

Case Study Augsburg Western Forests

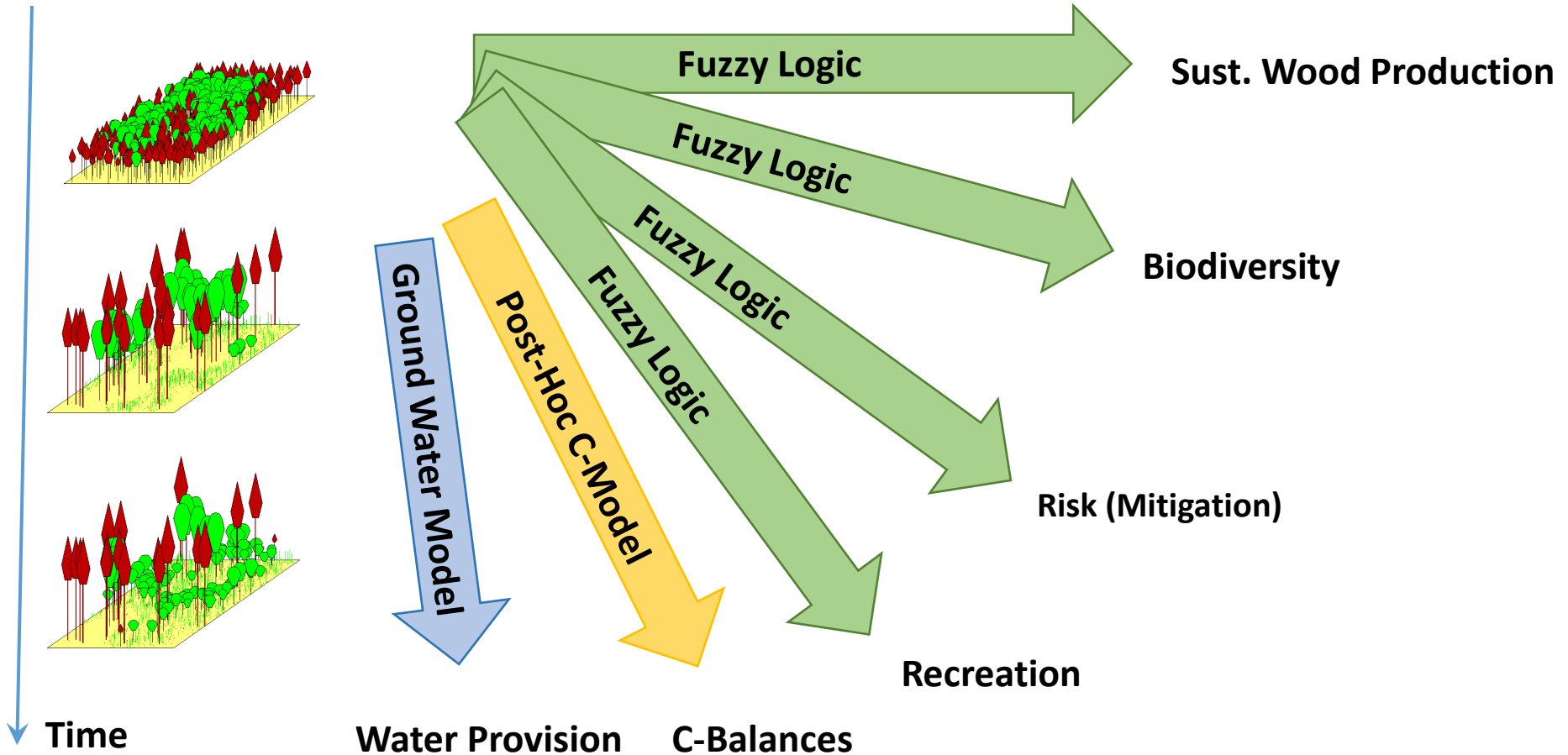
Simulation Results on Landscape Level

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Forest Structure

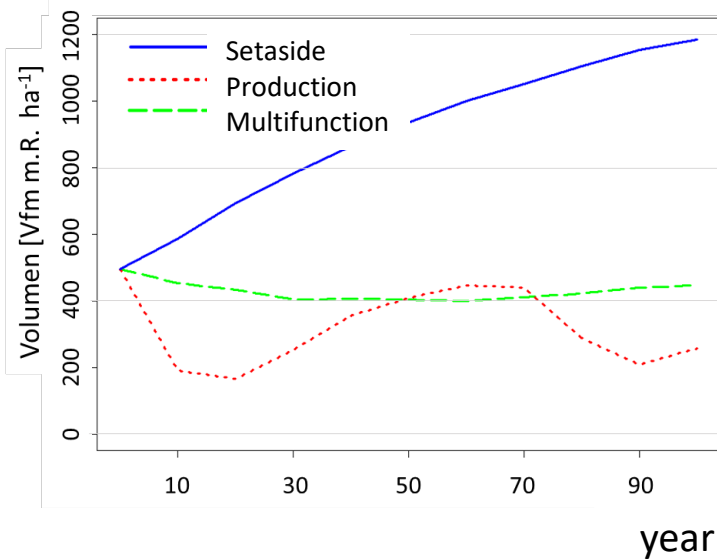


Ecosystem Services

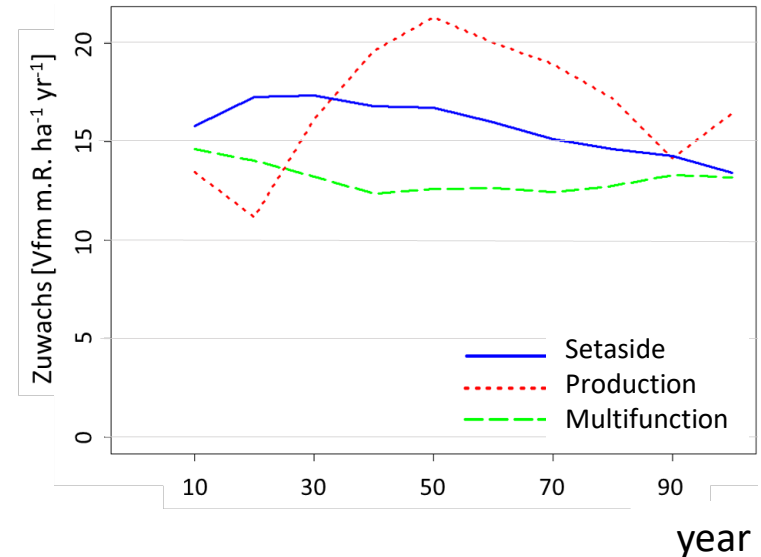


