

THE ALTERFOR CASE STUDY AUGSBURG WESTERN FORESTS IN SOUTHERN GERMANY

Peter Biber, Technical University of Munich

Video (Zoom)

22 September 2020, 10:00 am -2:45 pm (CET)



The project leading to this application has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 676754.



Case study area

Augsburg Western Forests

„Nature park“

53,000 ha forest area

Most important species

Norway spruce (60 %)

European beech (10 %)

Important in future?

Douglas fir (1 %)

Young stands underrepresented

Highly productive forest sites

Oceanic climate
Tertiary bedrock with loess cover

Long tradition: Profitable forestry with Norway spruce outside its natural range

Case study area

Augsburg Western Forests

Bavarian state forest (green),

Municipal forest (red):

Goal: Provide a multitude of ecosystem services including income, reduce risk

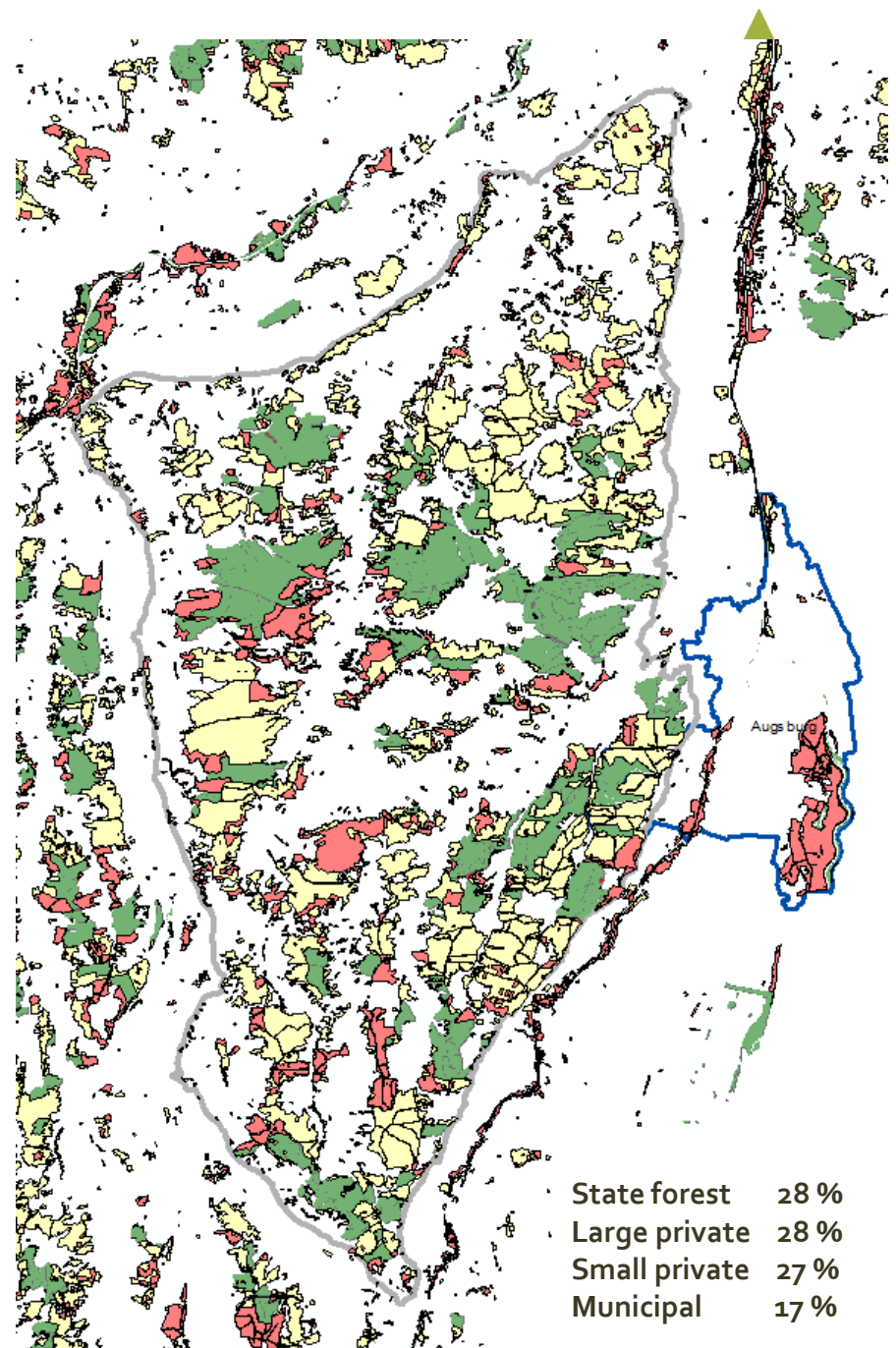
Forest conversion into mixed, rich structured stands since ~20-30 years
Conifers ~ 55% of the area

