

Towards a close integration of social and natural sciences

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Abstract. Interdisciplinary teams are now commonplace in natural resource research centers. The evolution from pure biologists to a systems approach with ecologists and later on, social scientists and geographers reflects our understanding that no natural environment is exempt from human impacts; to protect the natural environment we must incorporate the human dimensions within the environment. Whilst conceding that interdisciplinary research is vital to the conservation of natural resources, I review our state of knowledge on interdisciplinary research and identify several barriers to successful integration. To address these, it is necessary to first articulate and understand these barriers. Only then can they be identified as they arise between researchers and successfully overcome in order to achieve sustainable natural resource management. This paper identifies four major barriers that hinder efforts at successful integration of social and natural science. These are (i) differences in epistemology, (ii) the place and hierarchy of each science within the wider community, (iii) researcher time constraints and (iv) publication pressures. The paper also provides a list of recommendations to overcome these issues in order to guide researchers through the challenges of producing integrated, quality, outcome driven research that serve both the community and the natural environment.

Key words: Interdisciplinary research natural social science

Introduction

A cursory glance at some of the major natural resource research centres around the globe reveal a trend towards interdisciplinary research teams. One example of this trend include the Australian Centre of Excellence for Coral Reef studies, which employs ecologists, biologists, geneticists, sociologists, economists and anthropologists.

The evolution of teams based in one discipline, e.g. biologists, to a system approach with ecologists and later the addition of social scientists and geographers reflect our understanding of the complexity of natural environment and its interconnectedness with human society and its impacts; we now realize that we must examine the system as a whole if we wish to protect it. For example, a relatively simple but pertinent question such as “How can the harmful environmental impacts of human activities be reduced?” can draw on the disciplines of demography, ecology economics, engineering, sociology, psychology, anthropology, political science, law and ethics in order to reach a satisfactory answer (Daily and Ehrlich 1999).

In addition, there is a recognition that, in order to successfully protect a natural resource such as coral reefs, there must be local support for the projects, and some incentive to preserve and manage the resource. Often in cases where no social scientist is immediately available, the responsibility falls to the natural scientist who has been working near or alongside the local community for many years to develop the incentive to preserve and manage the

resource. However, as highlighted by the review of issues in interdisciplinary research that follows, an ad hoc, *cross*-disciplinary approach may not always be successful or achieve the desired outcomes; indeed authors such as Lele and Norgaard (2005) suggest that “charged with providing policy recommendations, natural scientists have to make judgments about how society works. They do not have adequate training to do this, but they are perhaps emboldened to do so by their positions and are likely to adopt simplistic models of social dynamics”.

In this paper, I look first at the growing need for interdisciplinary research teams in natural resource management and environmental conservation. Next I draw on the literature, as well as personal experience, to identify and articulate some of the issues that such interdisciplinary research appears to face. Finally, and again based on existing literature in the area, some of the recommendations for overcoming these issues are discussed.

Literature review

When it comes to incorporating the social sciences into natural resource management, both natural scientists and social scientists may find themselves frustrated. Campbell recounts her experiences working with natural scientists at a turtle hatchery: “I was once asked to conduct research that would “show” that tourism was more valuable than an extractive-use project. Biologists may see results that do not see a desired conservation outcome as a

betrayal, both personally and professionally” (Campbell 2005). One reason for this, according to Campbell, is that natural scientists “may have unconscious or assumed expectations about what results of socio-economic studies will show”, and which do not always reflect the research paradigms or priorities of the social sciences.

Indeed, some authors suggest that several misunderstandings may be at work here. First, a more palatable form of social science may be co-opted into a primarily natural science research team. In the words of Redclift (1998) “There is considerable evidence that some kinds of research in the social science can be fashioned to meet the demands of the natural sciences, e.g. demographic analyses can provide scenarios of food availability, surpluses, and resource scarcities. But is this social science? Is it rather what natural scientists think that social scientists are doing?” As a more extreme example we find the following “In my experience, natural scientists turn to social scientists to better package or market their eco/bio principles to the general public. True collaboration suggests mutual recognition of the distinct theory and methods that respective disciplines can bring to complex problems” (Fox et al. 2006).

