

Short Rotation Coppices within agroforestry – options and limitations

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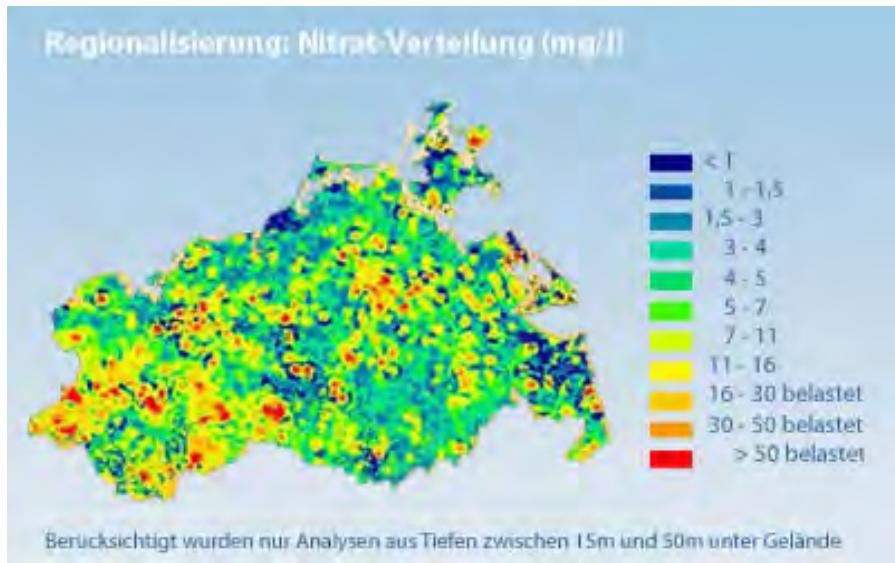
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..... in today's agriculture, we have, at least, **three major ecological problems:**



1. Nitrogen / Nitrate pollution



Mecklenburg-West Pomerania

Ministry of Agriculture, Environment and Consumer Protection, (www.regierung-mv.de)

DPA / NWZ (18.06.2012)

2. Soil erosion



© ddp-mecom Fotograf: Thomas Häntzschel



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3. Loss of Biodiversity



..... the solution?

Promoting tree growth on agricultural ground, to

- protect soils against erosion (actually, not a new idea!)
- extensify and buffer soils and waters from pollutions
- foster structural biodiversity
- increase C-sequestration
-

i.e., promoting Agroforestry



Photo by Erwin Cole, USDA Natural Resources Conservation Service

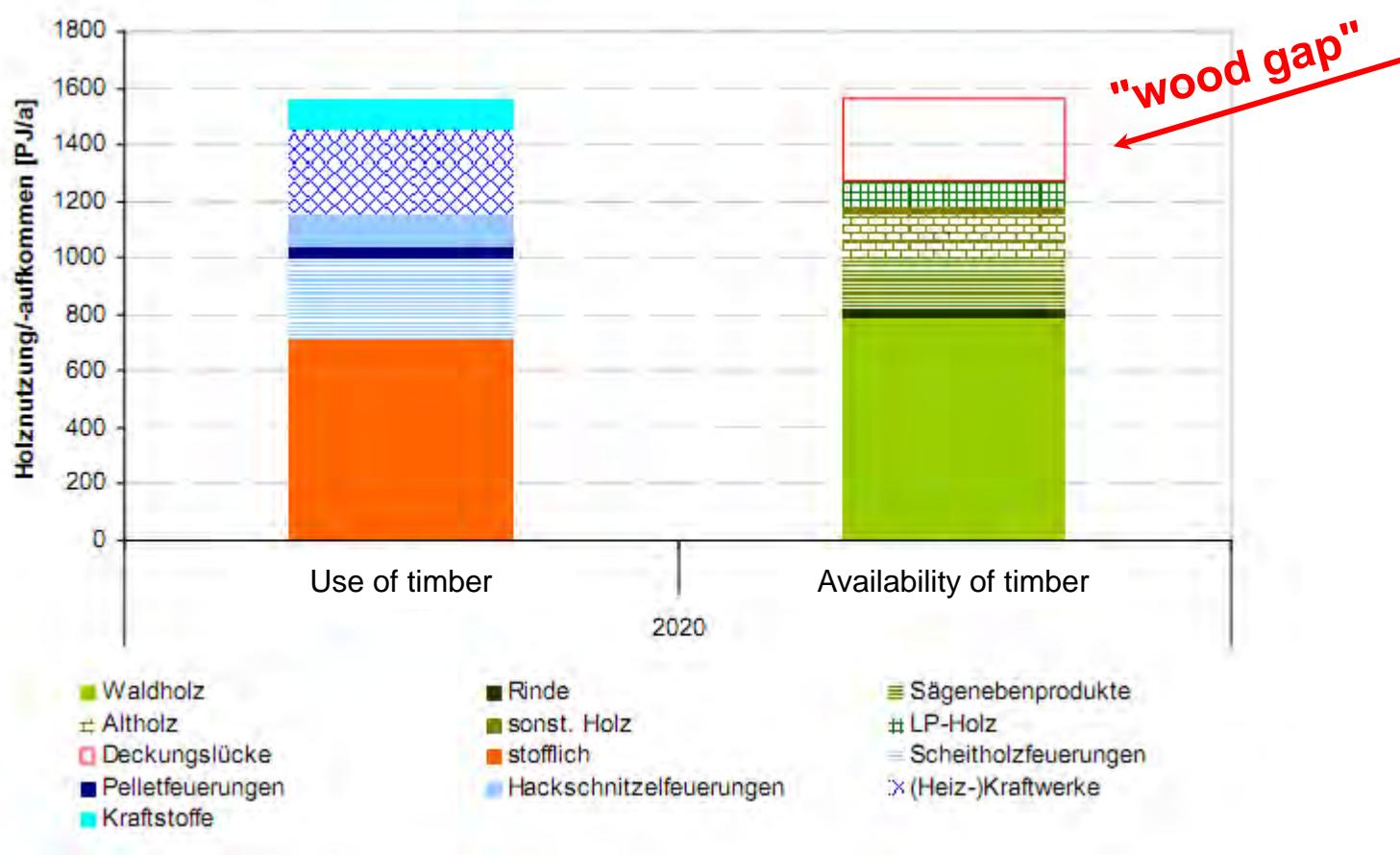
..... at least, one additional problem:

We need more wood!