Private forests (yellow):

Many large estates with own staff

Goal: Generate income

Rely on conifers (77% of the area), typically age class forest



Allies and power resources for knowledge transfer within Augsburg region - based on the pre-analysis*

Analysis by M. Krott, N. Jürges, M. Stefanov, University of Göttingen

Interest in	Power resources		
	Means of coercion	Incentives	Dominant information
Forest management	+++	+	+++
Buying and processing timber	+	+++	++
Employment in forests	++	+	+
Renewable energy generation	+	+++	++
Recreation	++	+	++
Hunting	++	++	+
Certification	+	+++	++
Water provision	++	++	+
Nature conservation	++	++	+++

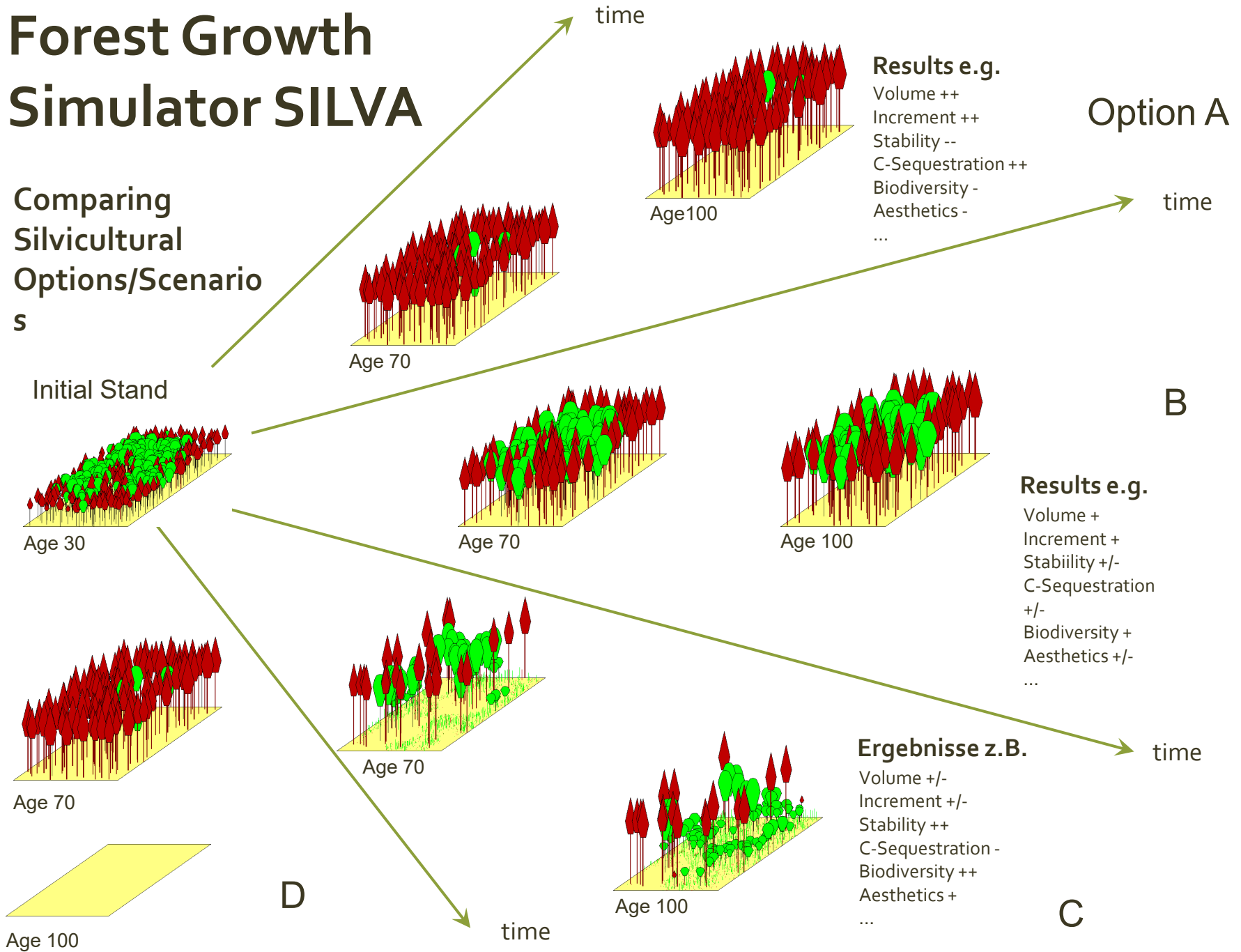
Multifunctional

Wood Production

Set aside

Forest Growth Simulator SILVA

Comparing Silvicultural Options/Scenario s



Case Augsburg – Silvicultural Scenarios on Landscape Level

Local Options
(Field Research Univ. Göttingen)