Conversely, however, it has been argued that social scientists must also be able to “demonstrate that conservation-relevant social science is legitimate, worthy of pursuit and capable of answering questions of profound theoretical significance” (Mascia et al. 2003). Clearly there is some feeling amongst the natural scientists that social science has in the past failed to provide the conservation outcomes required for adequate protection of a natural resource, and a certain level of frustration felt by social scientists working within conservation-oriented research teams.

Aims and Objectives

The aims of this paper are to:

1. To articulate some of the issues that face interdisciplinary teams
2. To help think about them and identify them as they arise
3. To make some recommendations for overcoming them

Material and Methods

The principle methodology for this paper is a review of the literature on interdisciplinary research, with a particular focus on those issues that arise in mixed social and natural science teams. The review is set within the author’s own experience as a graduate in marine and environmental sciences, a doctoral degree in tourism, and a postdoctoral position in the School of Business, managing a research project on

sustainable use of marine resources within a tourism context.

Results

Based on some of the ideas presented above, as well as a more complete review of the existing literature, it would appear that there are four main issues that may lead to communication breakdowns in interdisciplinary teams. These are (i) differences in epistemology, (ii) the place and hierarchy of each science within the wider community, (iii) researcher time constraints and (iv) publication pressures.

(i) Differences in Epistemology:

Differences in epistemology is arguably the biggest area of potential conflict between social and natural scientists. (Lele and Norgaard 2005). It can be suggested that natural scientists believe in an absolute truth, which should be reached through a reductionist, positivist approach to reach general consensus, whilst social scientists may employ far more interpretive techniques that encourage debate and move away from consensus, admitting the existence of competing controversial universalities or distinct epistemic communities (Redclift 1998).

A range of other related issues also appear in the literature. For instance, language issues may arise, as differences between a clearly technical language and a science built upon more common language may lead to misunderstandings. In particular social scientists who often use common language in their research complain that the uninitiated reader, may mistakenly conclude that he understands what is being said (Pearce 2008, pers. comm.; Wear 1999). An example from personal experience is the confusion between the terms tourists and holiday-makers. In these cases, interdisciplinary research requires a clearer description of framing theory and methodology, and some insights into constitutive metaphors in order to build a common language that may usefully serve both groups of researchers (Wear 1999).

A second sub-issue revolves around the sensitive topic of values. This issue arises at all stages – choice of questions, theoretical positions, variables chosen, styles of research. And whilst natural scientists like to think that they are value-neutral, e.g. through the use of the passive tense in reports, social scientists recognize the importance of the context of all research (Lele and Norgard 2005) allowing subjectivity to become part of the research. Moreover, Campbell (2005) points out that advocacy issues can be strong in conservation biology, sometimes to the detriment of science. The goal of conservation biologists is to preserve biodiversity. There is often therefore a value placed on social science that is able to achieve this conservation goal more effectively through

deliverables. Campbell suggests however, that issues of advocacy will influence human subjects through their perceptions of the overall research team and project and not just by the social scientists with whom they interact. This will have detrimental effects on the quality and validity of the social science.

(ii) The place of science in society:

Another sensitive issue that is identified in the literature is that of the place of science in society and associated issues of funding (Roughley 2005). A form of hierarchy of intellectual rigor appears to exist in the sciences from the so-called “hard” sciences such as physics and chemistry through to “softer” sciences such as ecology and psychology, leading finally to anthropology and sociology. This hierarchy of worth, and the funding discrepancies associated with it has been accused of creating arrogance or defensiveness within disciplines, and forming a barrier to successful interdisciplinary research. Some authors therefore argue for personal characteristics of interdisciplinary researchers to be carefully considered, and point to the need for trust, patience, responsibility and honesty (Naiman 1999).

This may also help to overcome apparent issues of power imbalances, whereby research leaders are often based in the natural sciences and the natural scientists, by the nature of research methods, may outnumber the social scientists. The interpersonal skills of the research leader will therefore also play an important role in creating good interdisciplinary science within large teams. He or she will need to ensure that everyone shares the same general vision, but have specific parts of the overall project so that they have ownership. This may require the commitment of senior people who have little to risk professionally and are anxious to involve bright junior people in their efforts. Furthermore, whilst there is often only one social scientist in the team, this person will be required to represent a broad suite of social science concerns and represent the team in a social context, e.g. educate local people or fix socio-economic problems. Both of these roles are demanding and can be exhausting, and again, require good interpersonal skills and a strong commitment to the project.