Projected use and availability of woody resources in 2020, Germany

There will be a "wood gap" of ca. 270 PJ/a, i.e. a lack of 1-2 Mio. ha of land for woody biomass production



..... the solution:

Short Rotation Coppice (SRC) with fast growing trees?



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..... what is SRC?

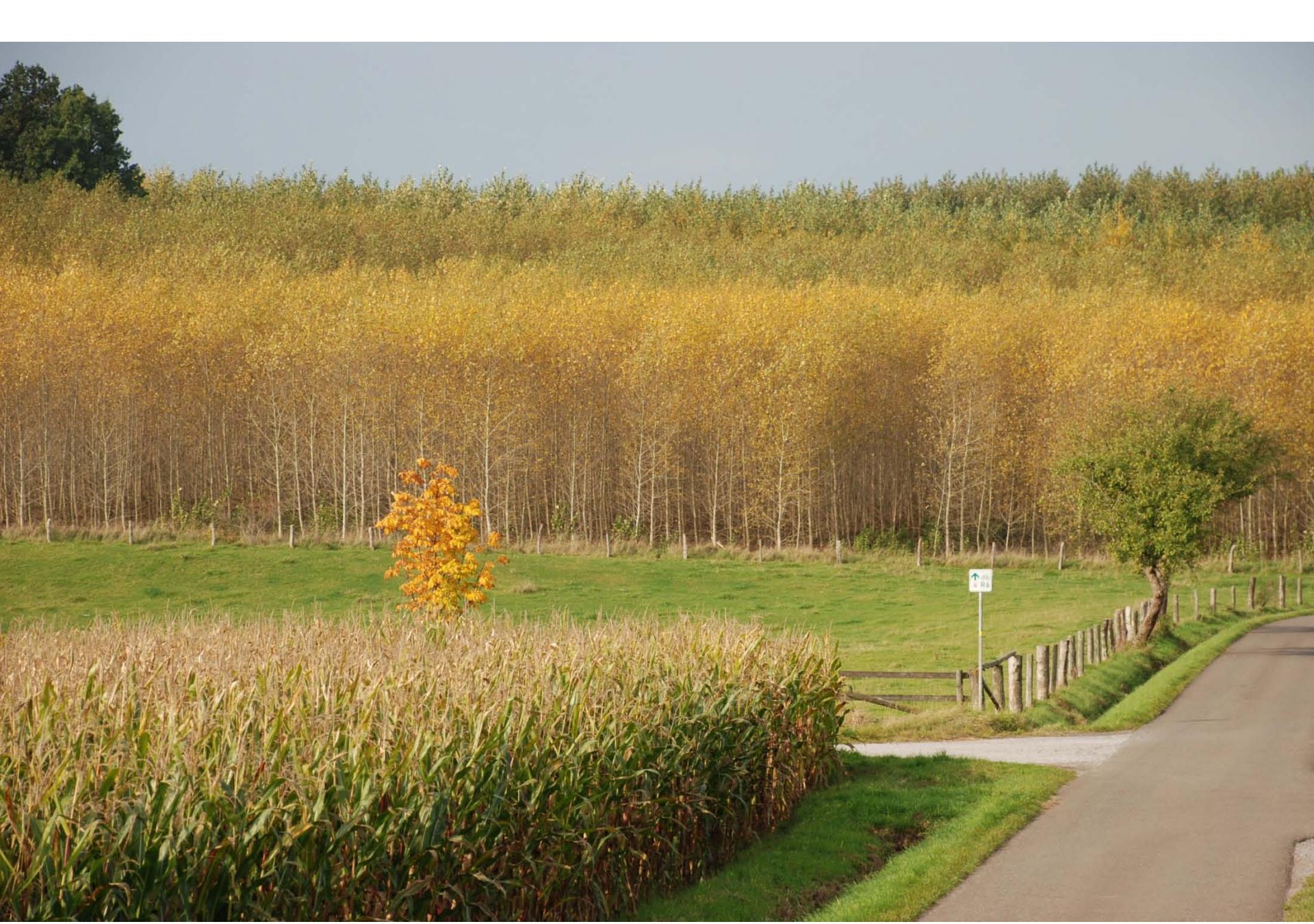
- ... a cultivation with fast growing trees (mostly polar and willow clones) to produce **in a minimum of time a maximum of woody biomass**
- ... a **cultivation of trees on farmland**, accepted as a "common agricultural praxis", as long as trees are harvested latest every 20 years
- ... a tree based land use system **which may provide additional ecological services** (e.g., less fertilizer & pesticides)
- ... a system **which may also include serious drawbacks** (e.g., enhanced water consumption, loss of open space, "monoculture effects")



Foto: Walotek



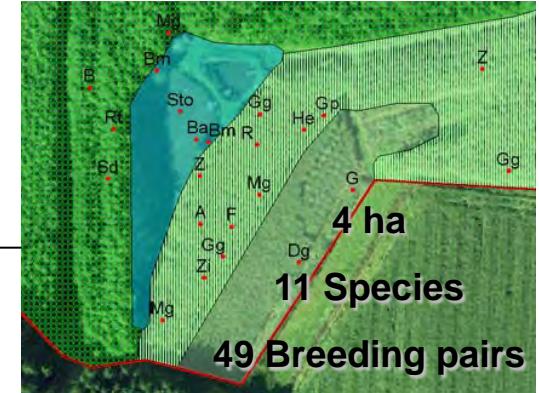
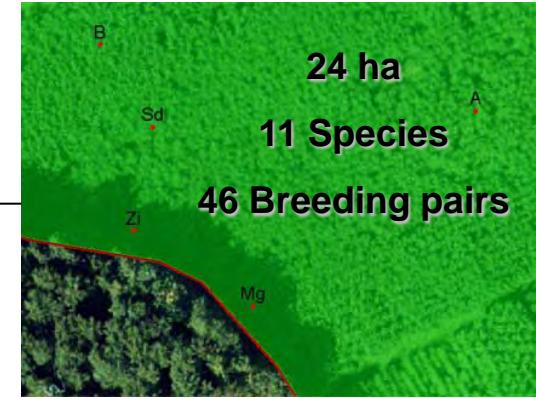
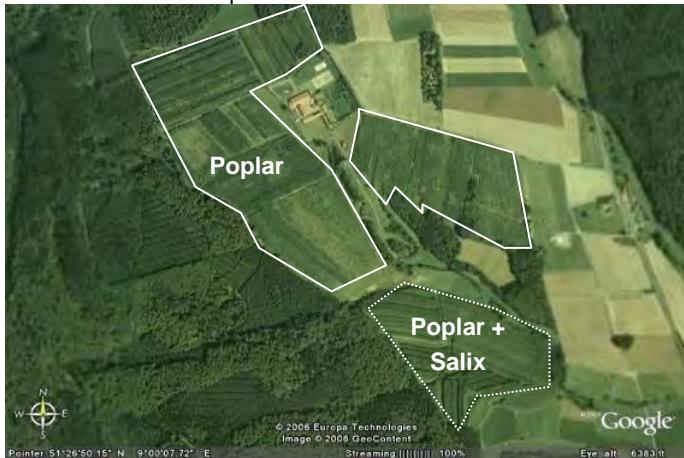
Site "Georgenhof" (Hessen/ Germany)