Main Scenarios on landscape level

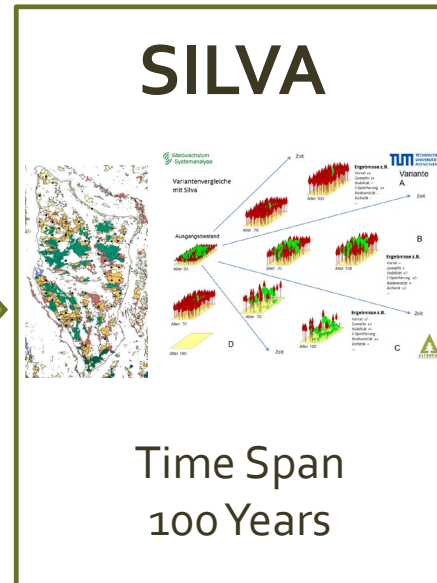
A) Production Forest

B) Multifunctional Forest

C) Setaside



Four Climate/Wood Demand Scenarios –
similar outcomes



Each main scenario was
calculated on the whole
area

with the same initial
situation

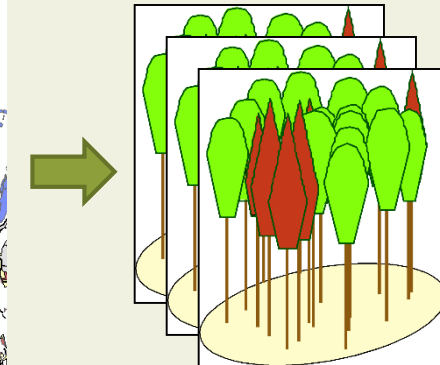
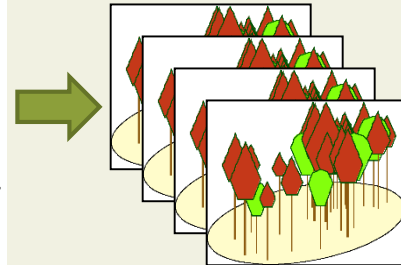
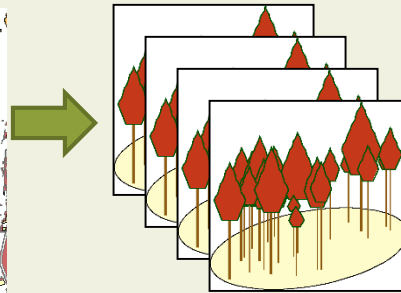
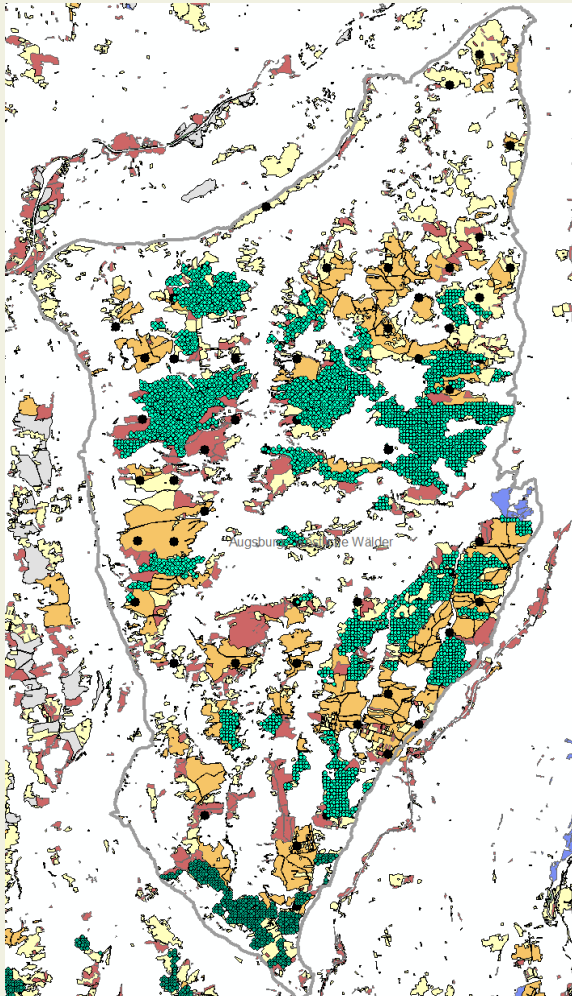
Emphasizes the contrasts

- A) Conifers promoted – short rotation – transformation into highly productive, even aged conifer forest
- B) Deciduous species promoted –frequent thinnings – target diameter system, transformation into rich structured, productive mixed forests
- C) Strict protection, no active silviculture

