Context scenarios: understanding societal context uncertainty in environmental modeling

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Context scenarios: understanding societal context uncertainty in environmental modeling

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Abstract: We propose the context scenario approach to better deal with the uncertainty of future developments of socio-technical and socio-environmental systems. This approach goes beyond the established practice of environmental modeling. This practice consists in either using quantitative framework data on future societal developments (as e.g. GDP, population growth etc.) to drive model based environmental scenarios, or in combining intuitive storylines on societal futures with environmental simulation (SAS, Alcamo 2008). Instead, we use a qualitative but systematic form of systems analysis (cross-impact balance analysis CIB, Weimer-Jehle 2006) and combine it with modeling and simulation to construct integrated scenarios of socio-technical and socio-environmental systems. In our research, we combine two perspectives: First, we design and implement various case studies combining and integrating qualitative CIB with simulation models (e.g. in the projects \textit{ENERGY TRANS}, \textit{Lima Water}). Second, we systematically reflect our work by using social sciences methods to evaluate and to learn from these experiences (e.g. in the projects \textit{ACCESS}, \textit{ESS}). Our work shows that the qualitative but semi-formalized analysis of societal contexts through CIB is one useful approach to explore and understand the variety of possible future developments of society, as it allows to feature and to explain the multifaceted interplays between societal and technical and/or environmental transformations. Using context scenarios in environmental modeling and simulation improves the consistency and traceability of scenarios and fosters interdisciplinary knowledge integration. In sum, context scenarios allow to more adequately deal with the future uncertainty and complexity of coupled socio-environmental and socio-technical systems; and to provide richer, more consistent and more traceable scenarios based on environmental modeling for research, policy making and public debate.

Keywords: scenario uncertainty; context scenarios; cross-impact balance analysis CIB; socio-environmental systems