The *Quasta* approach
"Exploring new pathways to improve the use of knowledge in sustainability challenges"

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Introduction

Knowledge, information and communication are key factors in sustainable development The challenging process towards sustainable development is a learning process in which researchers participate, as well as stakeholders from civil society and sectoral, governmental segments. In practice, knowledge tends to be fragmented and does not always address the actual problems. Moreover, (sectoral) stakeholders are not always aware of the sustainability problems and this may hamper the legitimacy of decision-making. The developed Quasta approach is aimed to address such knowledge issues.

Decision Support Systems[1]

Decision Support Systems (DSSs) are computer systems aimed to optimise the use of knowledge. In the present research, existing DSSs have been investigated for Integrated Coastal Zone Management (ICZM). The case of ICZM is chosen because sustainability problems in coastal areas tend to be complex and most urgent. It was shown that there is a dichotomy between research-oriented DSS tools that can only be used for well-structured problems and policy-oriented problem structuring tools that lack in analytical value.

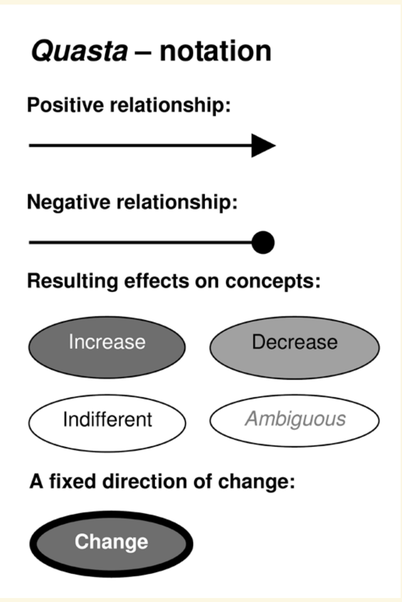

Figure 1. The legenda for Cognitive Maps and Quasta diagrams.

The *Quasta* technique for Cognitive Mapping

Dialogues with researchers, policy-makers and stakeholders may help to address the knowledge issues. *Cognitive Mapping* is a means to facilitate these dialogues, by representing the problems in a comprehensible manner. It is based on cause-and-effect relationships. The formalism of Qualitative Probabilistic Networks (QPNs) allows computer-supported reasoning with Cognitive Maps. The *sign-propagation* algorithm can be used to do so. However, our study has revealed some serious flaws that may occur when using the original algorithm[2]. We identified the causes underlying the problems, and presented an adapted algorithm that repairs the flaws. We also developed an approach for linking the cognitive maps with simulation models[3]. This approach allows *scenario exploration* and simultaneous forecasting and backcasting with any cognitive map. The so-called *Quasta* tool was tested in four workshops in which various sustainability issues were discussed[4]. Results indicate that Quasta is considered a useful tool that helps participants become aware of causal relationships, dilemmas and side-effects.