Case Study Area Augsburg

From the Data to the Simulations

Reconstruction the current status from State Forest and National Inventory



Grouping the inventory points by
Stand Type – about 400 Types

Simulation by Stand Type
Area per Type is known
=> **Weighting by type**

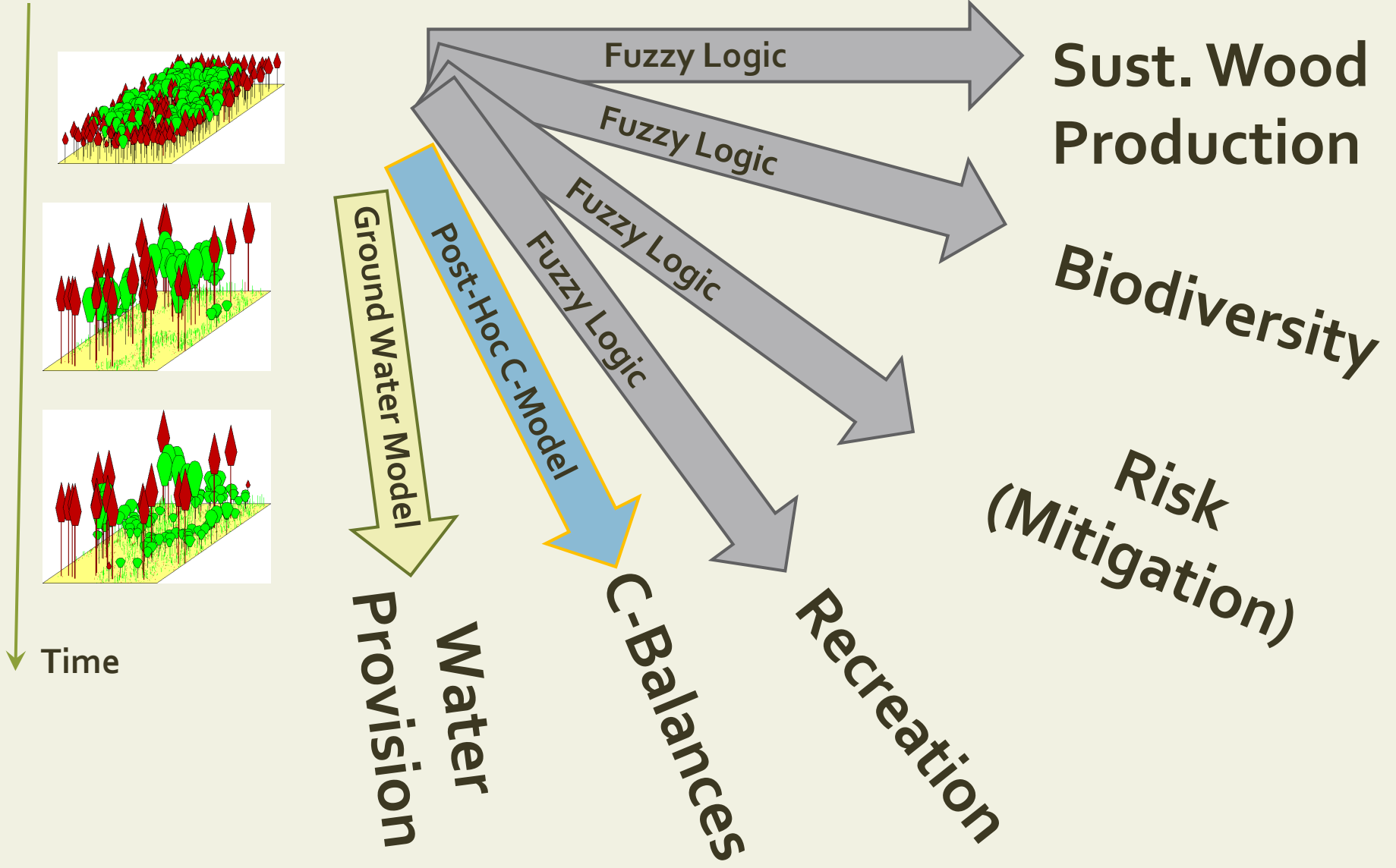
Silviculture in the Model is defined
per Stand Type