Site "Georgenhof" (Hessen/ Germany)



Plot size, boundary structure and bird occurrence



Smaller plot sizes and enriched boundary structures favor species richness

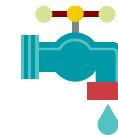
My focus today: **The impact of SRC on:**

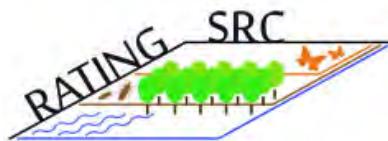
Nitrate leaching



and

Ground water recharge (GWR)





www.ratingsrc.eu

(2008-2011)

The drinking water catchment area "Fuhrberger Feld"



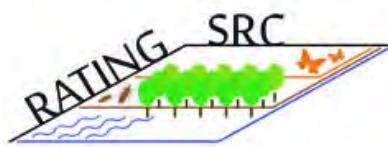
enercity[®]
positive energie

Die Marke der Stadtwerke Hannover AG

RATING-SRC

Reducing environmental impacts of SRC
through evidence-based integrated decision
support tools





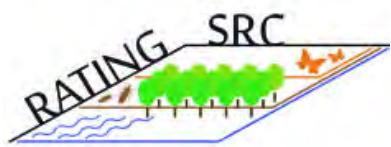
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The drinking water catchment area "Fuhrberger Feld"



- 30 km north of Hannover/Germany (size: 308 km²)
- Providing ca. 90% of the drinking water for Hannover (44 million m³/a)
- Mostly light sandy soils
- Previously, intensive managed cropland, incl. water table reduction





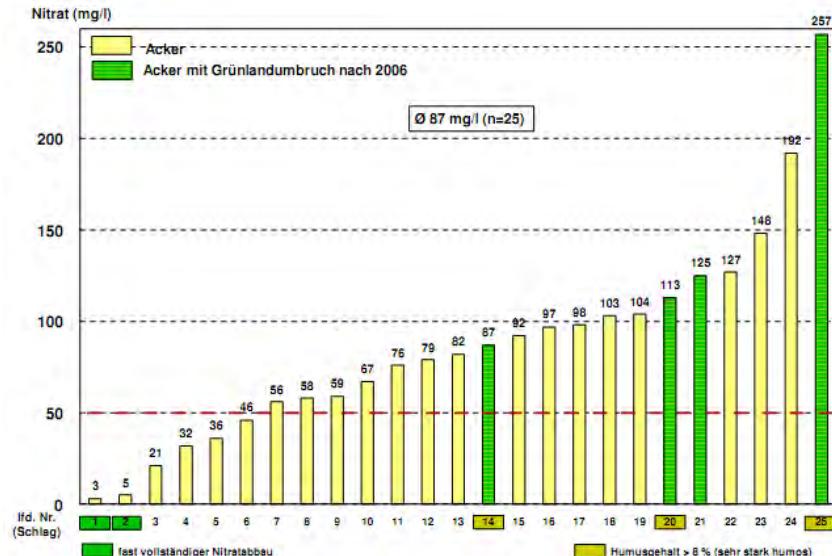
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The drinking water catchment area "Fuhrberger Feld"

