Opportunism, Threats, and the Evolution of Systematic Conservation Planning

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Introduction

Systematic conservation planning (Margules & Pressey 2000) is approaching its 25th birthday (Pressey 2002). The field has produced many hundreds of scientific publications. More important, its science is increasingly influencing the decisions of organizations (Groves et al. 2002), shaping legislation and policy (Environment Australia 2001; Reyers et al. 2007), and achieving results on the ground and in the water (Finkel 1998; Pressey 1998; Airame 2005; Fernandes et al. 2005). There is, of course, much room for improvement, but systematic conservation planning is progressively expanding its scope and perspectives and becoming more effective at synthesizing lines of thought that were previously poorly connected.

A recent paper in this journal (Knight & Cowling 2007) documents some of this progress. The authors' main argument, with which we agree, is that conservation scientists should better understand and respond to opportunities for action. In the process of making their case, however, they have muddied the water on three issues to the extent that clarification seems warranted. First, we question the accuracy and utility of discounting the contributions to real-world conservation of scientists who "typically pursue quantifiable certainty" and distinguishing that group from "those . . . involved in pragmatic real-world conservation planning," among whom we count ourselves. We offer instead a model of conservation planning that attempts to integrate diverse disciplines and activities into a single, comprehensive process. Second, Knight and Cowling conflate 2 very different meanings of the term *opportunism* that must be distinguished. One is the political and organizational opportunism that leads to residual reservation (Pressey et al. 2000). The other is the obvious need for informed opportunism (Noss et al. 2002) that balances biological priorities with opportunities for action. Third, we question Knight and Cowling's notions that explicitly considering threat in conservation planning unnecessarily emphasizes obstacles to conservation action or "shackles conservation planning with a negative perspective."

More Evolution than Revolution

People working on systematic conservation planning constitute a broad church. Some individuals have skills that range from technical to political. Some technical specialists directly influence policy and action or collaborate with people who make conservation happen on the ground, and these successes are only rarely reported in the scientific literature. Moreover, although one should not underestimate the importance of addressing the implementation crisis (Knight et al. 2006), there remain unresolved technical problems that, if solved, could help practitioners enormously. Recent examples are influential planning software (Possingham et al. 2006), statistical methods to promote real-time negotiation among stakeholders (Ferrier et al. 2000), and new analytical methods used by large organizations (Murdoch et al. 2007). Recent advances from people pursuing quantifiable certainty also underpin some of the approaches described by Knight and Cowling as necessary to make conservation planning more effective. This all indicates to us that the pragmatists are difficult to separate from the rest. Polarizing kinds of conservation science and discounting the real-world contributions of technical specialists (see interviews by Marris 2007 for more examples) are neither accurate nor necessary to underscore the urgency of expanding conservation planning to better deal with the complexities and uncertainties of implementation.

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Gaps between analyses of biological data and real-world conservation have become less distinct through time. The technical aspects of scheduling incremental conservation action during the process of implementation first emerged in the literature in the 1990s (Pressey et al. 2004). An initial framework for the process of systematic conservation planning (Margules & Pressey 2000) showed how this aspect of implementation related to other tasks. An improved version of this framework made explicit the need to address socioeconomic considerations at the outset (Cowling & Pressey 2003). This formalized what many conservation scientists had previously understood—the importance of engaging the right people not just in spatial decisions but throughout the planning process. In Australia there are several earlier examples of systematic planning that engaged stakeholders to effectively implement scientific conservation plans. These include the reservation of Kirkpatrick's (1983) selected areas in Tasmania (Pressey 2002), the Regional Forest Agreement process in New South Wales that began in 1995 (Pressey 1998), and the expansion of no-take areas in the Great Barrier Reef Marine Park, planning for which commenced in 1999 (Fernandes et al. 2005). For some time, conservation planners have been doing what Knight and Cowling say we must do. Granted we must do it better, but the last decade, in particular, has seen progressively more integration of social, economic, and political considerations with the technical aspects of analyzing data on biodiversity.

The process of integration continues. We have a project underway for the IUCN's (World Conservation Union) World Commission on Protected Areas and Species Survival Commission to integrate ideas and techniques from regional planning approaches from around the world. Building on earlier frameworks, we describe 11 broad stages, each of which can be unpacked into steps that indicate tasks or decisions for planning teams to consider (Fig. 1). Our draft framework illustrates several points relevant to the concerns of Knight and Cowling. First, the 6 technical stages described by Margules and Pressey (2000) are now preceded by 5 new stages, 4 of which deal with the social, economic, and political context for the later, mainly technical tasks. Second, none of the earlier stages are missing from the new framework. Conservation planning has grown by becoming more inclusive, moving forward by standing on previous work rather than discounting it. Third, some stages are particularly concerned with aspects of implementing conservation action (Fig. 1). We have expanded our draft lists of steps for 2 of these stages to emphasize the diversity of tasks and decisions involved. They range from nonspatial, consultative activities (e.g., step 3.6) to spatially explicit analyses in decision-support software (e.g., step 10.7). Fourth, the framework is a tightly integrated blend of highly technical, biological science, and contributions from many other disciplines. It illustrates how technical specialists can and do contribute to real-world conservation as members of the multidisciplinary teams and communities of practitioners that are becoming increasingly common in planning exercises.