Very broad range of possibilities

Forest Structure

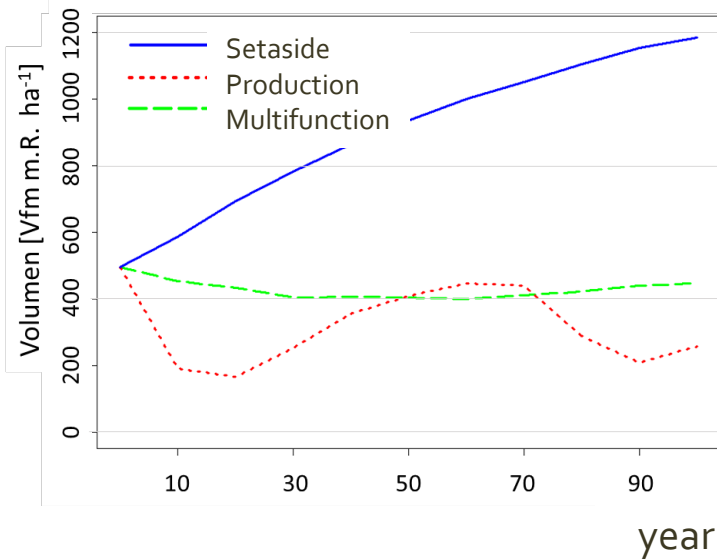


Ecosystem Services

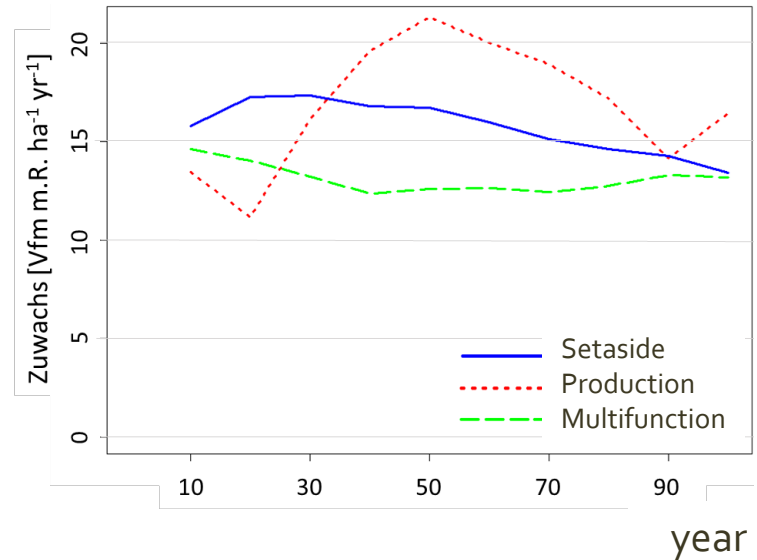


Timber Provision

Standing Volume



Volume Increment

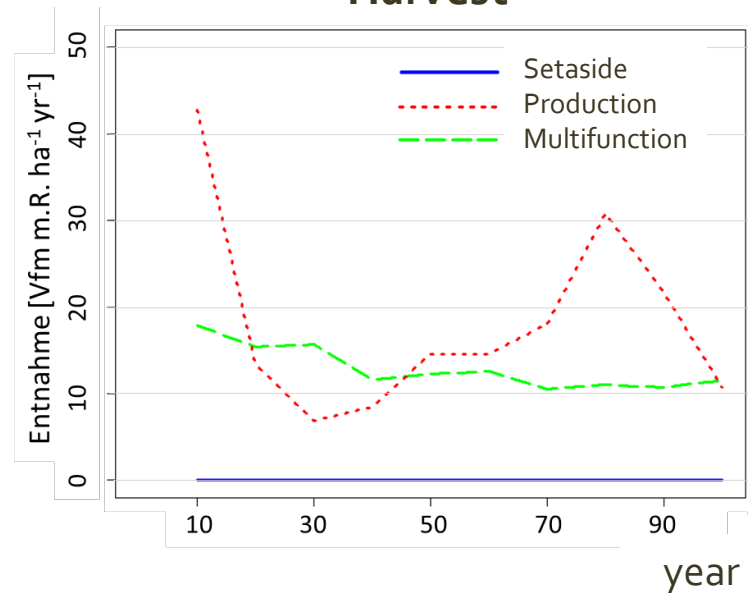


Multifunctional: Standing Volume, increment, harvest on level

Production: „Waves“ come from the initial uneven age class distribution,

Setaside: No harvest, extreme volume accumulation (risk!)

