



fact sheet

knowledge for managing Australian landscapes

Supporting decisions: understanding natural resource management assessment techniques

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Background

Problems of land degradation, pollution and resource scarcity are presenting communities, individuals, companies and governments with difficult decisions. The decisions can have far-reaching effects and are exceedingly complex, given both the quantity and quality of the information base on which the decisions have to be made.

An increasing number of decision support techniques have been used to help decision-making. However many decision-makers are unsure of which particular method to use, how to apply the technique and how the method might bias the results.

This project summarises the strengths and weaknesses of methods of decision support techniques for natural resource management (NRM) decisions to assist decision makers.

Objectives

1. To explain the workings of the more significant (representative) methods of NRM decision support (including the latest developments);
2. Discuss how these decision support methods may influence the outcome of NRM decisions; and
3. Provide practicing NRM decision makers with guidance for choosing which methods to apply.

Approach to the project

The researchers conducted literature searches and used their own experience to develop the discussion of the range of decision-support tools.

Chapter 1 discusses the elements of NRM decisions and seeks to describe the characteristics that define them. The major types of NRM decision problems are categorised and used later in the analysis to describe the strengths and weaknesses of each decision tool. Since all NRM decisions require an



estimate of the value of various environmental assets, chapter 2 reviews a range of approaches to valuing the environment, from standard economic approaches to Indigenous valuations.

Having set this background and context for NRM decisions, the next three chapters review a range of analytical decision-support techniques. Chapter 3 reviews benefit-cost analysis, chapter 4 reviews multiple criteria analysis, and chapter 5 reviews other analytical techniques, including energy analysis, ultimate environmental threshold analysis, planning balance sheets and the environmental evaluation system.

In each chapter the following questions are addressed:

- What are the major stages involved in applying the technique?
- How does the technique work?
- How does the technique influence a NRM decision?
- How can the technique bias a NRM decision?
- What are the technique's major strengths and weaknesses?
- What is the frontier of research for the technique?

Following this discussion and analysis, the policy frameworks operating in Australia within which NRM decisions are made, are analysed in chapter 6. In particular, environmental impact assessments, social impact assessments, urban and regional planning, risk assessment, life cycle assessment and citizens' juries are discussed. The chapter reviews how such assessments affect NRM decisions and how these processes relate to analytical decisions support techniques.

The final chapter integrates the discussions of the previous chapters and addresses the following four key questions.

1. How are the frameworks and techniques presented classified?
2. Which approaches are applied for different NRM decision types?
3. Does any one approach dominate?
4. What are the limitations of decision support?

Key findings

Characteristics of NRM decisions

Natural resource management decisions are made by many institutions operating at many different levels, including the private sector, all levels of government, and community groups. In making such decisions they often face uncertainty, potential for irreversible outcomes, multiple objectives, multiple stakeholders and intangible outcomes.

Decisions are classified into the following four types.

- **Prioritisation** - for example, choosing between two or more projects for investment.
- **Allocative** - for example, determining the most appropriate investment contributions.
- **Threshold** - for example, determining particular quality standards.
- **Binary** - for example, deciding whether to proceed with a development or not.

The researchers developed an overarching generic model of NRM decision making based on a rational decision-making model of:

- identifying objectives;
- identifying alternatives;
- measuring the performance of the alternatives against the objectives;
- evaluating the alternatives; and
- making a final decision.

Recognising that a uni-directional, rigid and highly structured model is not applicable in NRM decisions, their model follows the same general steps as the rational decision-making model but introduces iteration and feedback loops between the stages in the decision. The model also recognises that additional information becomes available during the decision making process, further complicating the process.

The stages in the model are

- identification of objectives;
- definition of problem;
- identification of alternatives;

- filtering process to short list alternatives;
- in-depth analysis;
- draft recommendation;
- impact assessment;
- final recommendation;
- satisfaction with results; and
- binding decision.

At any stage, additional information may be fed in that involves another round of analysis.

The researchers identify stages within this framework where the various techniques that have been analysed may be most useful. The community based resource management framework means that quantitative and qualitative aspects need to be investigated. They conclude that no single decision-making technique will provide the best analysis of a particular NRM decision, but that combinations of techniques will assist decision makers.

In general terms, the researchers suggest that analytical techniques will support political and social decisions by evaluating the economic implications of decisions. Thus, the range of policy framework processes will assist in setting the broad agenda and the efficiency and benefit cost issues can be addressed through the analytical decision-support techniques.

Implications for policy makers

The strengths and weaknesses of the various decision-support techniques are detailed in the paper. It is important that all groups setting NRM policy be aware of the assumptions behind the techniques they use and recognise that a combination of analyses will contribute to better decisions.

All groups faced with making NRM decisions must realise that ultimately these decisions are political and social judgments, and that while economics can play an invaluable role in determining the efficiency of particular courses of action, it cannot always assist with the key decision.

Since political, social and economic factors will influence NRM decisions, it follows that decision-support techniques that enable all factors to be analysed and discussed in a transparent way are necessary.

Implications for advisory & community groups

Advisory and community groups need to be aware of the same issues as policy groups. This report provides information that can be used to judge what decision making techniques are appropriate. The report makes clear that the use of single tools or approaches may result in an incomplete analysis of the issues.

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