

Developing a Bayesian Network for analysing interactions between the management of land, water and saltine lakes under climate change in the Seewinkel region

Combining data, methods and theories from different disciplines into a comprehensive and consistent framework is a major challenge in integrated land use modelling which is commonly used to describe, explain and explore cause-effect relationships. However, deterministic models may not be applicable if environmental or socio-economic processes are not fully understood, data gaps are evident, or uncertainty is prevalent. In this case, Bayesian Networks provide an alternative approach. Bayesian Networks are probabilistic graphical models that can be used to display and explore causal relationships between a set of variables. A major advantage of Bayesian Networks is that they allow for the integration of information from different knowledge sources (e.g. qualitative in the form of expert knowledge; quantitative in the form of modelling results or empirical data) and at different spatial and temporal resolution.

In my presentation, I'd like to give you a methodological overview on Bayesian Networks. Furthermore, I would like to share insights from developing a Bayesian Network for the Seewinkel region. We make use of several data sources, e.g. integrated land use modelling outputs, empirical data, and knowledge from local experts, and go one step further by including the effect of land and water use on the ecological state of saltine lakes to identify optimal management options for saltine lakes. First results show, that the development of a conceptual model, i.e. identifying of the most relevant variables, defining of relationships between these variables and determining their levels, is an iterative process that needs several feedback rounds. Feedback from seminar participants my help to improve the development and validation process of the Bayesian Network for the Seewinkel region.