Harvest

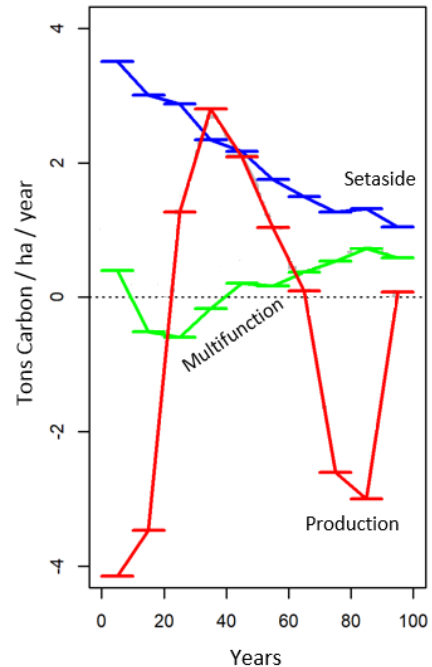


Carbon Sequestration

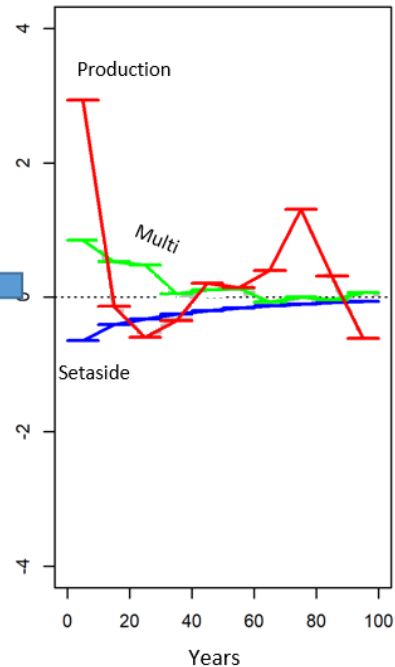
Forest Stocks + Wood Products + Emission Savings



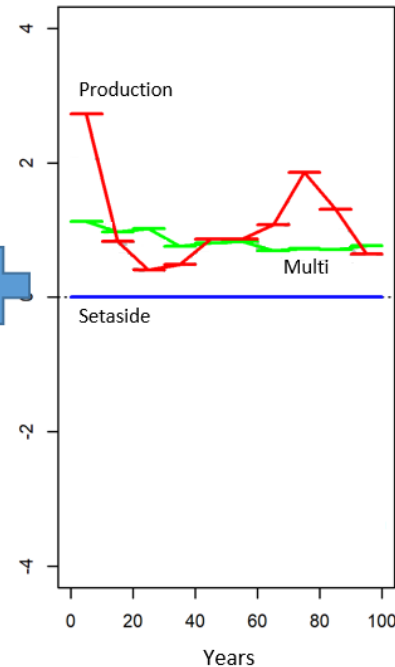
Forest



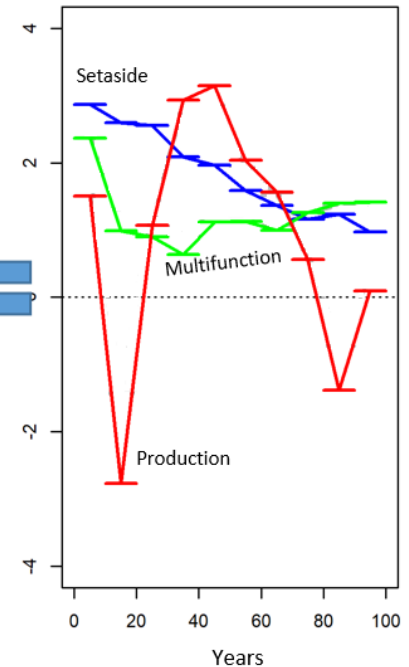
Products



Emiss. Saving



Total



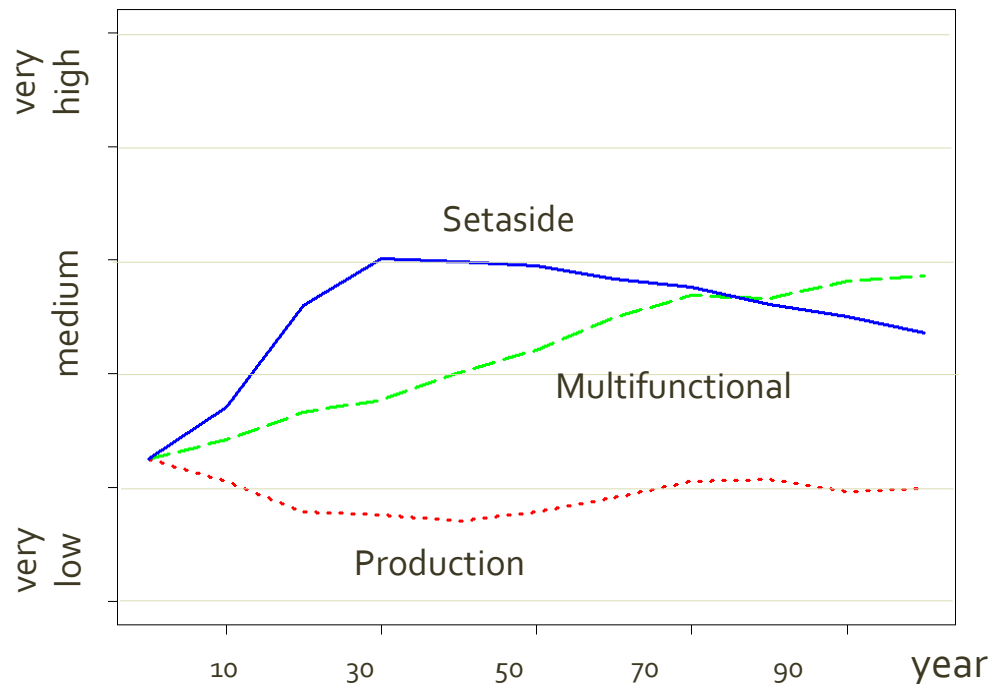
Multifunctional and Production: In average the same balance, only emission savings persist on the long run (due to balanced forest and product stocks)

