

# Climate change and water conservation effects on vegetation patterns in a stream catchment

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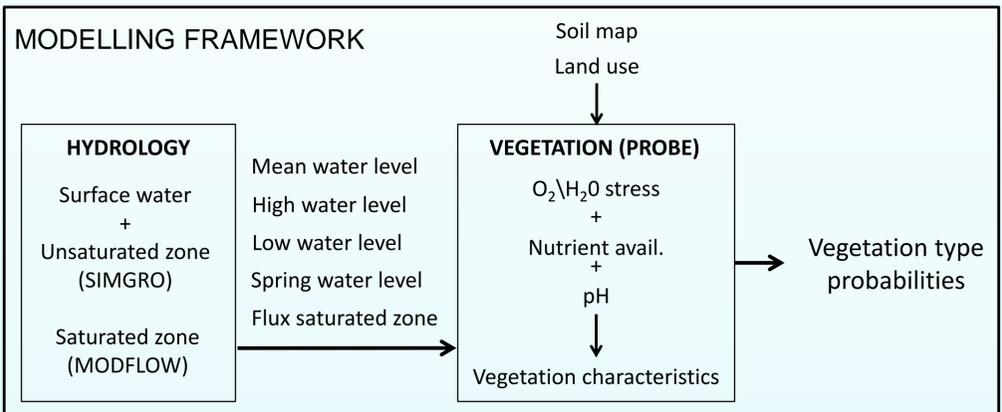
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## INTRODUCTION

Water availability and groundwater quality are important drivers of vegetation patterns. In temperate Europe, warming and changes in the hydrological cycle are likely to have profound effects on these vegetation patterns. Water conservation measures may reduce the potential negative effects of these changes by providing sufficient water availability and maintaining groundwater quality.

## RESEARCH QUESTIONS

- What is the effect of climate change on water quantity, groundwater quality and vegetation patterns in a stream catchment?
- How are these effects influenced by water conservation measures?

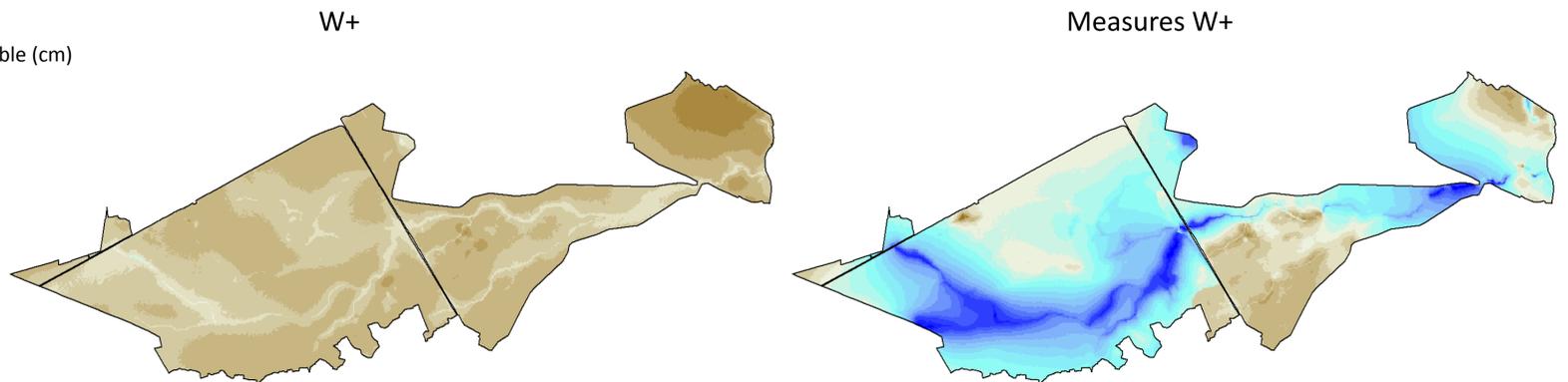
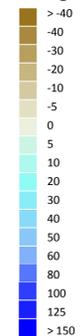


Land Use	Measures
Agriculture	consolidation groundwater extractions, level-regulated pipe drainage, widening water courses, construct weirs, prevent flooding, dam water courses, redirect water courses
Urban	disconnect precipitation from sewers, remove sewage overflow points
Nature	removal small ditches, no drainage, construct impermeable layers, stream restoration, allocate extra nature areas
Stream valleys	meandering streams, no groundwater extraction, no drainage

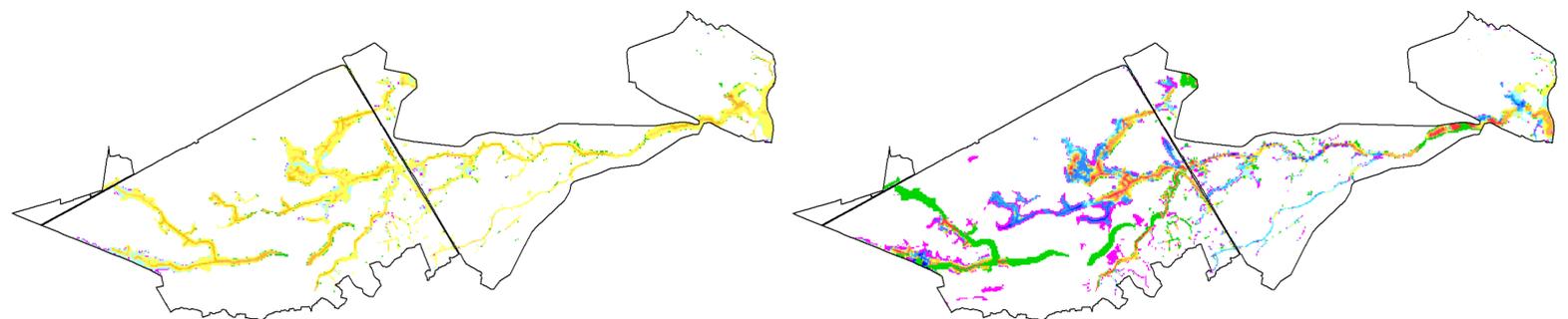
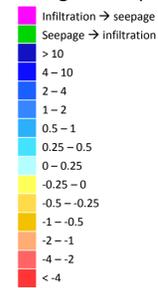
Climate Scenarios	Precipitation (winter)	Precipitation (summer)	Evaporation
Climate W	+ 7%	+ 6%	+ 7%
Climate W+	+ 14%	- 19%	+ 15%

