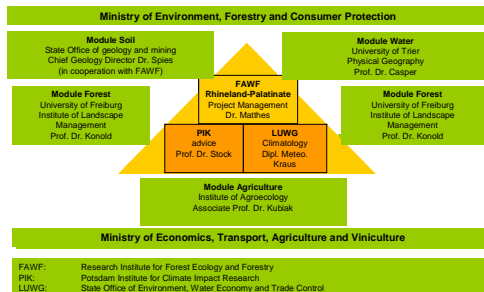


Impacts of climate change on water quantity and quality in Rhineland-Palatinate / Germany

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Introduction

The ministry of environment of Rhineland-Palatinate, Germany, advances the interdisciplinary research project dealing with "climate and land use change in Rhineland-Palatinate" (KlimLandRP). The aim of KlimLandRP is to specify adaptation strategies and to find current research gaps.

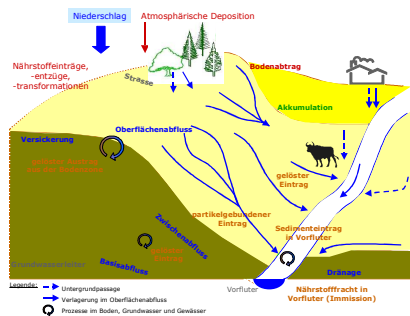


The University of Trier/Germany undertakes the task of quantifying the impact of climate change on hydrological cycle and on water quality. In the first phase of the project (2008/2009) there are applied two different model based methods.

Methods

1 STOFFBILANZ / balance approach

Using STOFFBILANZ it is possible to get approximate spatial information about present and future distribution of water, nitrate and phosphor balance in Rhineland-Palatinate. The nutrient balance is calculated by considering of punctual and diffuse entries, and retention along the flow paths.



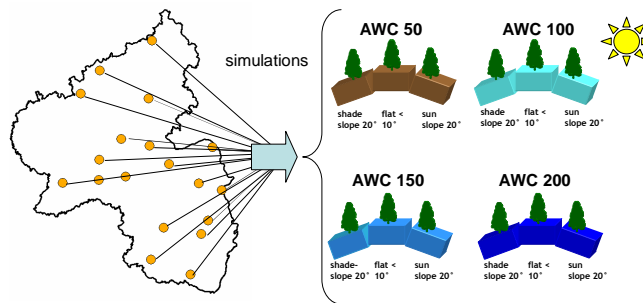
2 SITE ANALYSIS / process based approach

With the application of WaSiM-ETH 8.0.10 the impact of climate change on water balance for forest sites is quantified.

In cooperation with the module forest an approach is developed which allows to integrate the impact of climate change for the definition of water balance degree in forest management planning. This requires process based approaches like WaSiM-ETH.

The model is parameterized for a standard tree species (100-year old beech), while the exposition and the available water capacity (AWC) is varied.

The data sets of the German meteorological service (DWD) are used to quantify the current site reactions. Accordingly, WETTREG projections (2050/2100) for Rhineland-Palatinate are used to indicate the spectrum of climate change.

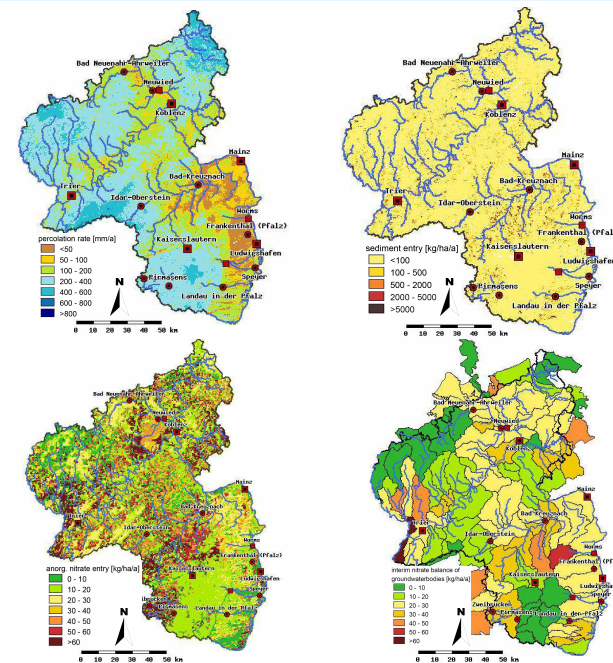


Results

Based on current measurements regions are identified which are - with regard to water balance and water quality - critical under current conditions.

In the northern Upper-Rhine lowlands groundwater recharge is very low. For the Nahe catchment basin high sediment yields and therefore phosphor input in surface water are expected.

In a second step different land use and climate scenarios can be furthermore applied to estimate a spread of reactions for the future.



The plausibility of the site simulations can be verified by measured data of forestal monitoring sites in Rhineland-Palatinate. Based on the calculated water balance elements, indices are deduced to quantify tree growth. These are thereon correlated with climate parameters. The relation between climate parameters and tree growth indices will be applied in forest management planning, particularly for forest site mapping.

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www.stoffbilanz.de

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