- Specific features -

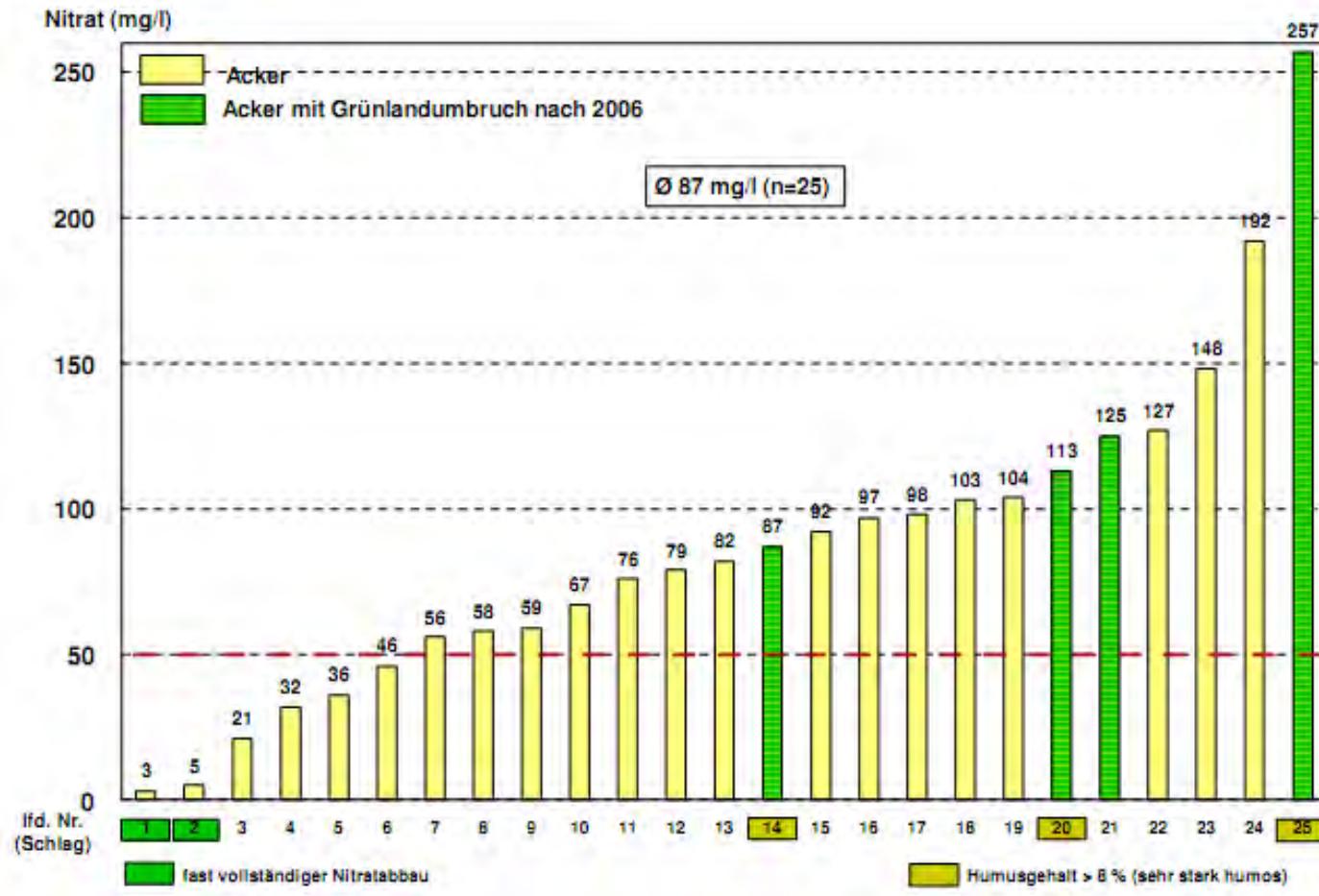


- A serious nitrate problem

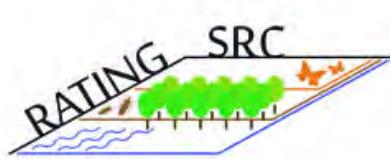


Nitrate in near-surface Groundwater, "Fuhrberger Feld"

Winter 2009/10, 3 m depth, n = 3 / plot



Selected sites due to treatment effect observations



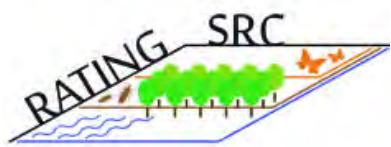
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The drinking water catchment area "Fuhrberger Feld" - Specific features -



- Since > 20 years, protection of groundwater sources by leaving sites fallow





www.ratingsrc.eu

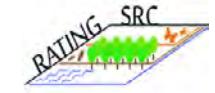
The drinking water catchment area "Fuhrberger Feld"

- Specific features -



- Plus, since 1994, installation of SRC as a strategy to combine groundwater protection and woody biomass production





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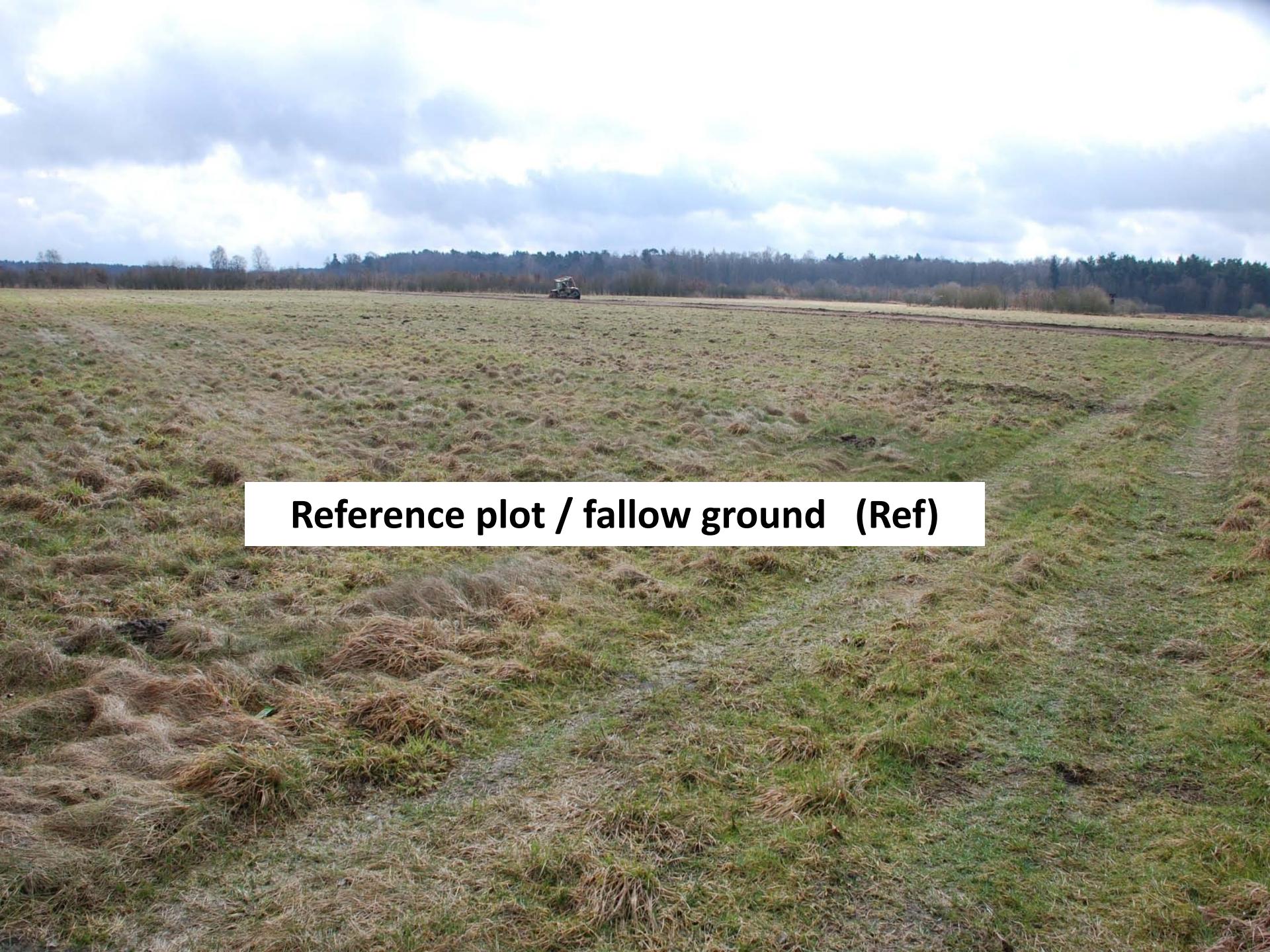
SRC research plots "Fuhrberger Feld"



Poplar, planted in 1994 (P94)



Willow, planted in 1994 (W94)



Reference plot / fallow ground (Ref)

