

COMMENTARY

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Knowledge production and environmental conflict: managing systematic reviews and maps for constructive outcomes

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Abstract

Systematic reviews and maps in the environmental field are often carried out in contexts of contestation between different knowledge holders and users, placing demands on the review team to constructively relate to different interests and perspectives. The aim of this short commentary is to place systematic reviews and maps into a broader perspective of conflict management related to knowledge production, including the role of facilitated stakeholder involvement. We introduce a brief framework that identifies four dimensions that are relevant for choosing among different approaches to knowledge production in conflict situations: type of conflict, view of knowledge, model of stakeholder involvement, and measure of quality. We also provide some suggestions on how such a framework can be applied in connection with planning for systematic reviews and maps. Options include managing conflicts through facilitated stakeholder involvement *within* the review itself as well as a thorough assessment of what specifically the method can contribute *in relationship* to other approaches to knowledge production for environmental management.

Keywords: Systematic review, Conflict, Post-normal science, Wicked problems, Stakeholder involvement

Background

Systematic reviews [1] and maps [2] (hereafter referred to simply as reviews) in the environmental field are often carried out by research teams to inform policy makers in contexts of contestation between different knowledge holders and users [3]. In this short commentary, we argue that conflict situations place demands on the review team to think through stakeholder involvement up front in order to constructively relate to different interests and perspectives. The aim is to place reviews into a broader context of conflict management related to knowledge production and to present different approaches to stakeholder involvement.

Conflict, wicked problems and post-normal science

The term conflict is often associated with negative connotations. Our starting point is instead that conflicts in interests, perspectives and/or knowledges are a persistent characteristic of all societies in the sense that actors enter situations with different worldviews and interests. If mechanisms are in place to handle conflicts well, they can be constructive and contribute to mutual learning and creative problem solving. While research may not be able to resolve conflict of perspectives, worldviews, and/or interest, we argue that it has a role beyond providing new facts. Specifically, research processes conducted with care can play a role in improving the actors' understanding of the meaning of the conflict and the grounds on which differences in perspectives are based [4].

This way of viewing conflicts is especially relevant for so-called 'wicked' problems [5]. Wicked problems defy simple definitions and explanations and stakeholders may disagree not only on the effectiveness of suggested solutions but also on the nature of the problem itself.

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Typical of wicked problems are high degrees of uncertainty, complexity and contestation. If the assumption is that only one perspective is valid, then knowledge production related to wicked problems can easily create or exacerbate destructive conflict situations. We argue that if the analysis instead starts from an assumption of several valid perspectives, a more constructive outcome is more likely for everyone involved.

Recognition of wicked environmental governance problems has gone hand-in-hand with a shifting understanding of the role of science in society, including the relationship between science and politics. Whereas 'normal' science has been expected to produce objective truths that should inform politics ('science speaking truth to power'), the practice of 'post-normal science' [6] or 'Mode-II science' [7] focuses on problems that cannot be resolved via normal science practice, namely uncertainty and contestation arising from the plurality of legitimate perspectives. There is increasing understanding that knowledge generation is inherently social and political [8], requiring carefully designed strategies for actively involving stakeholders.

Much emphasis in recent years has also been placed on how knowledge production, through deliberation, can contribute to social learning whereby participants conjointly negotiate competing problem definitions and ways of problem solving. This may support the development of improved relational capabilities to deal with common problems that individual participants cannot resolve on their own (for reviews see also [9, 10]). Social learning has also been put forward as a complement to conventional environmental policy instruments [11, 12]. However, in situations shaped by great inequalities and power differentials more specific demands are placed on the facilitation of knowledge production [13]. Examples include cross-cultural encounters where emphasis must be on opportunities for mutual recognition and equal opportunities to participate in decision making [14].

