



# Psychological values and cues as a basis for developing socially relevant criteria and indicators for forest management



R.M. Ford <sup>\*</sup>, N.M. Anderson, C. Nitschke, L.T. Bennett, K.J.H. Williams

*School of Ecosystem and Forest Sciences, The University of Melbourne, VIC 3010, Australia*

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## ABSTRACT

Criteria and indicators (C & I) have proven an essential tool for managers implementing sustainable forest management, but have been less effective for communication with the wider community. We demonstrate a new bottom-up approach to developing socially relevant C & I using social analysis and psychology-based concepts and methods. Our conceptual framework links the concepts of valued attributes and environmental cues with, respectively, criteria and indicators. We illustrate our approach using thirty-six semi-structured interviews of individual members of the general public and of stakeholder groups in Victoria, southern Australia. The interviews included a modified cognitive mapping task to identify attributes of forests valued by the interviewees, as well as cues used by them to know if a valued attribute was present or had changed. Seven broad valued attributes of forests were identified: Natural; Experiential; Productive; Setting; Social/Economic; Learning; and Cultural. Four broad categories of cues were identified: Biophysical; Social/Psychological; Economic; and Management/Planning. Cues were translated into a set of measurable 'socially relevant' indicators of forest management. Comparison with existing frameworks revealed some similarities, but that an important component of public evaluations, Experiential and Setting valued attributes, was largely absent from C & I used in Victoria, which are based on the Montreal Process framework. Some socially relevant indicators aligned with existing indicators, but others were poorly represented, particularly sensory indicators that are concerned with subjective experiences of forests. Our approach demonstrates a new way of developing C & I and has a strong conceptual basis that enables more explicit consideration and communication of a comprehensive range of social values and cues in environmental management systems.

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## 1. Introduction

In sustainable forest management (SFM), criteria and indicators (C & I) are typically used to represent both the scientific understanding and the multi-faceted social expectations of forest systems. SFM has been represented by C & I that have various policy purposes, particularly monitoring and reporting of progress towards defined SFM goals (Department of Sustainability and Environment, 2006; Howell et al., 2008). In practice, such frameworks help to distil and define what is important in forest management, and it is thus relevant to ask whose views and values they represent. SFM, as a broad paradigm in forest management, incorporates the idea that management should respond to values for forests held by diverse individuals and groups in society (Hickey, 2008; Lane and McDonald, 2002), including the more intangible human values for forests like aesthetic, cultural and intrinsic values. But while the aim of managing forests for salient social values seems to be commonly recognised (Cashore, 2009; O'Brien, 2003; Trainor, 2006),

the relationships between C & I frameworks and public values are rarely explicitly stated, and efforts to integrate those values are 'only beginning to take form' (Berninger et al., 2009). This has led to calls for research that more explicitly seeks to align SFM C & I with public values and interests in forests (Chandran and Innes, 2014), and that aids the development of C & I as tools for communication with the wider community (Chandran and Innes, 2014; Howell et al., 2008).

Psychological concepts and approaches, when combined with ecosystem sciences, can provide insights into the ways humans experience environments that can significantly enhance environmental management (Bengston, 1994; Endter-Wada et al., 1998). Psychological concepts of value can be used to identify what people consider to be important about environments (Ford et al., 2009; Reser and Bentrupperbaumer, 2005), which can inform priorities, objectives or criteria for management. Similarly the psychological concept of 'cues', described as elements in the environment that are closely linked with human knowledge systems (Golledge, 1992; Steg et al., 2013), can inform the development of indicators. Indicators allow broad inferences to be made about complex systems from relatively simple measurements (Heink and Kowarik, 2010; Niemeijer, 2002) and people use

<sup>\*</sup> Corresponding author.

E-mail address: [fordr@unimelb.edu.au](mailto:fordr@unimelb.edu.au) (R.M. Ford).

cues in a similar way, as reference points around which they gain a more general sense of their environment (Weick, 1995). We thus see considerable, but so far unrealized, potential for using the cue concept to design indicators that effectively convey information to lay audiences. Psychological approaches have been applied to the study of environmental values (Ford et al., 2009; Reser and Bentrupperbaumer, 2005) and to the development of indicators of visual components of landscapes (Ode et al., 2009; Ode et al., 2008), but to our knowledge they have not previously been used to develop C & I of environmental management.

There is a wide array of approaches for developing C & I. One important contrast is between top-down and bottom-up approaches (Fraser et al., 2006; Khadka and Vacik, 2012). Top-down methods are typically led by experts, based on scientific concepts or data availability considerations (Niemeijer, 2002). Bottom-up approaches incorporate the views of a broader range of stakeholders or the general public (Berninger et al., 2009; Doody et al., 2009; Fraser et al., 2006; Khadka and Vacik, 2012) and are considered more likely to identify public values and to produce measures that resonate with non-experts (Hawshaw et al., 2007). Bottom-up approaches rely on social data to understand stakeholder or public perspectives, and this can be achieved through two methods: public involvement or social analysis (Endter-Wada et al., 1998). Social analysis is a research driven process, usually designed to systematically include the range of views of the general public (e.g. Doody et al., 2009), whereas public involvement approaches tend to incorporate a narrower set of views of interested stakeholders who directly influence indicator choices among other management-related decisions (e.g. Fraser et al., 2006). While public involvement approaches have certainly identified more comprehensive sets of indicators than is possible with top-down approaches, and often empower participants in decision-making, the results can be very localized (Fraser et al., 2006). Social analysis approaches provide a more systematic and conceptually rigorous way of capturing data from a broader population, and so have potential to further broaden the range of values incorporated in C & I sets.