Timber Provision

Standing Volume



Volume Increment

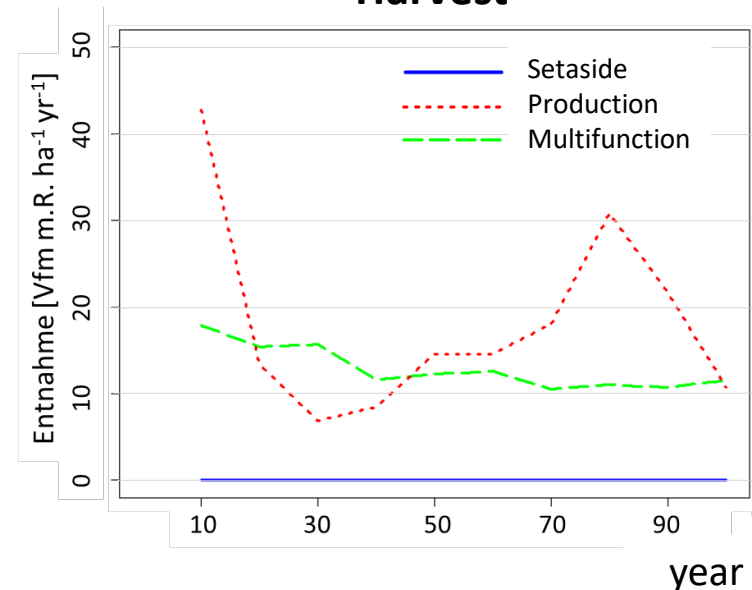


Multifunctional: Standing Volume, increment, harvest on level

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

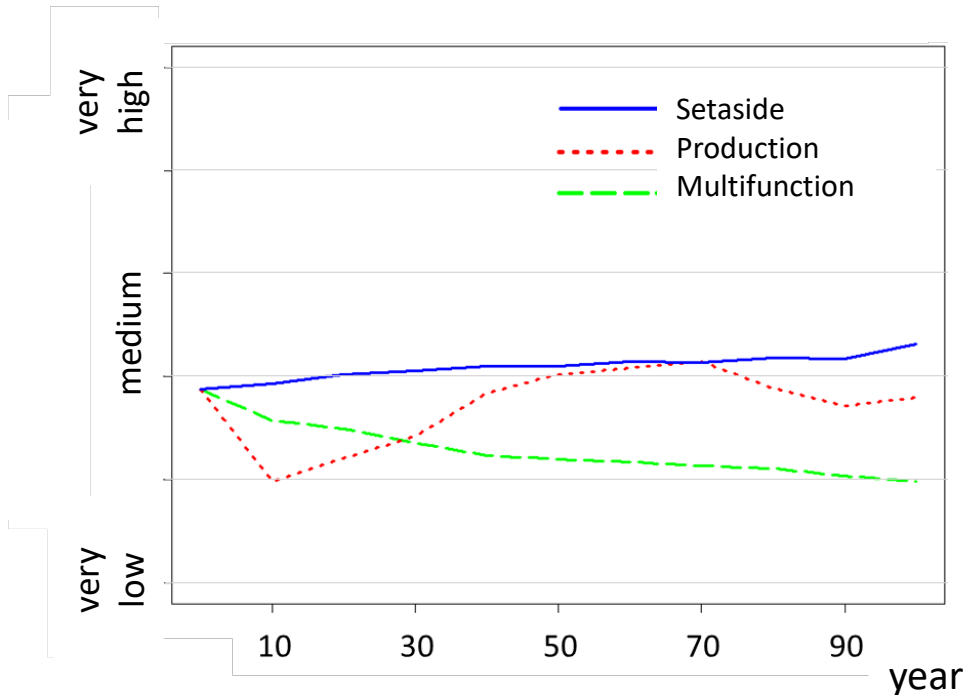
Setaside: No harvest, extreme volume accumulation (risk!)

