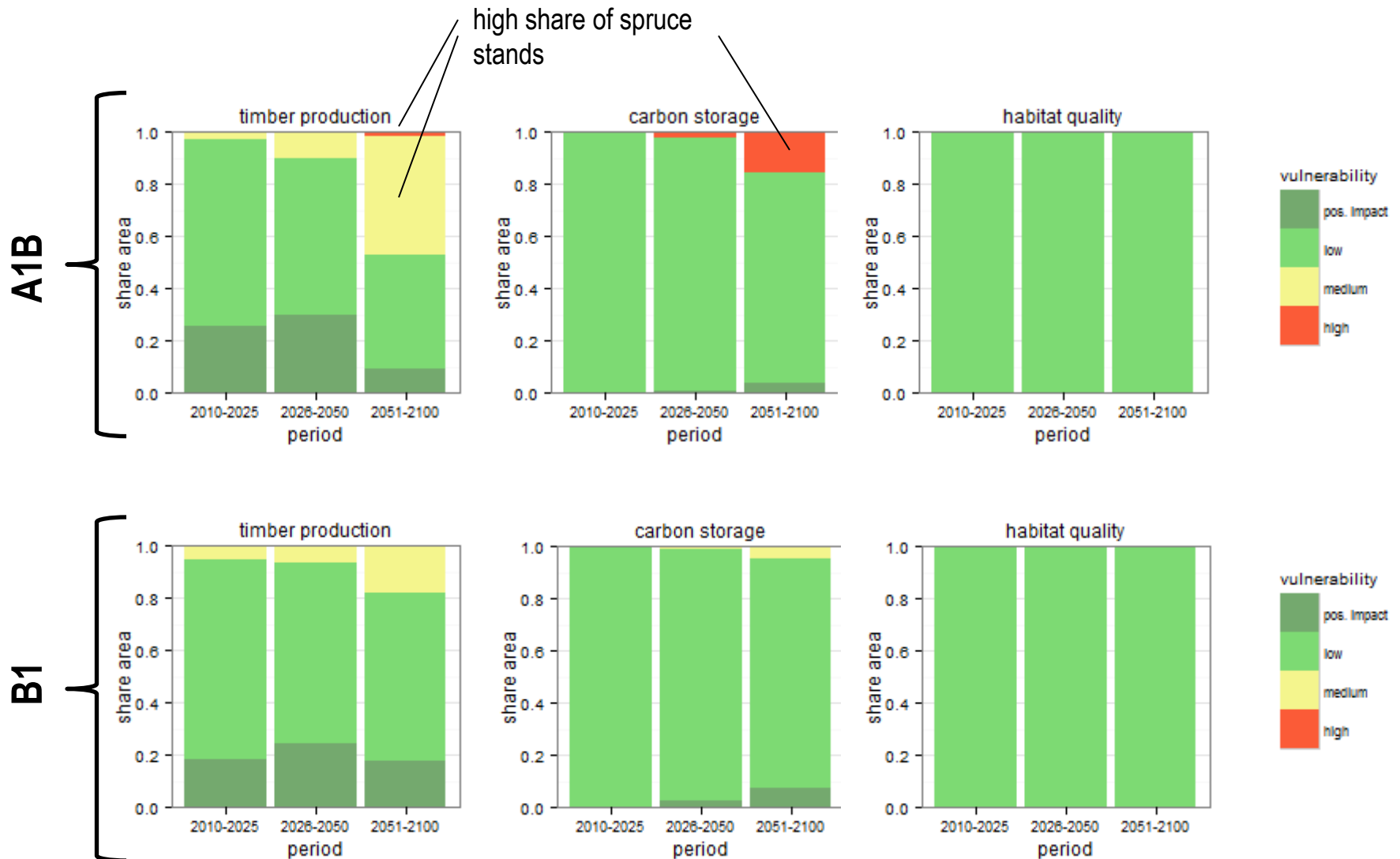




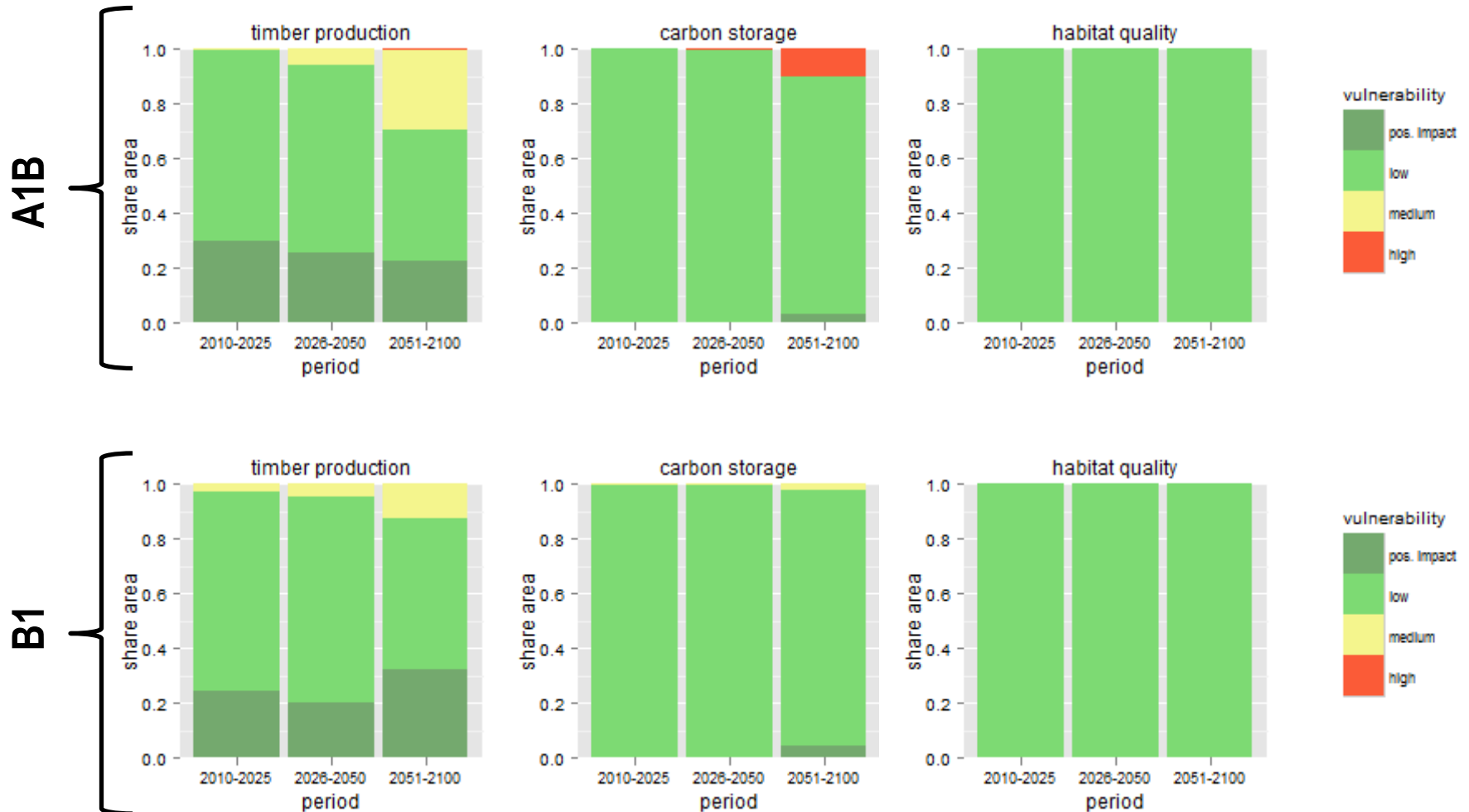
# Business as usual (BAU) and adaptive management (AM) options

management scenario	BAU	AM 1	AM 2
<b>strategy</b>	sustainable forest management to provide the required forest goods and services	adaptation via change of tree species composition	adaptation via using alternative silvicultural techniques and the change of tree species composition
<b>measures</b>	<ul style="list-style-type: none"> <li>■ <u>beech dominated stands</u>: two cut – shelterwood system</li> <li>■ <u>mixed stands</u>: active promotion of spruce and larch</li> <li>■ <u>spruce dominated stands</u>: artificial regeneration with spruce</li> </ul>	<ul style="list-style-type: none"> <li>■ reduce spruce and beech</li> <li>■ increase share of oak (beech stands), other broadleaf species and larch</li> </ul>	<ul style="list-style-type: none"> <li>■ reduce spruce</li> <li>■ increase share of broadleaf, larch and mixed stands</li> <li>■ regeneration of beech stands via a femel system</li> <li>■ increase standing deadwood</li> </ul>