The case of mining in the Arctic

Our argument regarding controversy and the role of knowledge in decision making can be illustrated by a brief reflection on the issues surrounding mining in the Arctic. Here, environmental reviews and assessments often focus on a limited subset of environmental impacts and mainly address a narrowly defined 'technical' problem. However, when such studies inform political decisions, for example when the assessment is the basis for a mining permit or a government position on land use planning, they cannot be disconnected from the issues related to land use conflicts and the legal and moral rights of different groups. While normal scientific methods might be relevant to answer the problem posed by the assessment/

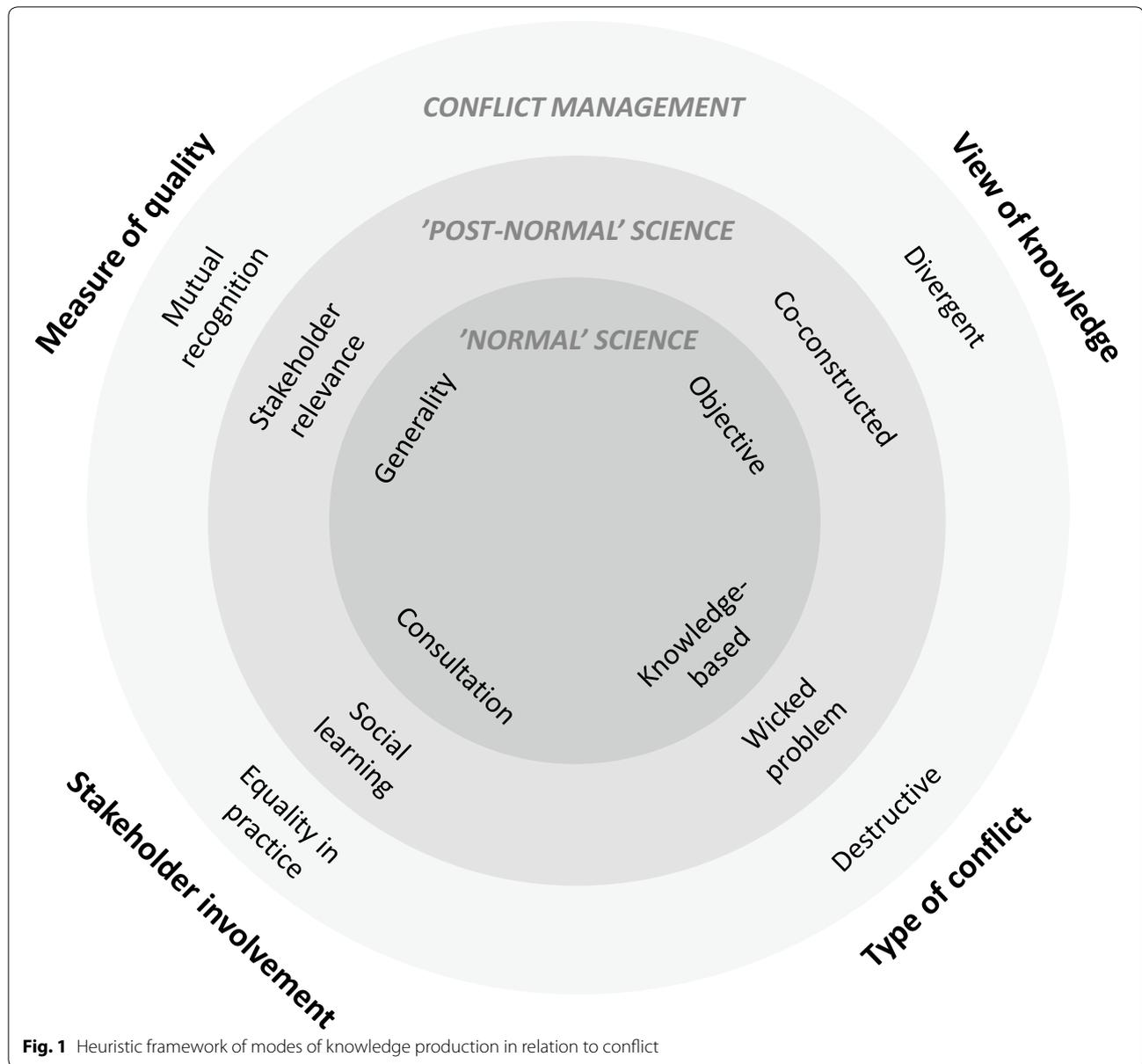
review, it is not sufficient for addressing the broader conflict situation. If a knowledge production process is not seen as legitimate, it can even exacerbate existing conflicts. Recognizing the nature of wicked problems, post-normal science directs attention to these social dynamics of the knowledge production process (for further reading about knowledge controversy in the case of mining in the Arctic, see e.g. [15]).

