



## Evaluating knowledge exchange in interdisciplinary and multi-stakeholder research



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### ABSTRACT

Interdisciplinary and multi-stakeholder research is increasingly being promoted and implemented to enhance understanding of global environmental change, identify holistic policy solutions, and assist implementation. These research activities are social processes aiming to enhance the exchange and translation of knowledge. Emphasis on the design and management of knowledge exchange is increasing, but learning about how to do this better is hampered by lack of conceptual development and appropriate methods to evaluate complex and multifaceted knowledge exchange processes. This paper therefore develops principles for the evaluation of knowledge exchange in interdisciplinary, multi-stakeholder environmental change research. The paper is based on an analysis of 135 peer-reviewed evaluations of knowledge exchange from diverse disciplines. The results indicate strong relationships between the field of study (e.g. health care, environmental management), the way knowledge and knowledge exchange were conceptualised and implemented, the approach used for the evaluation, and the outcomes being evaluated. A typology of seven knowledge exchange evaluations is presented to guide discussions about the underlying assumptions of different approaches to knowledge exchange and its evaluation. Five principles for knowledge exchange evaluation are also identified: (i) design for multiple end users; (ii) be explicit about why a particular approach to knowledge exchange is expected to deliver its outcomes; (iii) evaluate diverse outcomes; (iv) use evaluations as part of the process of delivering knowledge exchange; and (v) use mixed methods to evaluate knowledge exchange. We conclude that a catch-all approach to evaluation is neither appropriate nor desirable. Instead, approaches that focus on understanding the underlying processes of knowledge exchange, assess the relative contribution of other factors in shaping outcomes in addition to knowledge exchange, and that involve multiple stakeholders in implementing evaluations, will be the most appropriate for evaluating knowledge exchange in interdisciplinary global environmental change research.

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## 1. Introduction

Knowledge about environmental and societal challenges has significantly improved understanding of the need to instigate change towards more sustainable human activity. However, simply providing more and better information and predictions of global environmental change is not enough (Fischer et al., 2012). More effort is needed to understand how to create change, implement research, and facilitate new ways of thinking (Fischer

et al., 2012; O'Brien et al., 2013). How knowledge is integrated and perceived is crucial in this regard. Integration and perceptions of knowledge affect how problems are identified and framed, the capacity for generation of innovative and practical solutions, the relevance of outcomes to policy and the extent of participation in learning (Bracken and Oughton, 2013; Juntti et al., 2009; Raymond et al., 2010; Reed, 2008).

While much more work is needed to bridge disconnections between research and practice, there are signs that the way research is being conducted, facilitated, and funded, and the relationship between science and society is changing (e.g. Funtowicz et al., 2000; Nowotny et al., 2001; Planet Under Pressure, 2012). Traditional assumptions of researchers as the sole producers of knowledge are

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increasingly being supplanted by activities that include multi-way interaction and co-production of knowledge between researchers, decision-makers and other beneficiaries of science (Francis and Goodman, 2011; Funtowicz and Ravetz, 1993; Planet Under Pressure, 2012; RCUK, 2009). Increased demands for publicly funded research to be able to justify its activities by demonstrating economic and social impact (ESRC, 2009, 2012) are resulting in more directed research programmes, greater activities to enhance the sharing of knowledge, and mechanisms to incentivise researchers to find ways of generating policy- and practice-related ‘impact’ from their research (DFID, 2013; Phillipson et al., 2012). This reflects recognition of the value of different forms of knowledge (e.g. local and scientific) and inclusion of diverse voices to find more innovative solutions and ensure research is relevant, valid and practical (Connick and Innes, 2003; Raymond et al., 2010). These changes are particularly important for environmental change research where there is a need for cross-fertilization of perspectives to address challenging and multi-faceted problems (Kates et al., 2001; Norgaard, 2004). Yet the opportunities also pose significant challenges for researchers who need to juggle demands for their work to be both inclusive and robust in the eyes of their academic peers.

Overall, awareness is increasing about the importance of research fields that study the process of research itself. Such fields include implementation science, knowledge translation, knowledge management and research impact. These fields are both *activities* aiming to encourage implementation and practice, and *research* that aims to understand the processes shaping the sharing and integration of knowledge. One area gaining particular prominence is knowledge exchange. Knowledge exchange is a broad concept defined as “a process of generating, sharing, and/or using knowledge through various methods appropriate to the context, purpose, and participants involved” (Fazey et al., 2013). It encompasses a range of concepts such as co-production, transfer, storage, transformation, integration and translation of knowledge and social learning, with each concept having different implied meanings (Fazey et al., 2013).