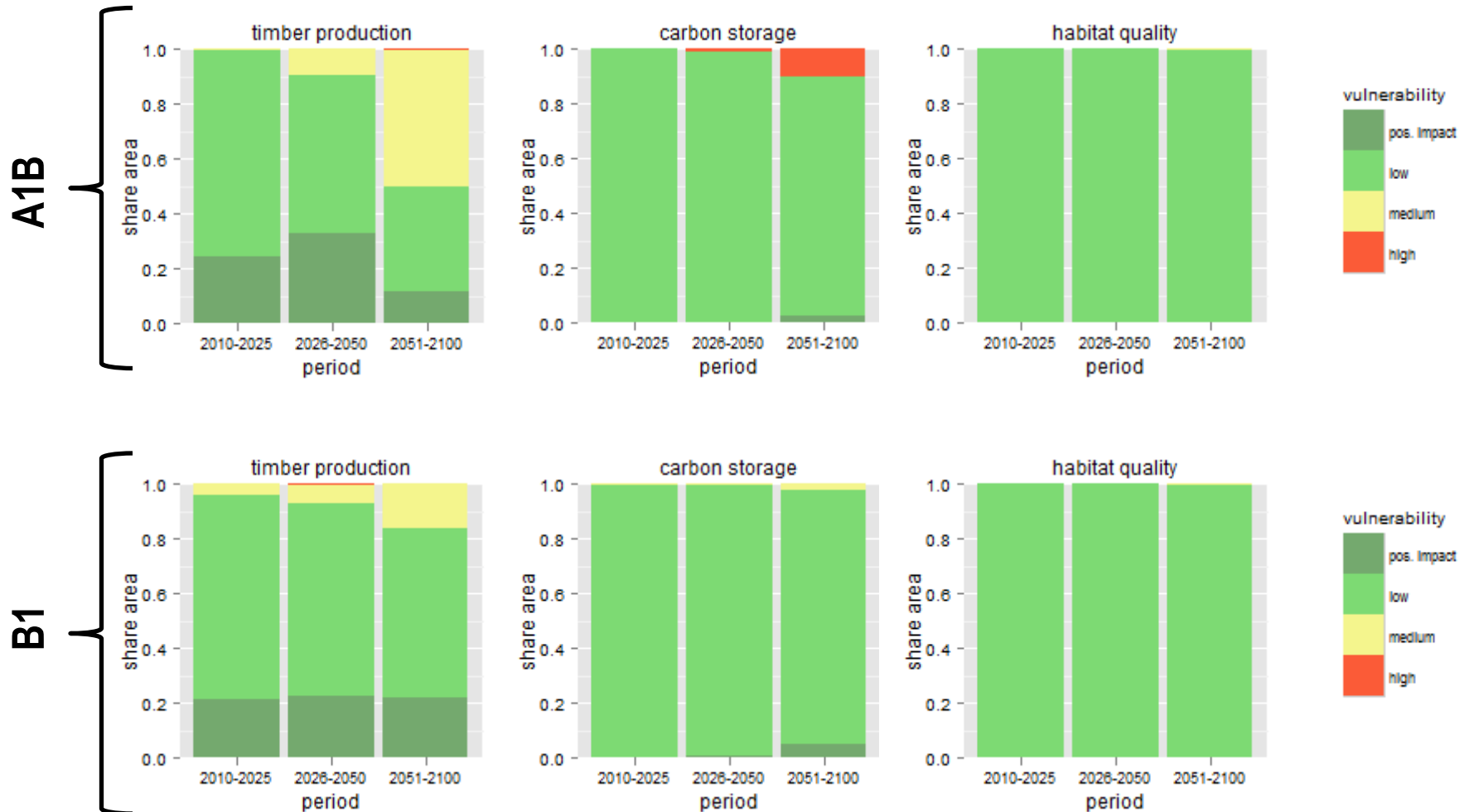
# Business as usual management (BAU)



# Adaptive management 1 (AM1)



# Adaptive management 2 (AM2)



# Summary

- Business as usual management
  - the share of **medium and highly vulnerable** stands is **increasing under climate change** (drought)
  - **hotspots** of high vulnerability → **spruce** dominated stands
  - **dry site conditions** → also **beech** dominated stands show **medium vulnerability**
- Adaptive management 1
  - is able to **reduce vulnerability**
  - reducing spruce and beech and foster oak has a strong effect
- Adaptive management 2
  - **only small adaptive effects** in comparison with BAU
  - no active promotion of oak
- **Timber production** is the **most vulnerable** ecosystem service
- Habitat suitability of white-backed woodpecker and Ural owl show low sensitivity to climate change → **thresholds!**
- Recreational value: shows low climate sensitivity (not shown)



# Further steps...

- further analysis
- **Stakeholder workshop III** - inform and discuss about results

## Key question:

Are the thresholds set by the internal stakeholder also acceptable for all stakeholders?



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