Choice of process for knowledge production

An important task for the systematic review community is to define its own specific role in relation to the broader context of conflicts related to knowledge and the 'tool box' that is available for managing them. We discuss the options available in relation to four different dimensions that have been variously discussed in past work on post-normal science and conflict management (e.g. [6, 16]). These options reflect four (interdependent) operational stages that may inform process design in planning for a systematic review: (i) assessing the type of conflict, (ii) creating awareness about different views of knowledge (epistemology), (iii) deciding the relevant model of stakeholder involvement, and (iv) deciding on how to measure quality of the knowledge production process (Fig. 1). Whereas the space limitations prohibit a detailed examination of the implications of each of these options for designing reviews, we include a brief summary with concrete examples that we hope will help stimulate further debate on this topic (Table 1).

The type of conflict

The choice of process for knowledge production depends both on the type of controversy and level of disagreement. In cases where stakeholders agree on the problem definition and what kinds of data are needed to answer the question(s), normal scientific methods and systematic reviews following standard protocols may be sufficient. Faced with wicked problems, where there is no agreement on the problem definition in the first place, normal scientific credibility and standard systematic review protocols will not suffice. Here, equal emphasis must be placed on the legitimacy of the knowledge production process [18]. Does the process include all relevant stakeholders? Is the process transparent? Do all knowledge holders have an equal voice in the process of gathering and evaluating information? Such approaches are common in scientific assessments that are conducted in a policy context. In destructive conflict situations, (at least some of) the parties reject the legitimacy of other perspectives and, potentially, even the right of others to articulate their views and interests. Here, stakeholder involvement must focus on how to more constructively mediate between the differences in interests and perspectives [4].



The view of knowledge

Decisions about the choice of knowledge production process in research tend to be shaped by the underlying philosophy of science (e.g. epistemology, the view on how we know what we know) [16]. The view of knowledge can influence the sensitivity to different worldviews in ways that can also affect how we handle conflict situations. For instance, it determines whether one is interested in the normal scientific facts, the different perceptions of the problems at hand, and/or the underlying reasons why different perspectives exist. The view of knowledge

determines not only what problem definitions are recognized but also what types of data are considered valid [19], which in turn shapes the framing within which evidence-based decision-making takes place. A vital step is therefore to negotiate the definition of what constitutes credible evidence and to transparently document not only scientific data but also indigenous and local knowledge and practitioners' experiences. Different views of knowledge can be especially pronounced in cross-cultural settings and can also have implications for what research methods are considered ethical [17].

Table 1 Different approaches to process design in knowledge production

	Normal science	Post-normal science	Conflict management
Question	Well-defined problem Closed-framed question	Wicked problem Stakeholder-negotiated question(s)	Potentially irreconcilable problem definitions Co-existing diverging questions
Evidence	Published scientific and grey literature Quantitative and qualitative scientific analysis	Filling primary data gaps highlighted by stakeholders Exploring interpretations through social learning	Evidence generation integrated in process design, e.g. via joint fact-finding Facilitated exploration of the role of different types of knowledge
Review team	Experts Scientific independence	Involving stakeholders in framing the process, e.g. identifying research questions Consensus seeking	Stakeholders <i>are</i> the experts and directly involved in answering the questions Building mutual understanding of disagreements
Stakeholder group	Consultation role only Identified based on pre-defined problem	Decision-making authority Involvement <i>prior</i> to problem definition	Stakeholders may not agree to form a group—distinct meetings instead Facilitation aiming at equality in practice among different stakeholders

Inspired by the outline of methodological steps in systematic reviews and maps [1], this table highlights issues that need to be considered in the planning of any assessment of knowledge