Setaside: Initially high, but decreasing balance due to forests approaching max. density and no harvest, i.e. no increase of product stocks and emission savings

Biodiversity



Biodiversity – Fuzzy Logic based Assessment



Evaluation Rules:

Tree species and structure diversity (+)

Big trees (+)

Deadwood volume (+)

Multifunctional: Steady increase due to active promotion of tree species and structural richness

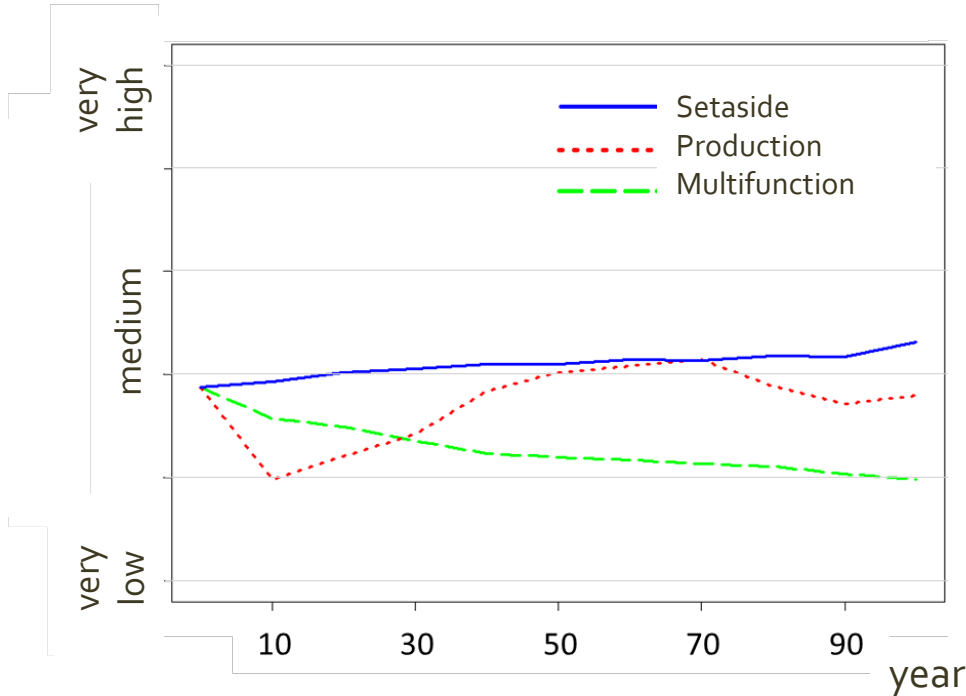
Production: Low level due to promotion of even aged conifer stands, few big trees, low amounts of deadwood

Setaside: Initially increase of diversity, big trees, and deadwood. On the longer run, stands lose structure (high density)

Storm and Barkbeetle Risk



Storm & Bark Beetle Risk – Fuzzy-Logic-Based



Evaluation Rules for Risk:

Norway spruce Share (+)

Trees with DBH > 40cm (+)

Species and Structural Diversity (-)

Multifunctional: Risk decreases due to active promotion of tree species and structural richness and lower spruce shares

Production: Risk level oscillating, highest at times when mature stands dominate

Setaside: Highest risk level due to quick accumulation of big trees, and still high spruce shares

Synthesis



	Multifunctional	Production	Setaside
Timber Provision	+	++	--
Carbon Sequestration	+	+	+
Biodiversity	+	--	+
Risk mitigation	+	-	--
Recreation	+	-	+ -
Groundwater	++	--	+

Lessons Learned for Implementation



Fundamental inertia of forest landscapes as systems:
The dictate of the initial conditions

C Balance: Sustainable management provides long-term emission savings; quitting management creates a strong, but only temporary sink

Biodiversity and management do not necessarily exclude each other

Maximizing production counteracts biodiversity, and requires professional knowledge due to high and increasing risk

Set aside areas for nature protection / biodiversity: Choose low-yield – high diversity areas or high-yield – (currently still) low diversity?