(iii) Issues of time:

When talking about interdisciplinary research, it has been suggested that mutual understanding and cooperation build slowly (Daily and Ehrlich 1999). Social interaction and long-term association that allow friendships to develop create stronger interdisciplinary teams. Furthermore, it takes time to develop common language and familiarise oneself with other disciplines, as well as build the research program around several disciplines so that it may be

truly inclusive, empowering and truly reflect the issues at hand (Naiman 1999). On the other hand, conservation has a certain level of urgency associated with it. It may be therefore that much of social science research and methodology are a luxury that conservation practitioners cannot afford (Brosius 2006).

Another issue that is related to time constraints is the issue of good science: the commitment of time and energy into understanding other disciplines invariably detracts from the time and commitment put into maximising one’s own mastery of a single discipline. The result is a perception that interdisciplinary scientists are less competent or accomplished, and that interdisciplinary science is less exacting (Fox et al. 2006).

(iv) Publishing Issues

A final major issue that has been noted in the literature comes with the publication process for researchers. Pressures to publish in high ranking academic journal may limit incentives to publish in the newer interdisciplinary journals, or in journals that may not lead to high citation rates. Furthermore, reviewing processes might be more difficult as interdisciplinary articles require more time and effort from editors and reviewers. Review processes for interdisciplinary journal are also felt to be biased towards natural scientists, and reviewers are often interested in and familiar with the issues addressed but unfamiliar with theories and methods. According to Campbell (2005) this does not stop reviewers from suggesting related revisions, usually inappropriately. It is suggested that there is a need to expand list of social scientists on editorial boards and use these more fully.

Discussion

Whilst this review does not provide a comprehensive list of all issues facing interdisciplinary research teams, it had highlighted some of the key issues. By articulating some of the more commonly cited issues that arise in interdisciplinary research, it is hoped that researchers in this situation will be able to recognize and circumvent barriers as they arise. Some recommendations highlighted in the literature, particularly in Naiman’s (1999) and Mascia *et al.*’s (2003) papers, include the following:

- Make a conscious commitment to cooperate, and visualise and acknowledge the personal and professional sacrifices as well as the rewards
- Cooperate with colleagues who have a similar level of commitment to team research. Team research is freely sharing ideas, a commitment to excellence, being honest and having an arena of mutual respect in which to work

- Choose people that are willing to assume and share leadership and responsibility.
- Take the time to educate new team members and to ensure their ownership of a significant aspect of the project. Build confidence as well as ownership
- Find ways to encourage continuous communication of new ideas, even though one may not always agree, do validate the person as well as his/her willingness to share
- Never forget that we are all individuals with our own strengths and weaknesses. Value everyone in the group, not just those with the best work habits or ideas.
- Learn how to continue learning in an ever changing world, practice tact and patience; demonstrate respect.
- Encourage social scientists to make a greater effort to initiate and obtain funding for their own environmental management or conservation projects, to which they could include natural scientists.
- Hire social scientists for leadership positions and provide them with the mandate to build social science into organisational decision-making
- Enlist social scientists to develop and manage “rapid social assessment” programs, which would provide decision-makers with a rough sketch of critical social information at potential conservation sites through short-term but intensive inquiry.
- Document and share success stories that illustrate the value of social scientific information to “on the ground” conservation results. Such success stories not only foster organisational learning, internal support and conservation success, but also justify donor and organisational investment in the social sciences.

By adopting some or all of the recommendations outlined above, it may be possible to achieve a greater integration of natural and social sciences and achieve significant progress in interdisciplinary research. In conclusion, the greater integration of social and natural science may adopt a more outcome driven approach that creates good, creative interdisciplinary

research, in turn allowing communities to adapt to rapidly changing natural environments. Finally, more dialogue between social and natural scientist is encouraged through such media as peer-review publications (examples include the *Journal of Environmental Management*, *Natural Resources Journal and Society* and *Natural Resources*) and conference presentations. The emerging interdisciplinary teams can and should add new perspectives to each science and allow them to learn from each other, particularly, in the words of Lele and Norgaard (2005), once each side acknowledges what the other does not know.

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