The top-down approaches typically used for defining SFM criteria have arguably limited the inclusion of social values in SFM frameworks. For example, the Montreal Process criteria (Montreal Process Working Group, 2009) currently used by countries such as Canada, New Zealand and Australia were developed in 1995 by a small group of people with training and interests in forest management (Gale and Cadman, 2014). Similar criteria are used within the European Union and the International Tropical Timber Organisation (McDonald and Lane, 2004). In practice, there are tensions between these top-down frameworks, which enable standardized reporting internationally, and reporting needs at local or regional scales where social values tend to vary from place to place (Hickey and Nitschke, 2007; Khadka and Vacik, 2012). In Australia this is managed by allowing some limited variation in indicators at regional scale in consultation with stakeholders (Chandran and Innes, 2014; Howell et al., 2008). A further consequence of the origins of SFM frameworks in forest science is that the development of social indicators has lagged behind that of the economic and biophysical ones (Hawshaw et al., 2007). For example, it has been noted that forest aesthetics, an important way that members of the general public experience forests, has largely been absent from a range of SFM management tools (Sheppard, 2004). Thus, while there is some desire to adapt the Montreal framework as applied in Australia to improve communication with the general public (Howell et al., 2008), questions remain in relation to whether existing C & I will reflect and represent the full range of values of a lay audience.

We use the south-eastern Australian state of Victoria as a case study to demonstrate a new approach for developing C & I. Here, the state government has responsibility for the sustainable management of the majority of public land (including production forests, national parks, urban parks and many coastal areas), and has recently emphasized the importance of integration of community values in policy and planning to help establish management priorities (State of Victoria, 2012).

Forest management in Victoria involves a diversity of landscapes and potentially contentious issues (McDiarmid, 2011). For example, there is ongoing public debate about the appropriateness of timber harvesting in productive eucalypt forests that also provide habitat for endangered fauna (Lindenmayer, 2003). In this context, we developed a social analysis approach to articulate lay perspectives of forests and to identify socially relevant C & I for SFM. Using psychology-based concepts and methods, we identified attributes of forests that are valued by the public, and the cues people use to assess these attributes. We then evaluated the degree to which the C & I applied in Victoria (based on the Montreal Process) aligned with these attributes and cues. Our principal aim in this paper is to demonstrate an approach for developing C & I that is: i) conceptually sound; ii) represents a broad range of public values in forest management; and iii) can facilitate effective communication of environmental outcomes with both managers and the public.

## 2. Methods

The approach outlined here integrates psychology, ecology and policy to identify socially relevant criteria and indicators through a three-stage process (Fig. 1). In the first stage, a conceptual framework linking concepts in social and environmental psychology (value and cues respectively) with management concepts (C & I) was developed. Language is important in interdisciplinary research (Bracken and Oughton, 2006), and we used key terms such as 'values' and 'indicators' as boundary objects to facilitate translation between ecological, psychological and policy understandings of SFM (Heink and Kowarik, 2010). Such terms are recognizable within more than one field of knowledge, but different disciplines have subtly different understandings, which might not be evident beyond that discipline unless they are clearly articulated (Bracken and Oughton, 2006). For example, 'values' is used generally to indicate that something is important or preferable across environmental policy, psychology and economic domains, but precise meanings differ markedly (Brown, 1984; Reser and Bentrupperbaumer, 2005). In our research process, common understanding of key concepts was developed through iterative conversations within the research team (including expertise in environmental and social psychology, forest ecology, and forest policy), which led to the development of an agreed conceptual framework.

While we sought to connect disciplines in the conceptual framework, the primary investigation of values and cues in the second stage of the research was by methods commonly used in social psychology. Values related to environmental management have been studied from a number of perspectives including using economic (Brown, 1984),

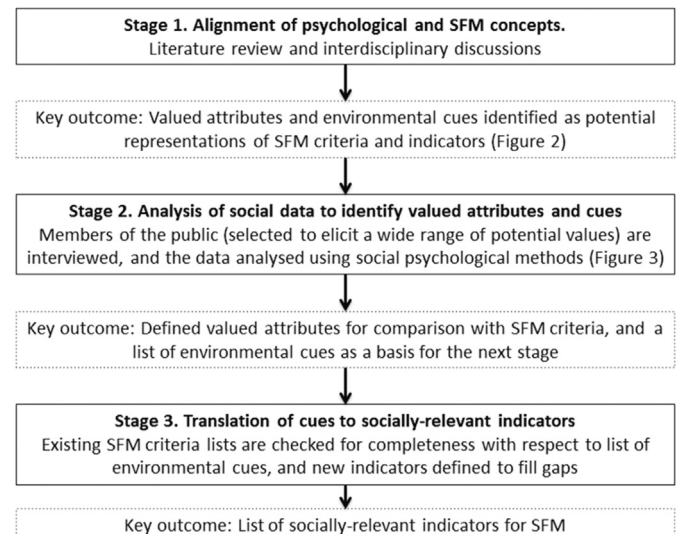


Fig. 1. Summary of the approach used to develop measurable socially relevant indicators.

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