THE CHALLENGE

Various United Nations agencies, along with many individual nations, local governments and corporations have now adopted sustainable development as an overarching goal of all economic and social development. Viable decisions based on economic, social and environmental considerations of the present and the future will accordingly be necessary. Great uncertainty is surrounding the decisions UWS executives and managers are called to make. Decision-makers of various levels of UWS management have indicated that they are more willing to trust models and other decision-support tools if they are presented to them accompanied by the appropriate uncertainty analyses. Accordingly, “adaptive management” is widely considered to be the best available approach for managing biological systems in the presence of uncertainty.
THE PROJECT

To support in these challenges, adequate methods and tools are needed, with a leading role to be played by science and research. Nevertheless, the tools presented in scientific literature are not always in a meaningful format and language for managers looking to implement them into real-life decisions. The concept of decision support aims to facilitate this communication by integrating and synthesising outputs from diverse tools and indicators into easily understandable and transferable output for decision-makers. The objective of this project is to describe a conceptual framework to support decision-makers of the UWS in the assessment of the environmental and socio-economic impacts of UWS planning decisions in a methodical and coherent manner.

RESULTS

A conceptual framework has been developed to support the decisions of UWS executives and managers. The framework represents a coherent method for decision-support, using indicators to integrate social, environmental and economic impacts of UWSs. The uncertainty surrounding each decision is also addressed by investigating the variability of factors and parameters relevant to each stage of the framework (context uncertainty), and including an uncertainty analysis of valuation assumptions (valuation uncertainty). The framework has been applied on a real UWS case study.

Within the project and to support the framework development, other studies have been implemented:

- Investigation of indicators of social acceptance and social benefits arising from the sanitation service.
- Integration of indicators of environmental impacts and societal preferences.
- Investigation of sensitivity and uncertainty of different context and valuation factors of the UWS context.

APPLICABILITY AND POLICY IMPLICATIONS

There is an apparent inadequate application of models and decision-support tools in practical issues faced by decision-makers, recognised by both the scientific community and policy makers. The project produced a framework to support decision making by executives and managers in the context of UWSs. As water managers and policy makers have indicated their need for methods that integrate ecology, economics, social, physical, chemical and biological impacts of water and wastewater, the framework represents a coherent method to integrate such aspects. The principal stages of the framework and its sequential nature intend to emulate the order real-life decisions in UWS are and should be made and thus involve different decision makers at each step. This classified architecture of decision support also facilitates tackling specific concerns relevant to the decision maker of each stage of the planning and designing process.

BENEFITS

This project provides support for the assessment of competing measures that current and future UWS challenges demand by:

- Integrating various socio-economic and environmental aspects related to each decision.
- Integrating various tools and methods to facilitate comparison.
- Attending to the needs of decision-makers at different levels of UWS management, that have diverse objectives and challenges.
- Providing coherent and concise methods to address system (context) uncertainty and uncertainty regarding valuation.
- Serving as an intermediary tool between the available and developing technology, models and indicators and the potential end-users.

METHODOLOGY

The project has first conducted a preliminary bibliographic review on tools, methods and indicators used to support decisions for UWSs. Typical scenarios and problems that the integrated management of UWSs is facing have also been identified, based on literature and full-scale systems.

For the purposes of application of the framework to a specific full-scale UWS case study:

- An integrated UWS model has been developed in the modelling software WEST®, comprising of the catchment, sewer system, wastewater treatment plant and river.
- The model has been calibrated using hydrologic, climatic, population, operational and hydraulic information and data.
- Scenarios and settings to study the current and future uncertainty in the context of the system have been developed for the case study.

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