## RESULTS

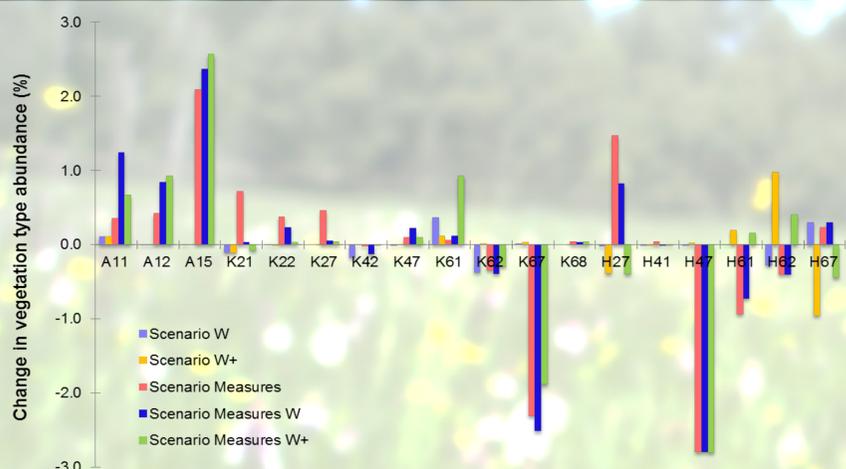
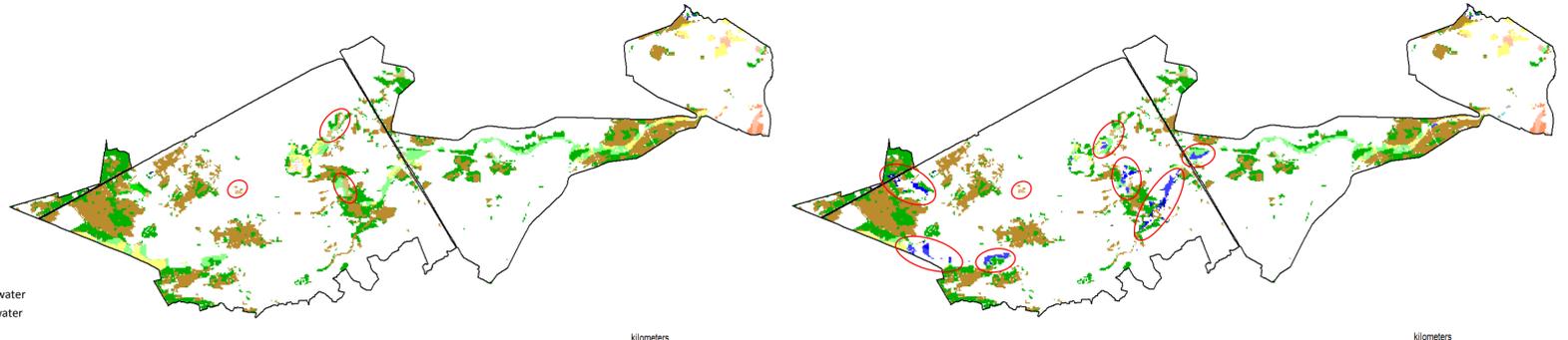
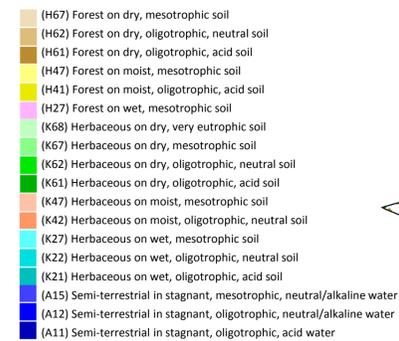
Change in mean lowest groundwater table (cm)



Change in seepage flux (mm d<sup>-1</sup>)



Vegetation types



Scenarios	Lowest (cm)	Highest (cm)	Seepage flux (mm d <sup>-1</sup> )	Seepage area (%)
W	+9	+15	+0.11	+4.6
W+	-12	-3	-0.16	-2.2
Measures	+41	+49	-0.40	-0.4
Measures W	+48	+63	-0.33	+5.5
Measures W+	+27	+46	-0.53	-2.2

## CONCLUSION

- Climate change affects water quantity and groundwater quality
  - Water conservation measures:
    - overruled most of these changes and successfully increased water availability
    - decreased groundwater quality at certain locations
  - Vegetation patterns changed more when water conservation measures were implemented than under climate change alone.
- This integrated modelling approach is essential when developing successful future management plans.



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