

Faculty of Environmental Sciences, Department of Forest Sciences, Institute of Soil Science and Site Ecology

Climate change: Impact on nitrogen export from different land-use types in a reservoir catchment

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SWAT 2013 Toulouse France, 17/07/2013





Research area - REGKLAM





Research area - Ammelsdorf catchment



Climate (period 1961 - 1990) Precipitation 1096 mm a⁻¹ Mean annual temperature 4,3 °C (Bernhofer et al., 2009)

Size 51 km²



900 800 ШШ

600

400

300 100

0

-100

-400

-500

change]

Precipitation

Projected climate change signals

Temperature (until 2100) WETTREG 2010 +4 °C CLM +4,5 °C



CLM, A1B, 1 Run

CLM, A1B, 1 Run

WETTREG 2010, A1B, 10 Runs



900 change] mm 800 600 400 Precipitation 0 -100 -400 GP_082_121 --- GP_082_123 1961

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Input data for Ammelsdorf catchment



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Model setup and measurement data



- 14 Subbasins
- 1312 HRUs
- Discharge data Ammelsdorf & Rehefeld (LHWZ, 2012) 2006-2012
- Water quality data Ammelsdorf (TUD) 2009-2012
- Calibration period 2009 - 2011
- Validation period (planned) 2012



Model calibration – discharge





Model calibration –nitrogen



Objective function:

Simulated annual export = \pm 35 % of observed annual export

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Projected annual nitrogen export Agricultural land





Projected annual nitrogen export Pasture land





Projected annual nitrogen export Forest land





Projected annual nitrogen exports Ammelsdorf gauge





Projected annual nitrogen exports Ammelsdorf gauge





Projected annual nitrogen exports Ammelsdorf gauge



WETTREG 2010, A1B, Run 1-10

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Projected monthly nitrogen exports Ammelsdorf gauge 2009 - 2020





Projected monthly nitrogen exports Ammelsdorf gauge 2021 - 2050



Projected monthly nitrogen exports Ammelsdorf gauge 2071 - 2100

Conclusions

- The projected nitrogen exports contain high uncertainties due to the underlying uncertainties in the projected precipitation and potential land use changes.
- There is no significant trend within the projected nitrogen exports at the annual scale.
- The nitrogen exports at the monthly scale indicate distinct changes: Higher exports during the winter month and lower exports in spring.

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