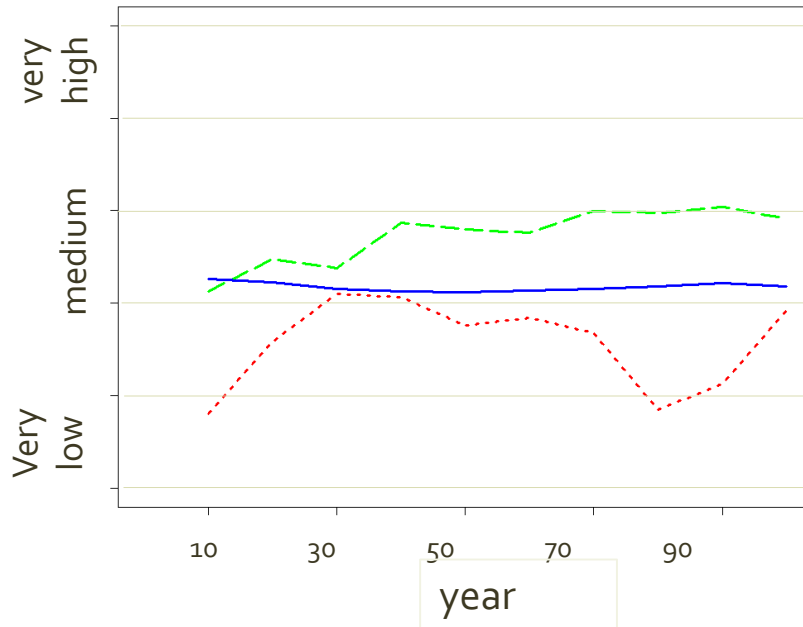
Photo: L. Steinacker

Thanks for your attention!

Recreation Value



Recreation Value – Fuzzy Logic based Assessment



Evaluation Rules

Preference: Diverse mixed stands, stands should be managed, but management not visible

Key variables: Tree species diversity, structure, big trees, stand density, deadwood, harvest intensity, harvest residues

Multifunctional: Fits in most aspects very well to recreationalists' preferences

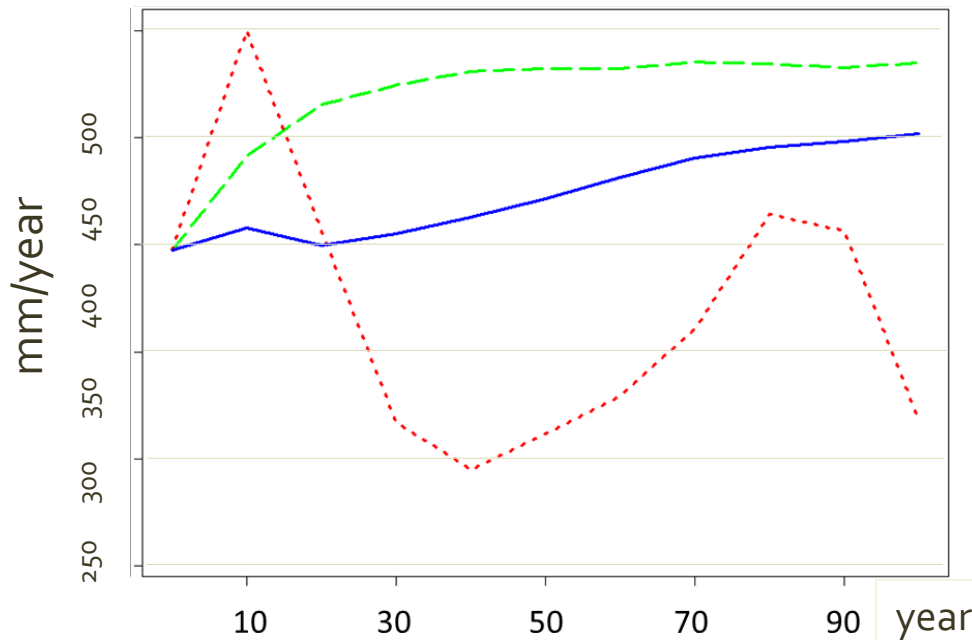
Production: Oscillating, especially low at times of high harvest intensity

Setaside: Undesired over-density increases, but balances with no management

Groundwater Refill



Groundwater Refill



Evaluation with a forest water balance model

Key variables

Spruce share (-)

Beech share (+)

Spruce stand density (-)

Spruce mean height (+)

Multifunctional: Stabilisation on high level

Production: Oscillating, but lowest level due to high spruce share and lowest max. spruce heights

Setaside: slow increase due to increasing beech share und increasing max. spruce heights