One Kind of Opportunism?

The opportunism referred to in early work on systematic conservation planning, and by Knight and Cowling in their introductory text, reflects a worldwide tendency for conservation reserves to be residual to extractive uses (Pressey et al. 2000; Scott et al. 2001; Rouget et al. 2003). A major reason for this tendency is political pragmatism or the "art of the possible," selling hectares as conservation gains to constituents who are mostly undiscerning about biodiversity and what is needed to promote its persistence. Residual reservation focuses on the less threatened areas in Fig. 2. One outcome is that places and biodiversity features most in need of protection do not receive it. Moreover, each additional residual reserve gives the misleading impression of conservation progress but entails the irretrievable opportunity cost of further loss of biodiversity that needs protection but has not received it. At its worst, this could be termed "uninformed opportunism" (Fig. 2) that simply ignores biodiversity values. This is not something conservation planners should be embracing. It remains the nemesis of conservation initiatives and is justifiably something scientists should move beyond, while understanding its motivations and ways of minimizing its effects.

Nonetheless, anyone who thought that systematic methods were a "panacea" for this problem (Knight & Cowling) must be disappointed. The economic and political drivers of uninformed opportunism remain powerful. In Australia, for example, the big conservation battles and the most extensive real gains (increasingly made on the basis of systematic methods) have been at the margins—in publicly owned forests and coastal zones affected by logging and sand mining (Pressey et al. 2000) and in the sea (Fernandes et al. 2005), where there are negotiable use rights but no private property. To one side of these battles, in strongly residual landscapes, there have been easier and more extensive, although less meaningful, expansions of reserves. To the other side, in privately owned areas with potential for agricultural and urban development, gains have been modest, at least in extent, although not necessarily in importance for biodiversity.

Conservation planning has not "come full circle" (Knight & Cowling 2007) on the issue of opportunism. With the evolution of the field (Fig. 1) has come a growing realization that quantitative priorities must be tempered with consideration of opportunities for action, but this is not a new concept. Kirkpatrick's (1983) pioneering analyses were eventually implemented because he knew how

Figure 1. An evolving framework for conservation planning with 11 main stages. Text under the heading for each stage summarizes the main issues to be addressed (see Margules & Pressey 2000; Cowling & Pressey 2003 for more detail on most stages). For convenience, the process is depicted as a linear sequence, but in reality some stages will be undertaken simultaneously and there are many feedbacks from later to earlier stages. Among the reasons for feedbacks are revisions of earlier steps to deal with surprises, including unexpected opportunities. The dashed rectangle contains the stages described by Margules and Pressey (2000). Shaded stages are particularly important for implementation of conservation action. Shown on the right are the steps involved in stages 3 and 10.

to apply his science in a political context (Pressey 2002). Successful applications of systematic methods in Australia (e.g., Pressey 1998; Fernandes et al. 2005) involved tactical departures from quantitative priorities during negotiations with multiple stakeholders. None of this involves embracing uninformed opportunism. The informed opportunism of Noss et al. (2002), advocated by Knight and Cowling (2007), is quite different. It reflects a balance between, on one hand, priorities based only on the persistence of biodiversity and, on the other hand, the need to consider the real-world opportunities and constraints that affect conservation actions. One extreme interpretation of quantitative priorities (Fig. 2) would be to withhold conservation resources until the highest priority areas, in the top right of the graph, became available. Another extreme interpretation would be to protect any areas that became available, regardless of their priority. Informed opportunism lies between these extremes (Fig. 2), “taking advantage of conservation openings as they arise, but with explicit recognition of the trade-offs involved” (Noss et al. 2002). It acknowledges that “the best may be the enemy of the good” (Game & Peterken 1984) and steps

