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An approach to develop decision support tools for the management of coastal lakes

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Abstract: The coastal zone of New South Wales (NSW), Australia is a highly valued for its economic, social and ecological resources. The long term sustainability of these resources depends upon a delicate balance in land and water activity within the catchment. However, an increase in urban development and tourist activity, an intensification of agriculture practices and a greater recognition for environmental and cultural conservation are increasing competition for resources. Thus an integrative approach is required to manage the emerging conflict. A decision support tool was developed for eight coastal lakes in NSW, to assist in their sustainable management. The Coastal Lake Assessment and Management (CLAM) tool allows users to predict the potential impacts of various management decisions on the economic, social and ecological resources valued by the community. Examples of management decisions, or scenarios, include approving new urban developments and remediating riparian zones. Community values could be visual amenity, costs to local government, and/or threatened species. Specific scenarios and values were identified through consultation with the local communities for each lake. The CLAM tool can be used to assess the trade-offs from single management decisions, but can also evaluate the impact from cumulative management options to assist in strategic planning. The interaction between the economic, social and ecological values identified by the community were integrated using a Bayesian Decision Network (BDN) approach. This method was selected because it enables the efficient representation of social, economic and ecological values that may operate at a range of scales, and enables both quantitative and qualitative data (i.e. data analysis, model simulation results and expert opinion) to be utilised. The uncertainty of the model input data and output results is inherently presented as a probability distribution, so the user is able to make a valued judgment on the reliability of the model information before using it to inform a decision. The BDN framework is nested into an easy-to-use software interface. The model and software was developed and tested in conjunction with the local stakeholders, and to date has been well received. The advantages noted by the users include justification for decisions (e.g local government planners are now able to assess the environmental impacts of urban development applications) and public education on the catchment system.