Poplar, planted in 2009 (P09)



NO₃ in soil solution

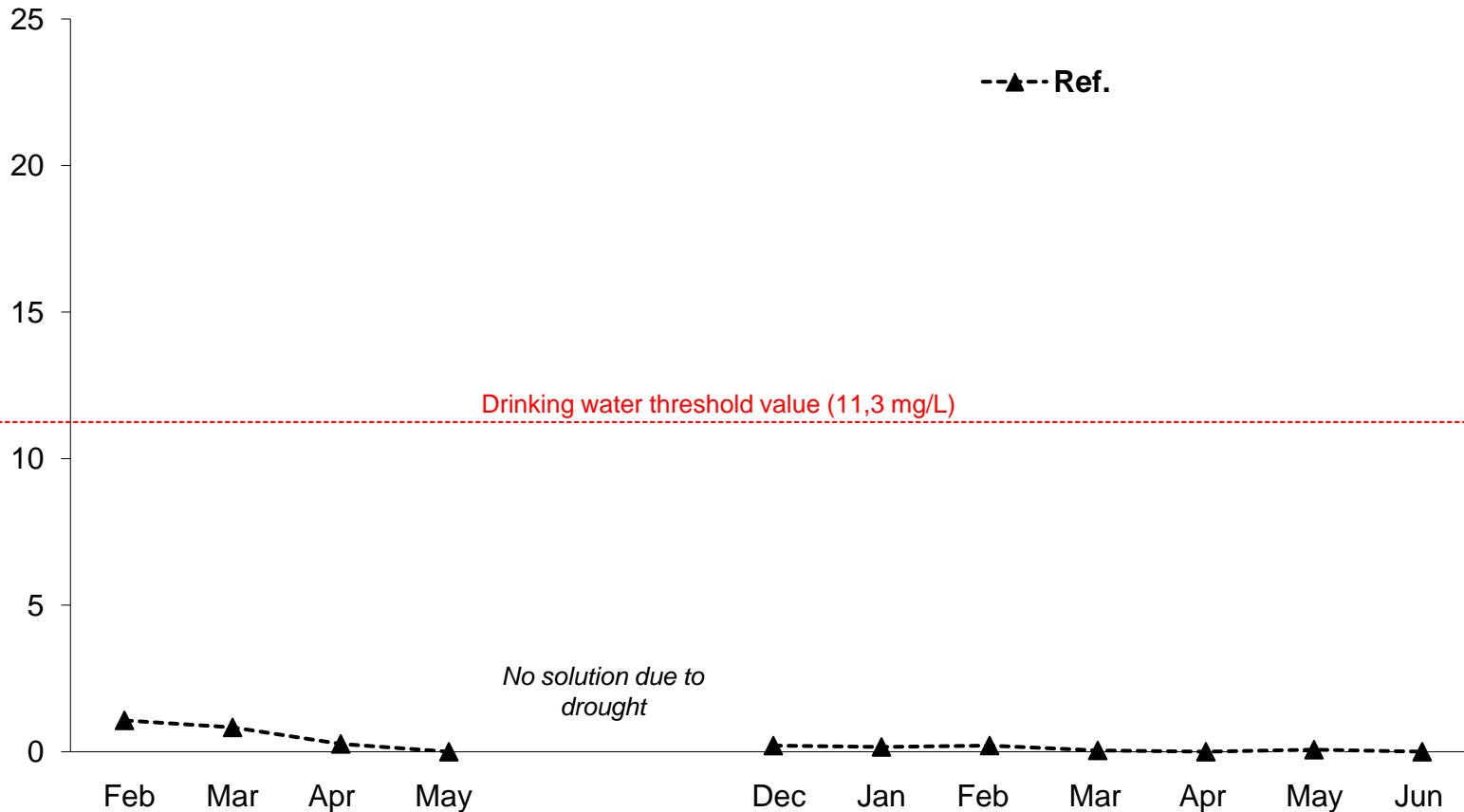
Standard P-80 suction lysimeter cups, 100 cm soil depth, bi-weekly sampling, *n=5 pro plot*



NO₃-N in soil solution

100 cm soil depth, monthly mean
(Feb 2010 - Jun 2011)

NO₃-N [mg/L]