Harvest



Storm and Barkbeetle Risk

Storm & Bark Beetle Risk – FL-Based Assessment



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

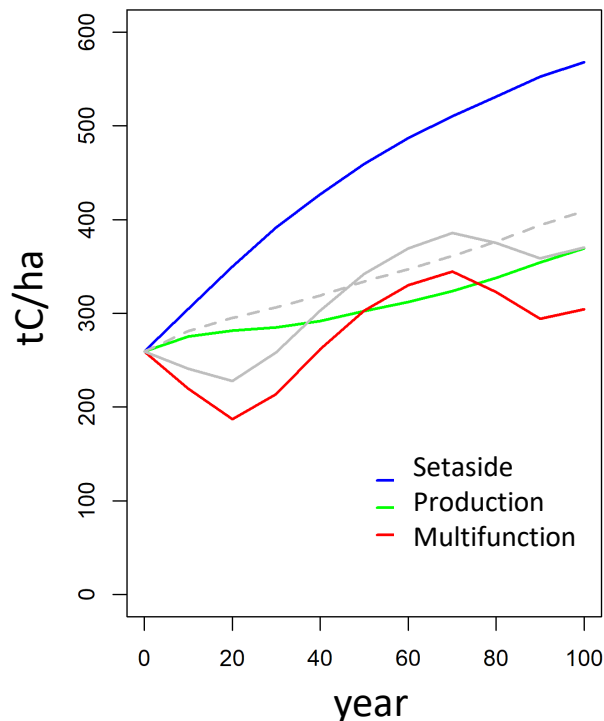
Production: Risk level oscillating, highest at times when mature stands dominate