Model of stakeholder involvement

A number of typologies have been constructed that help make sense of different modalities of stakeholder involvement (e.g. [20]). For a well-defined scientific problem without wicked dimensions, stakeholders may not need to be engaged very deeply in the knowledge production process. Of course, they can still have an advisory role for identifying salient questions and for making sure that the results become integrated in decision making. This is how stakeholder involvement in science is most often defined. When addressing wicked problems, it becomes important to choose research methods that contribute to shared learning and which allow stakeholders to become actively engaged in the knowledge production process and the ‘structuring’ of the problem situation [21]. For instance, in joint-fact finding, stakeholders ‘work together to produce a common knowledge base that they consider valid and relevant for the decision-making situation under dispute’ [22]. In situations of high controversy and destructive conflict, it is rarely possible to agree on a joint problem formulation and the purpose of the process may initially be to explore why such divergence exists in the first place. Addressing conflict constructively also requires ensuring ‘equal participation in practice’ (e.g. [17]), for example by being attentive to uneven distribution of influence and resources. Approaches that rely on active involvement of stakeholders also require strategies and resources for ensuring that the goals of the involvement can actually be achieved, for example investing in arranging workshops, professional facilitation, and economic compensation for stakeholders’ time investments.

Measure of quality

The measure of quality that is adopted for assessing and steering a knowledge production process will shape the level of trust the users are likely to place in it. For well-defined problems, the level of trust relates to normal scientific method and the aim is typically to ensure a high level of generality. Wicked problems require more attention to the broader context of knowledge production, such as the quality of the process for engaging stakeholders. A common quality dimension is the level of transparency in the process, where the demands on transparency for a broader audience increase with the level of controversy. In destructive conflict situations with high levels of controversy, the primary aim of the process is typically to provide support for stakeholders to rebuild mutual respect and recognition of others’ perspectives and interests. While quality in reviews in the normal science tradition relate to reproducibility of results as an important value, quality in post-normal science and conflict management rather depend on the rigorous selection and application of methods for participation, co-construction and transparency (e.g. [16, 22]).

Conclusions

We have introduced a simple framework for thinking about how the systematic review community may respond to conflict between actors affected by the issue under review and/or the review itself. A central argument is that there are options available to maneuver through various models of stakeholder involvement *within* the review itself as well as through being cognizant of the potential and limitations of such reviews *in relationship* to other approaches to knowledge production for environmental management. Notably, in wicked

problem situations, especially in situations of high or even destructive conflict, other knowledge production approaches are likely to be more relevant than systematic reviews and maps on their own.

How do these proposals relate to current practice (see e.g. [1]) in the conduct of systematic reviews? First and foremost, the four dimensions that we raise need to be addressed already in the early planning of a review, which should ideally include an assessment about the nature of issues at hand and the potential role that knowledge production may have in contributing to constructively managing a potential conflict situation. The planning phase should—in addition to standard ethics review and assessment of risk and opportunities associated with the work—involve a systematic stakeholder mapping [23] and judgements when systematic reviews and maps can play a constructive role. Already in making this judgement stakeholders need to be involved, since their perspectives and knowledges will determine what type of review is most relevant.

Second, based on this initial assessment during the planning phase, those responsible for the review may opt for a normal, post-normal or conflict management approach to the review—with corresponding responses regarding, e.g. stakeholder involvement. For instance, if a well-defined question can be identified and the level of controversy is low then standard practice may be followed. That is, involving stakeholders in deciding on a protocol but doing the actual review independently to ensure normal scientific integrity. In contrast, if the problem is wicked in nature or stakeholders cannot agree on the problem definition(s) then post-normal or conflict management approaches will guide ways to engage stakeholders more comprehensively in the review, e.g. in the knowledge production and analysis steps.

Overall, we have in this paper made some arguments for the reasons why and ways how systematic reviews may move further towards providing what is also known as ‘multiple evidence bases’ for decision making [24]. Co-production of knowledge across multiple knowledges is warranted when reviews address controversial and wicked problems, combining systematic mapping of published scientific literature with direct participation of stakeholders to contribute with their diverse knowledges. Placing the specific process of systematic reviews into such a larger context is a first step towards acknowledging the different perspectives that need to be considered in addressing complex environmental problems. Openly acknowledging multiple perspectives also serves to avoid forced consensus that could otherwise undermine the legitimacy of scientific review.

Authors’ contributions

RKL and AEN jointly produced this manuscript through complementary equal contributions. The author listing on the title page is alphabetic. Both authors read and approved the final manuscript.

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Competing interests

The authors declare that they have no competing interests.

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