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Biomass and water: a critical review of the water footprint concept as sustainability criterion for biomass production

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Agricultural production is the most water consuming economic sector worldwide. Together with fertile soil the availability of fresh water is the most restricting factor for biomass production in many areas around the globe. Additionally, agriculture significantly contributes to water pollution by nutrient losses and pesticide emissions. Therefore assessment of impacts on water is one of the essential aspects in the evaluation of the sustainability of concepts considering biomass as raw material.

The water footprint concept combines all different types of water uses into one indicator. The total water footprint of biomass production consist of the green water footprint, which is the amount of rainwater evapotranspirated for growth, the blue water, which is the amount of ground and surface water used for irrigation, and the grey water, which quantifies the fresh water amount needed for assimilation of pollutions loads emitted into the water system from areas used for biomass production.

The water footprint concept has significantly raised the public awareness of fresh water as resource with restricted availability. Water footprints for different products are commonly known and compared to each other. Despite the release of these general water footprint values a standardized method of water footprint accounting is still in work and differences in the basic assumptions for the calculation together with few methodological shortcomings may lead to significant differences in the results. Problems in this respect will be presented in this contribution and suggestions to improve standardization will be given.

In contrast to the carbon footprint the water footprint has a strong regional component, because long distance water transport is far out of any economical possibility. That means even though the world's total biomass productivity is restricted by the joint availability of fertile soil and fresh water. There are tremendous regional differences to which extent water availability contributes to this restriction. Therefore, as a single parameter, the water footprint, which considers water use/consumption only, is no sufficient indicator of the sustainability of the (regional) water use. An approach to put water footprint values of a common product into a regional context will be presented in this contribution and the potential for using the water footprint as sustainability criterion on a regional scale will be discussed.