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Abstract: There is a long tradition of model-based decision support in water management. The consideration of deep uncertainty, however, changes the requirements imposed on models.. In the face of deep uncertainty, models are used to explore many uncertainties and the decision space across multiple outcomes of interest. This requires a model that runs fast, making it necessary to do concessions in the resolution including spatial, temporal and process information. For delta management under uncertainty, a model should capture all relevant changes, processes, actions, and feedbacks over time and produce relevant outcomes for stakeholders; thus it requires an integrated and dynamic model. Earlier, we developed a fast integrated model for the Rhine delta in the Netherlands, where there is a long tradition on model development and where both the physical and social system are quite static. However, in data scarce areas, and especially in dynamic deltas such as Bangladesh, building a fast, integrated and dynamic model is challenging.In this contribution, we discuss the model requirements for decision support under deep uncertainty in data scarce dynamic deltas. We illustrate this using a case study of the Ganges Brahmaputra delta in Bangladesh, where we develop a fast integrated metamodel. In this delta, uncertainties arise not only from external developments such as climate change, sea level rise, and upstream developments, but also from within the system. For example, the delta experiences large morphological changes that are difficult to explore even with detailed complex models. In addition, the social system is very dynamic; people migrate or adapt in response to morphological changes or extreme events. This coevolution needs to be captured in the model. We give examples of the complexity and dynamics of the delta and discuss possibilities to capture this in a model.

Keywords: Decision support; uncertainty; data scarcity; Delta; Bangladesh.