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

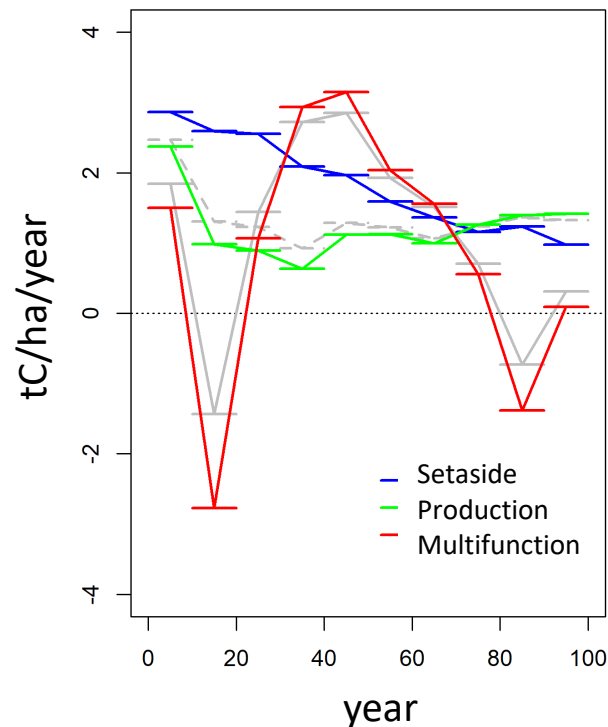
Carbon Sequestration

Forest Stocks + Wood Products + Emission Savings

C-Stocks



C-Balances

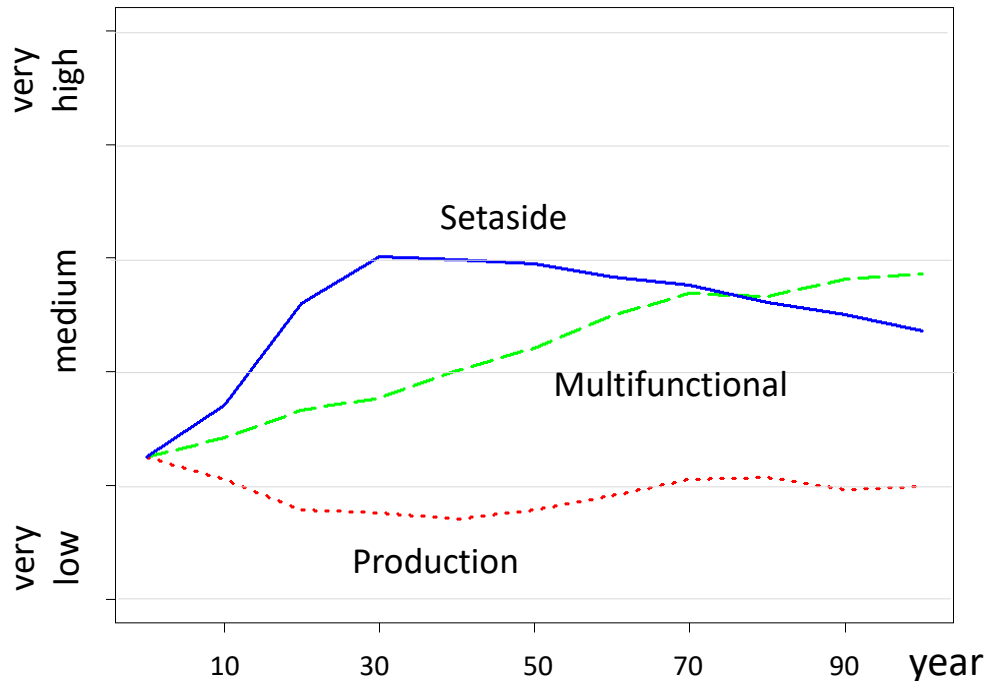


Multifunctional and Production: In average the same balance, only emission savings persist on the long run (due to balanced forest and product stocks)

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)

