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Water resource use and water availability in Europe – a cross cut assessment

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Urbanisation, tourism and irrigation are main drivers of water quantity problems, especially in water-scarce regions. Ongoing climate change is intensifying the situation. Managing water resources is not only a challenge for developing countries but also for the European Union. Member States cover different hydro-climatic regimes and have individual constellations of water users, water needs and saving potentials. This constitutes also differences in vulnerability and appropriate management strategies. Development of management strategies and water related policies relies on suitable information on water resources and water needs. For policy making at international level, as in the EU, a large scale approach is required that brings together relevant information, and that is sufficiently detailed to identify hot spots and the nature of water quantity problems. However, relevant data are often not available or highly uncertain. Typically, they are also aggregated to regional and national levels masking problems of smaller dimension.

In this contribution we present an integrative analysis of water availability and water uses at European scale and characterize pressures on water resources, the underlying drivers and possible management options.

Bringing together modeling results and disaggregated statistical information we estimated the relevant water balance components including human water uses. All components were calculated for a 10x10km grid covering Europe and were further analyzed at grid level and river basin level. A water balance model was applied to estimate excess water available for runoff and groundwater recharge. Agricultural water demands were determined independently by an agricultural model. Water abstractions for public and industrial use were taken from European statistics and disaggregated in space based on weighting factors such as population, land cover and other. The comparison of blue and green water fluxes with water requirements for different human uses allowed us to identify hot spots of water quantity problems (over-abstraction, sea-water intrusion) and to analyze the main factors exerting pressures on water resources (agriculture, public and industrial water use).

Including additional information such as population, irrigation methods and water sources enabled us to evaluate water saving potentials and derive options for management and policy making.

The approach provides information below regional or river basin level supporting problem analysis, comparison of different regions and communication between different administrative and policy making levels (regional, national and international authorities). The outline of a classification of water quantity problems combining hydro-climatic regimes and water use characteristics will be presented and discussed.