Land, climate and resources (LandCaRe) 2020 – foresight and potentials in rural areas under regional climate change

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Adaptation to climate change requires knowledge on the potential regional and local impact of climate and weather extremes. Effects of climate change on agriculture may be positive or negative, depending on the variability of weather conditions, site quality, land use and management. Adaptation must consider sustainability with respect to high plant production without loosing different ecosystem services like soil protection, purification and recycling of water or maintenance of biodiversity. Further, adaptation measures should not enhance climate change but reduce greenhouse-gas emissions. That implies decision making to consider both socio-economic and ecological consequences of adapted management.

The joint research project LandCaRe2020 (www.landcare2020.de) deals with effects of regional climate change and weather extremes on agricultural production including energy plants and ecosystem processes at the landscape level. Tools will be provided which produce knowledge for decision making in agriculture, related industries and environmental issues in rural areas. Central objective of the project is the development of a dynamic decision support system (LandCaRe-DSS), exemplarily developed for two different regions in eastern Germany (1) the "Uckermark" in the dry lowlands of Brandenburg and (2) the "Weißeritzkreis" in the humid mountain area of Saxony. Adaptation of the DSS to other regions will start in the second phase of the project. The DSS includes modules for past and future climate, ecological indicators like greenhouse gas emission, plant production potentials or biodiversity as well as economical indicators like the development of farm income and employment or eco-

nomic risks. Integration of the modules is based on a geographic information system (GIS) and predictions can be performed from individual agricultural fields up to the landscape level. Based on FACE (free-air carbon dioxide enrichment) experiments, a unique parameter set of effects of increased atmospheric carbon dioxide on plant production and water use will be included. The DSS is dynamic because it allows new model runs with various sets of scenarios and parameters by the user. The results can be questioned and visualized from a virtual library. Through a communication process including interviews, workshops and DSS training units a user panel has been created with representatives from agricultural and environmental administrations and organisations, agricultural industry and farms. As far as possible, their requirements on specific matters, indicators or design will be included in the DSS during the developing process. Further, it is possible to create specific versions of the DSS based on data of the respective user. The project is open for participation in the user panel and collaboration with other related projects. At the end of the project, the DSS verified for the two exemplary regions will be accessible via internet. The model framework, adapted software and a defined set of required data provide for future transfer to other regions.