Knowledge exchange is relevant to most areas of research, drawing on insights from diverse fields, including adaptive co-management, participation, stakeholder engagement, and community based conservation. It can be both formal or informal, from co-management and co-production of research, community-based or collaborative management, knowledge brokering, management of knowledge sharing systems in organisations or to support disaster planning, community communication and knowledge transfer, the translation of research for practice, health education programmes or policy-maker forums. Processes to enhance knowledge exchange may therefore range from small scale one off interventions that involve didactic teaching to large scale community engagement or management programmes.

While knowledge exchange has always occurred in some form in applied research, and continues to do so informally through diverse mechanisms and processes in which researchers engage with others (e.g. through teaching, the sharing expertise with volunteers or those working in practice, or the social interactions in the development of policy), there have been significant developments in the research environment that are not simply related to a change in rhetoric. First, there is a greater emphasis on the *importance* of being more explicit about enhancing knowledge exchange in ways that are more participatory or that put researchers on a more equal footing with other stakeholders, such as during the co-production of research (Fazey et al., 2013; La Peyre et al., 2001; LWEC, 2012; Mauser et al., 2013). Second there is increasing emphasis on explicitly *designing* knowledge exchange to enhance the way in which engagement and exchange occurs (LWEC, 2012). This can increase emphasis on how a particular

approach is expected to deliver its intended outcomes, rather than automatically assuming that it will do so. These recent shifts do not necessarily mean that changes in practice have occurred, and in most cases ways of working between academia and other sectors are still traditional and hierarchical and there is much scope for using a wider range of approaches (Davies and Powell, 2012). However, the discourse about the role of research and how it is done is changing, providing space for more innovative and potentially more fruitful mechanisms of the sharing of knowledge and cross-sectoral engagement and learning.

Perhaps not surprisingly then, knowledge exchange is increasingly being recognised as a research field in its own right (Straus et al., 2011). Such research aims to understand the social processes involved in knowledge exchange that enhance the impact of research on policy and practice. A research agenda for knowledge exchange, developed by eliciting the expertise of researchers and practitioners, found that while related activities were increasingly being used during and after research in environmental fields, there was a particular need for: (1) a better understanding of the processes and mechanisms involved and (2) conceptual and methodological development for evaluating knowledge exchange (Fazey et al., 2013). These two areas are interrelated. Understanding process requires suitable evaluation methodologies, while improving evaluation requires understanding of the process to determine what should be evaluated and which methodologies are most appropriate. Despite some notable exceptions (e.g. Meagher et al., 2008; Phillipson et al., 2012), there are limited examples of process-oriented impact studies or large scale evaluations of knowledge exchange in multi-stakeholder and interdisciplinary endeavours (Pentland et al., 2011; Phillipson et al., 2012; Plummer and Armitage, 2007).

This paper aims to develop overarching principles for evaluating knowledge exchange in interdisciplinary and multi-stakeholder environmental change research. While insightful reviews of evaluations of research impact have already been conducted (Boaz et al., 2009), this paper specifically focuses on knowledge exchange evaluations. The key objectives are to: (1) provide an overview of different kinds of knowledge exchange evaluations and what they evaluate; (2) establish an empirically based typology of knowledge exchange evaluations; (3) determine how the way knowledge exchange is conceptualised influences approaches to evaluation; and (4) critically assess the relevance of different approaches to knowledge exchange evaluation to interdisciplinary research programmes relevant to global environmental change. The paper is based on analysis of 135 peer reviewed evaluations of knowledge exchange.

We first describe our methodology (including conceptual foundations), then the research results. We conclude with a discussion of the implications of the findings for evaluating knowledge exchange in complex research processes, and set out five overarching principles to guide the design of knowledge exchange evaluations. The paper is significant for three reasons. As far as we are aware, it is the first to: provide an empirically based typology of evaluations generally; analyse different kinds of knowledge exchange evaluations; and establish a set of principles for knowledge exchange evaluation for global environmental change research. The outcomes of the paper will be of relevance to researchers and practitioners from diverse backgrounds interested in learning from existing projects and programmes and to improve the design of knowledge exchange processes.

## 2. Methodology

### 2.1. Three key aspects of knowledge exchange evaluation

There are many definitions and uses of evaluation (Chapman et al., 2007; European Communities, 2006; Shufflebeam and

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