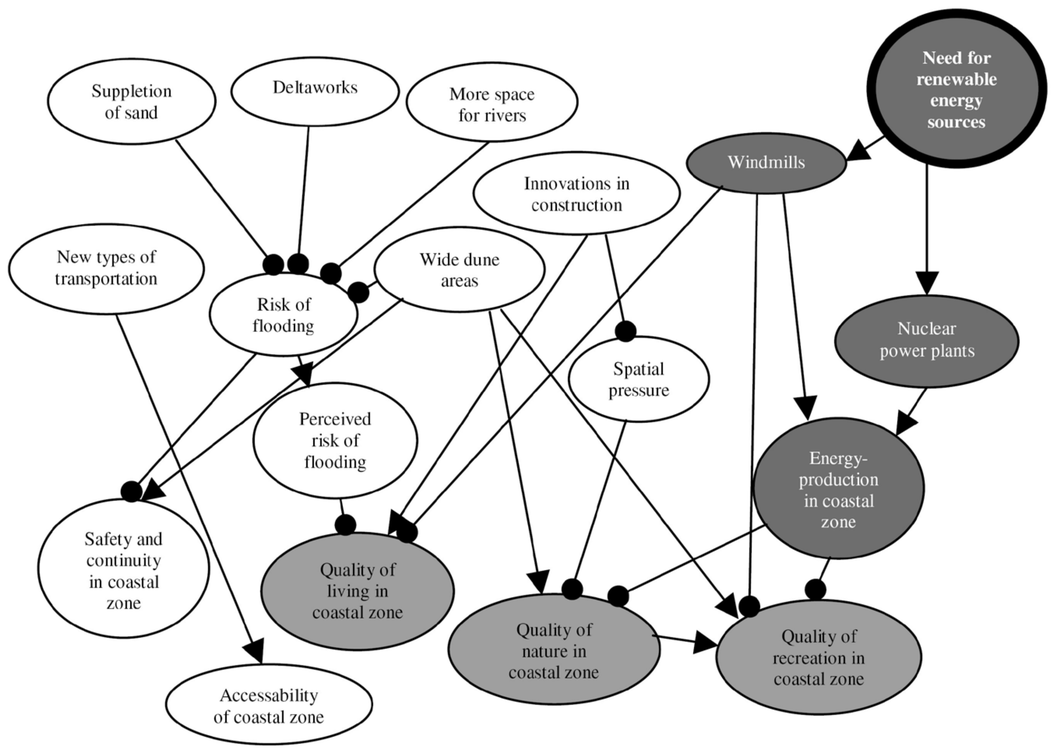

Figure 2. Qualitative scenario analysis with Quasta with some parts of the diagrams as constructed in the workshops. Here Quasta is solely used for forecasting. See legenda above.

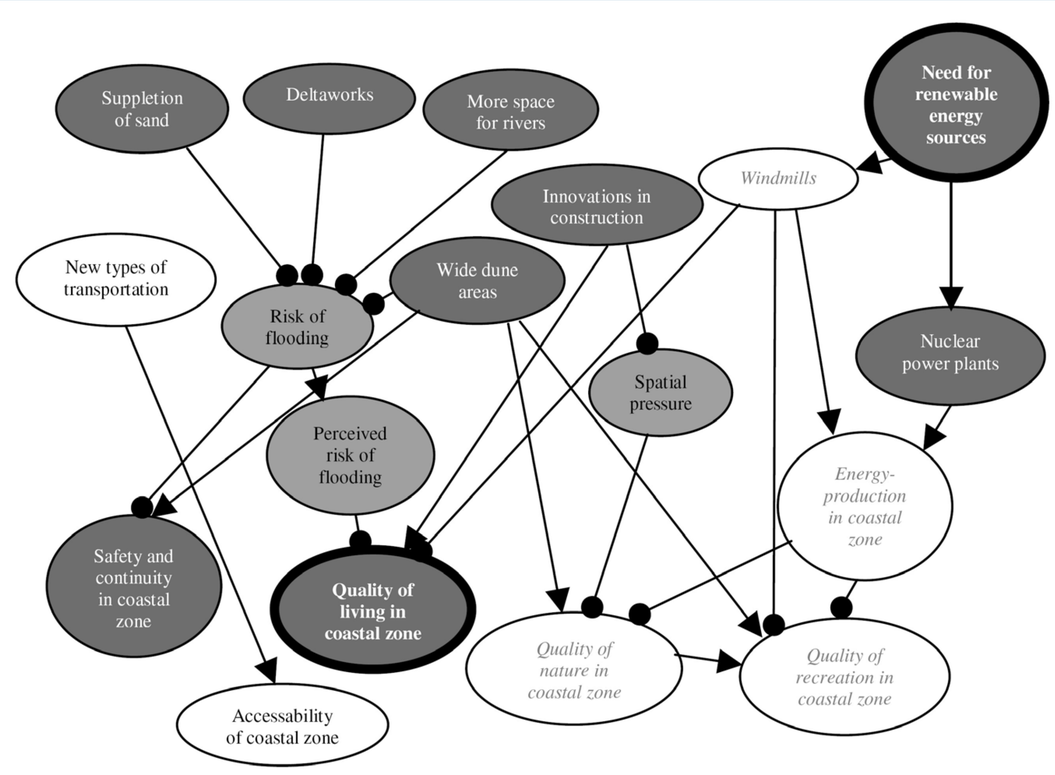

Figure 3: Scenario analysis with the same Quasta diagram as shown left. Here Quasta is used for simultaneous forecasting and backcasting. See legenda above.

Conclusions

Sustainability challenges demand for well-structured dialogues and knowledge exchange between researchers, policy-makers and (sectoral) stakeholders. Existing computer tools are either research-oriented or policy-oriented. In our exploratory research a new approach has been presented, based on the newly developed Quasta tool. This seems a very helpful approach, as it helps stakeholders to grasp the problem structure. More research and practical experiments are required to determine the value of this methodology in the future.

References: [1]Van Kouwen et al, *Coastal Management*, forthcoming· [2]Van Kouwen et al, manuscript submitted· [3]Van Kouwen et al, manuscript submitted· [4]Van Kouwen et al, Environment and Planning A, forthcoming.

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