Ref

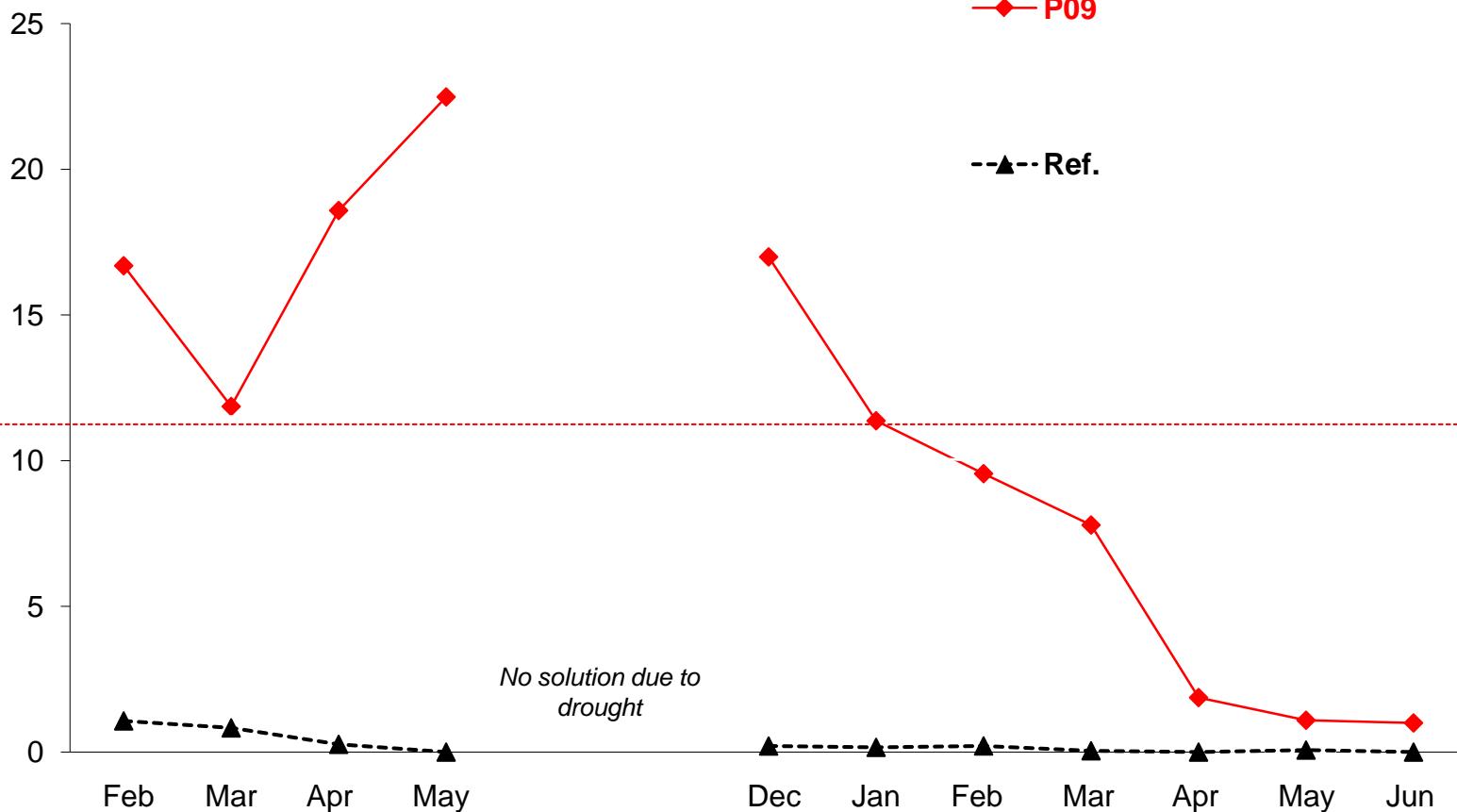
NO₃-N in soil solution

100 cm soil depth, monthly mean
(Feb 2010 - Jun 2011)



P09

NO₃-N [mg/L]



Ref

NO₃-N in soil solution

100 cm soil depth, monthly mean
(Feb 2010 - Jun 2011)