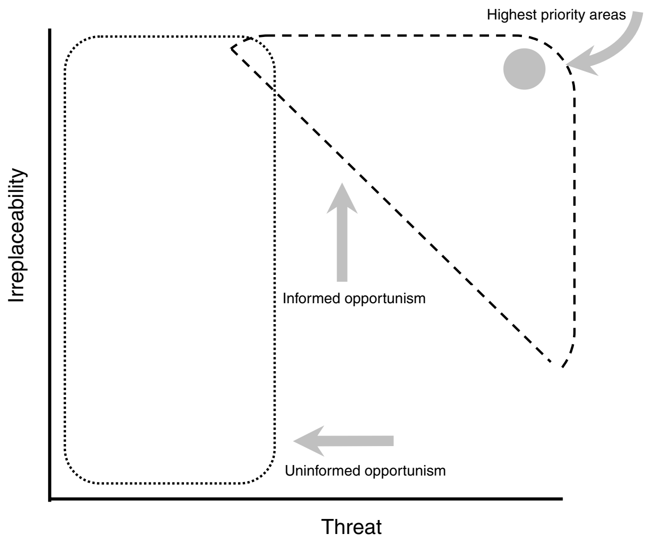

Figure 2. A framework for identifying conservation priorities. Both the irreplaceability of areas and the threats they face can be measured, allowing potential conservation areas to be located as points in this 2-dimensional space. Highest priority areas are in the top right of the graph (see Pressey et al. 2004 for review and rationale), although these might not be available for conservation action at any particular time. Informed opportunism involves tactical departures from highest priorities to take advantage of opportunities for conservation action. Further work is needed to identify the exact size and shape of this domain, and these are likely to vary between regions. Uninformed opportunism selectively "protects" areas with lowest threat and least potential for extractive uses.

away from a theoretically optimal outcome to improve actual outcomes.

Explicit approaches for finding these compromises are only partly developed. The importance of finding them is underscored by the need for systematic conservation planning to better deal with strongly contested circumstances—productive private land being a sobering example (Pressey et al. 2000; Murphy & Noon 2007)—where conservation gains have been limited. Part of the solution is certainly more and different information (Knight & Cowling 2007) and part is bridging the divides between technical specialists and decision makers (Roux et al. 2006). Another part is for planners to become better at moving from "knowable" to "complex" domains (Kurtz & Snowden 2003), where they must be alert for and adaptable to unpredictable events. Yet another part involves structured use of expert judgment. Experts, far from being "much maligned" (Knight & Cowling 2007), have been recognized as essential in complementing the limitations of databases used for systematic planning, especially when it comes to issues around implementation (Noss et al. 2002; Cowling et al. 2003; Wilson et al. 2005). Experts have also been closely involved throughout exercises in systematic conservation planning that have been successfully applied (e.g., Pressey 1998; Fernandes et al. 2005).

Dealing with Threats as Well as Opportunities

Informed opportunism involves looking for opportunities without losing sight of threats. Whether threats are perceived as obstacles, and the extent to which threats are negatively conveyed to managers and others, depend on the inclination and skills of the planning team. It is also likely that different groups of stakeholders will be involved in identifying threats and opportunities. How should these different kinds of information be combined? A starting point is to consider why threats can guide decisions about conservation priorities. As well as informing the whole process of conservation planning (Fig. 1; Wilson et al. 2005), threats are a key factor in scheduling conservation action after the design of a regional conservation plan. Scheduling is necessary because of a pervasive predicament of conservation planners: conservation action is typically incremental because of limited resources and is accompanied by ongoing loss of biodiversity. Measuring priority of areas by combining a measure of conservation value (how much we stand to lose) with a measure of threat (how likely we are to lose it without intervention) (Fig. 2) involves a prediction about scheduling (Pressey et al. 2004). The prediction can be stated as follows: the extent to which conservation objectives are compromised by ongoing attrition of biodiversity will be minimized if priority for protection is given to areas with highest irreplaceability and highest threat (those in the top right corner of Fig. 2). On the basis of land-use simulations, this prediction seems to work (Pressey et al. 2004).

So, is it sufficient to define conservation priorities only in terms of irreplaceability and threat? Certainly not. The general need for biological priorities to be assessed in a sociopolitical context has long been recognized (Vane-Wright 1996). Specific improvements to the irreplaceability-threat approach are being developed, including ways of incorporating biodiversity processes (Pressey et al. 2007) and measures of condition or integrity (Linke et al. 2007). Among the other issues needing attention are the application of alternative conservation actions (Wilson et al. 2007) and assessment of their appropriateness and feasibility in different circumstances; variable costs of conservation in relation to different actions and levels of threat; and uncertainty about achieving objectives (McBride et al. 2007). Improved scheduling strategies that account for these additional variables are being developed collaboratively between technical specialists and practitioners.

Another necessary improvement to scheduling is to move informed opportunism (Fig. 2; Noss et al. 2002) from a concept to an operational tool. Quantitative methods have laid some of the groundwork for considering opportunities in identifying priority conservation areas, at least in terms of their availability for conservation action (e.g., Game & Peterken 1984; Costello & Polasky 2004; Meir et al. 2004; Haight et al. 2005). Notably, these studies recognize that conservation opportunities can and should be explored while still acknowledging threat as a key consideration. Anthropogenic threat reflects real conflicts between biodiversity conservation and the needs and aspirations of people. These conflicts will expand and intensify, not diminish. Advancing conservation is partly about building the capacity for implementation through a better understanding of how the human world works. That might reduce, but not eliminate, conflicts. Advancing conservation is not about losing sight of priorities for protection, which are always informed by threats. Moving from "crisis to informed inspiration" (Redford & Sanjayan 2003) in conservation biology involves several kinds of knowledge, including clear perceptions of threats and effective ways of responding to them. Otherwise, our inspiration will not be informed.

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