Synthesis

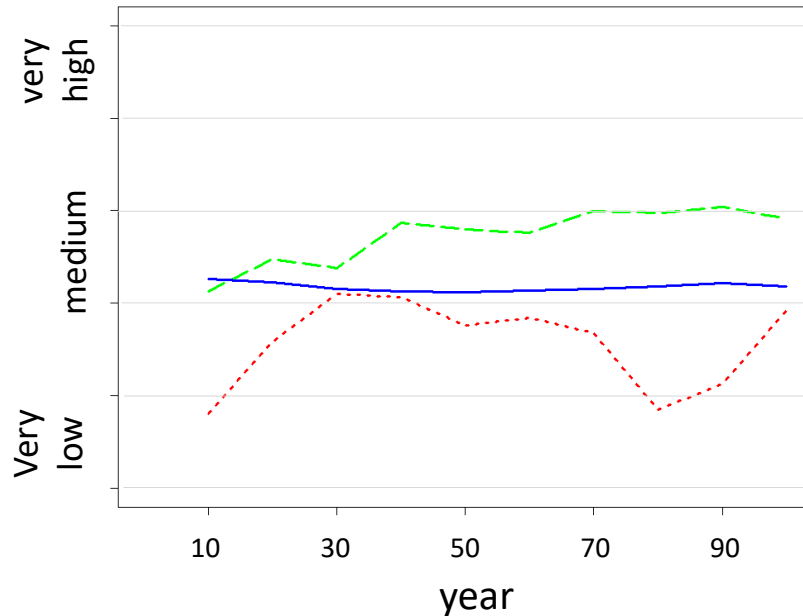
	Multifunctional	Production	Setaside
Timber Provision	+	+++	--
Carbon Sequestration	+	+	+
Biodiversity	+	--	+
Risk mitigation	+	-	--
Recreation	+	-	+ -
Groundwater	+++	--	+

Thanks for your
attention!

A man with glasses and a beard, wearing a blue and white plaid shirt and khaki pants, is sitting on a tree stump in a forest. He is leaning against a large tree trunk on the left. The background is filled with green foliage and trees. A white speech bubble with a blue border is positioned in the upper right corner of the image.

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

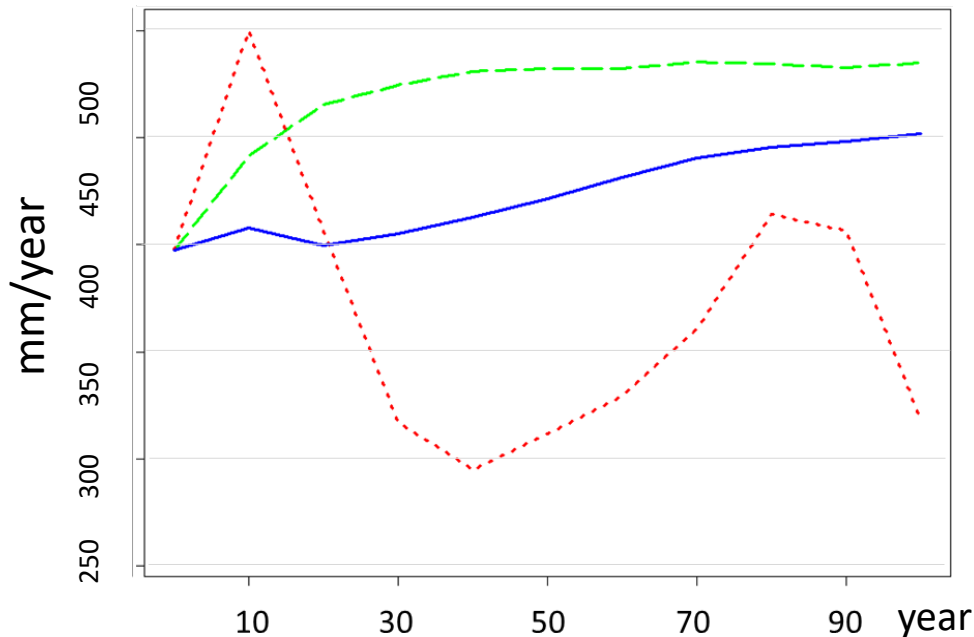
Multifunctional: Fits in most aspects very well to recreationalists' preferences

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

Lessons Learned

Promising methods developed for linking forest simulation methods and ecosystem service provision

Biodiversity and management do not necessarily exclude each other

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

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

Generally, management effects were stronger than climate and policy effects

Integration of extreme climate-related events as an important future step