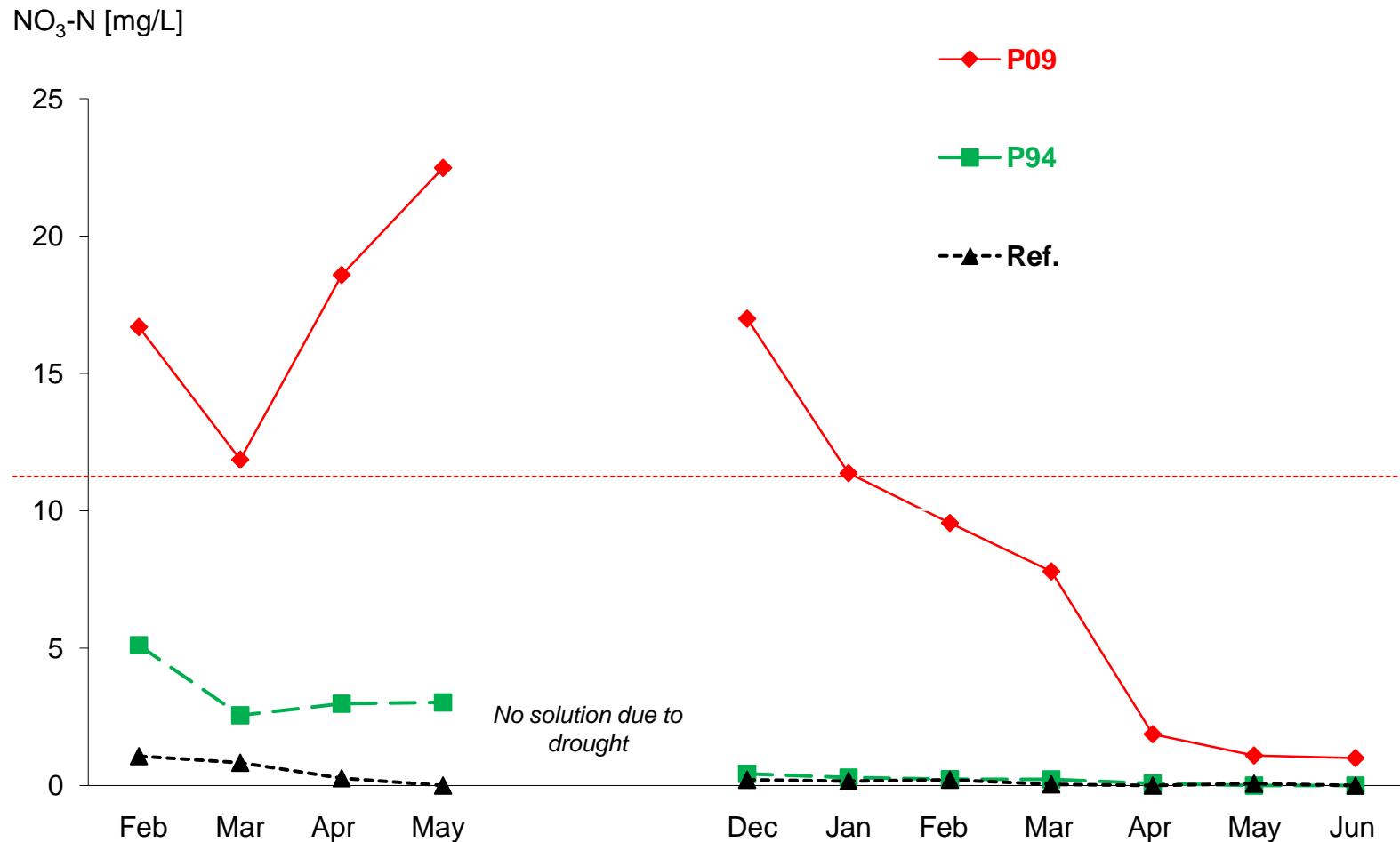
P09



P94

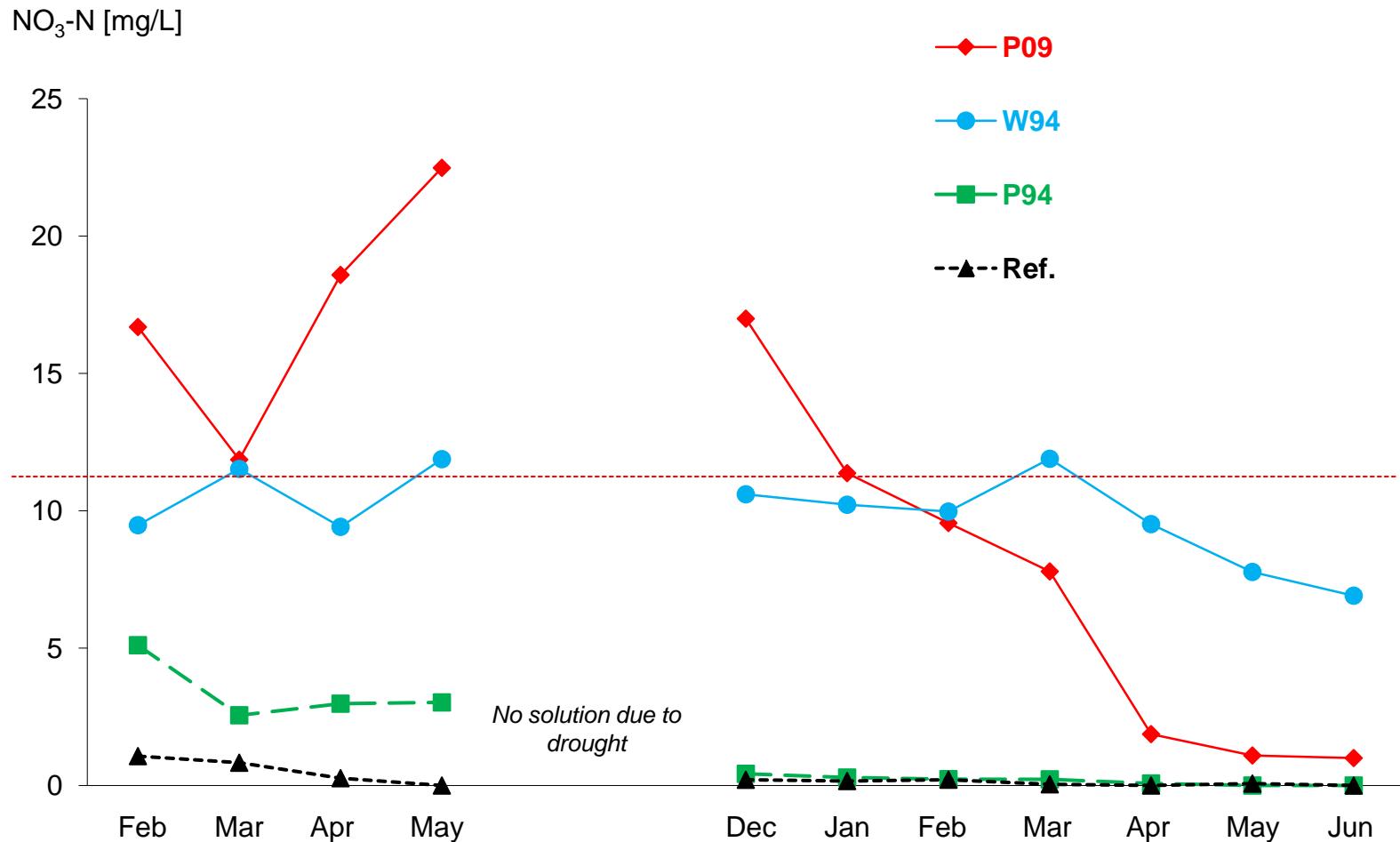


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NO₃-N in soil solution

100 cm soil depth, monthly mean (Feb 2010 - Jun 2011)



P09



P94

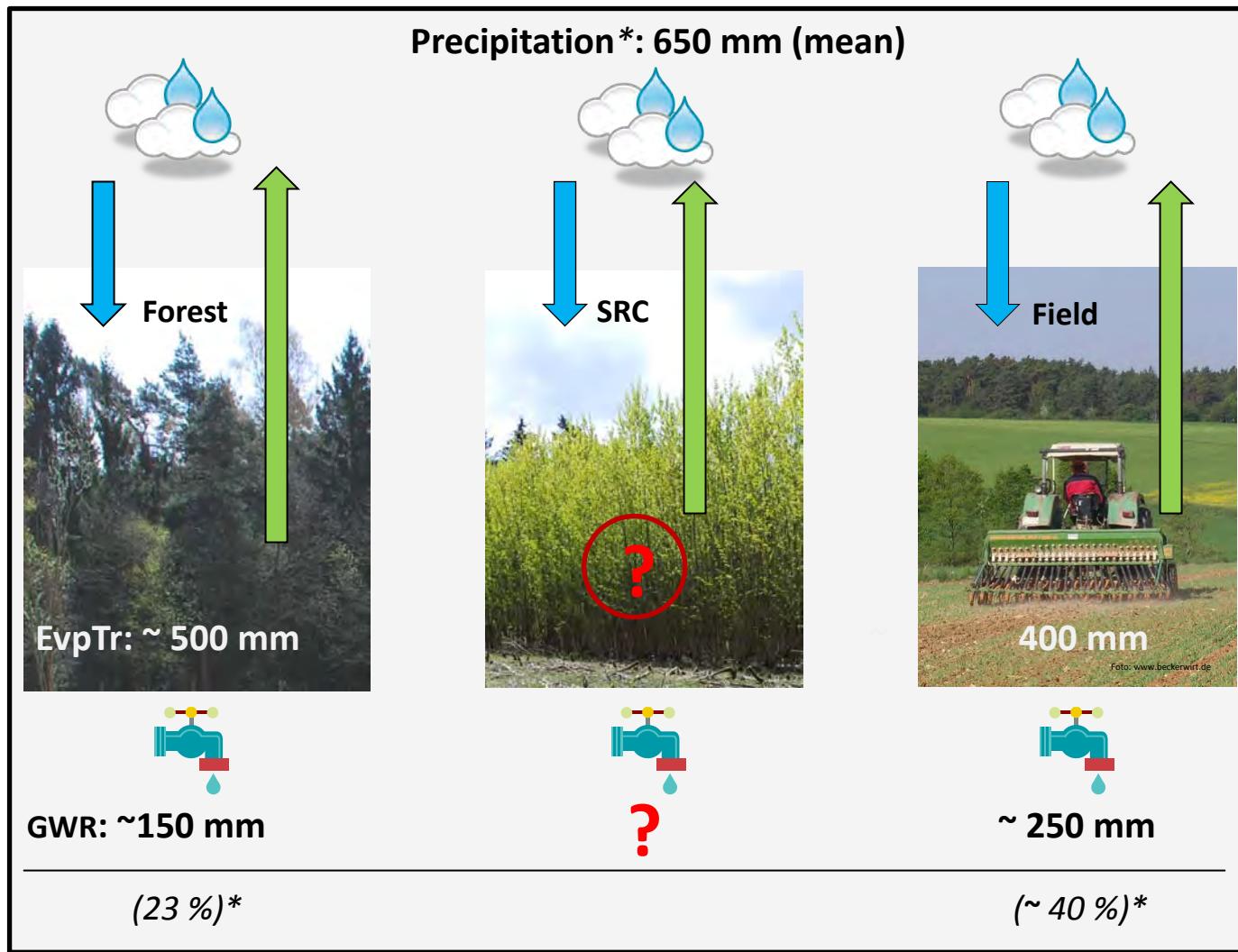


W94



Ref

Groundwater Recharge (GWR) under SRC, "Fuhrberger Feld"

