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# Iterative Discovery: a Method for Discovering Feasible Interventions and Targets Conjointly Using Uncertainty Visualisations

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## Abstract:

Making environmental management and policy decisions is a complex and difficult task when the problem of interest encapsulates pervasive complexity, dynamism and uncertainty. One category of environmental decision making problems may be referred to as “Planning refinements with difficult-to-define objectives”. By our definition, such problems have the following characteristics:

- a current management intervention is already in place, which is known to have limitations, none of which are considered pressing;
- there are significant uncertainties in the systems and models;
- management targets are too complex to satisfactorily explore with optimization tools;
- management targets need to be set that are dependent on what can be achieved, because trade-offs (e.g. biophysical, socioeconomic, policy) mean that the ideal outcome is not achievable.

This talk presents a recently published generic method, referred to as Iterative Discovery, where the aim is to plan refinements to management interventions with difficult-to-define objectives, often due to system uncertainties and diverse stakeholder positions. The method is initiated by evaluating a scenario describing the current-best intervention. This provides the starting point for three evaluation cycles, focusing on model assumptions, alternative interventions and management targets. The outcome of this method is a list of management targets that can and cannot be achieved, the potential interventions that correspond to these targets, and the assumptions and uncertainties associated with these interventions. This method is applied to a case study for environmental flow management in the Macquarie Marshes, Australia. We identified feasible management targets based on ecological outcomes in flood suitability across different locations, climate conditions and species, and the suitable environmental flow volumes that correspond to these targets.

**Keywords:** uncertainty; environmental management; visualisation; decision making