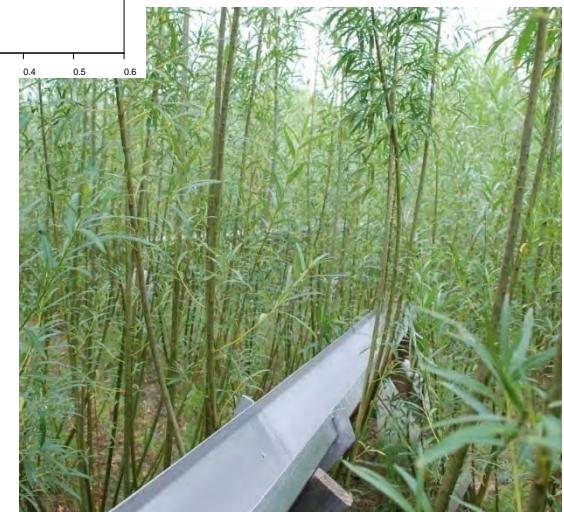
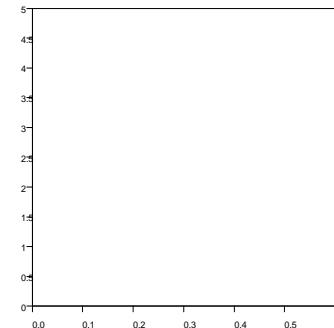


Measuring and modeling the water and energy fluxes

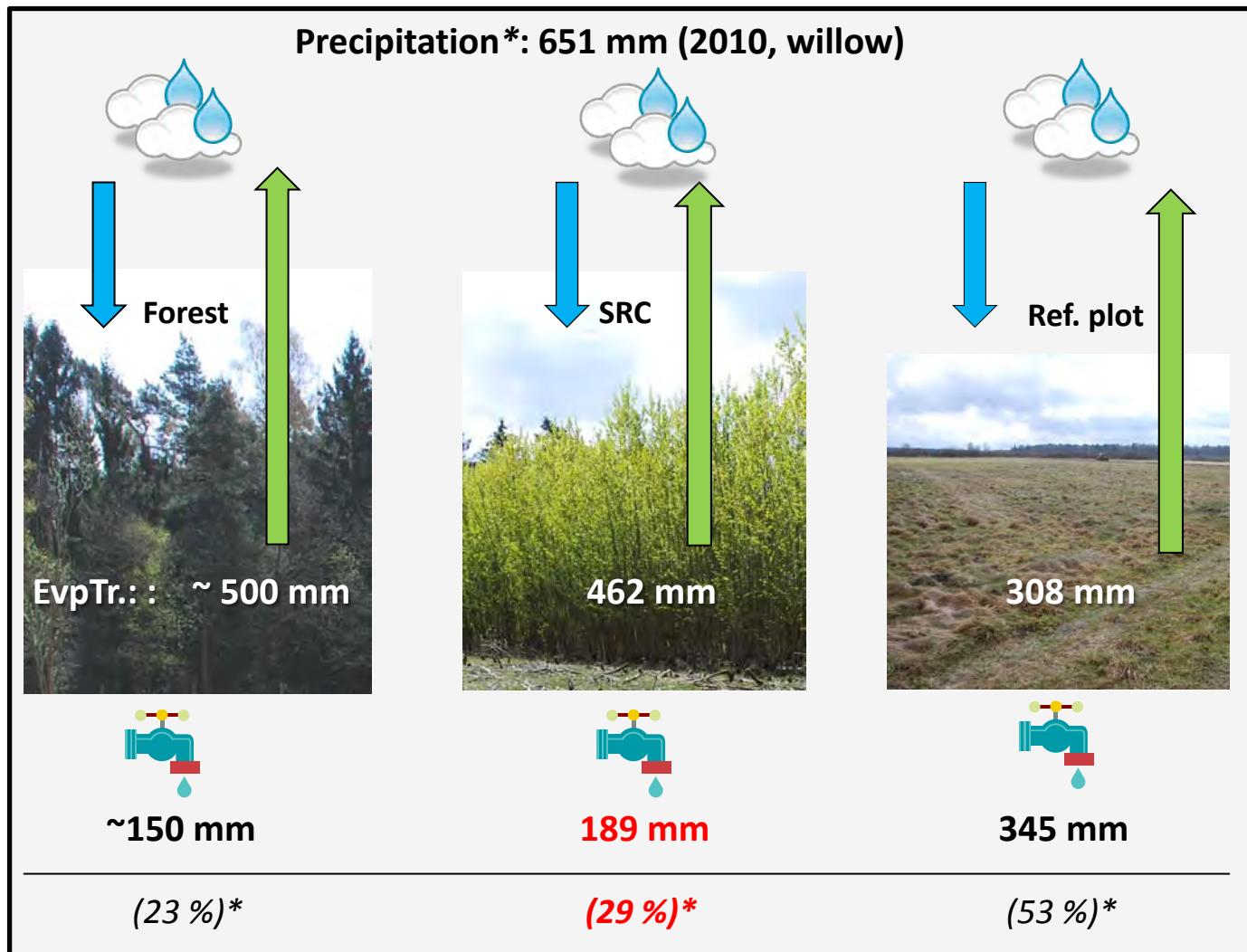


Variables in high resolution:

- Precipitation
- Temperature
- Humidity
- Wind speed
- Global ration



Groundwater Recharge (GWR) under SRC, "Fuhrberger Feld"



Conclusions

SRC plantations

- offer promising options to supply additional wood sources while simultaneously providing ecological services in today's agriculture
- should be better integrated in the given agroforestry approach to optimize added-ecological values and to avoid negative effects



- should be treated as a component to increase the economical and ecological value of a given landscape

Thank you for your attention

