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Government science in forestry: Characteristics and policy utilization

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ABSTRACT

The relationship between forest research, its producers and forest policy is extremely complex. While there is a growing body of work about the role of university research in informing forest policy, comparatively little attention has been paid to government science in forestry. This paper describes the characteristics of government science and explores how it informs forest policy using the Ontario Ministry of Natural Resources (OMNR), Canada, as a case study. A close and effective relationship was found between scientists and policy developers/analysts where the OMNR was legally required to engage in scientific research to inform the development of guidelines and associated evaluation processes. Other factors that contributed to an effective use of research in the development of policy included the active engagement of policy developers/analysts in the design of projects using "policies as hypotheses" within an adaptive forest management framework. While our results suggest that government science at the OMNR has effectively addressed many of the policy risks associated with forest management, it can also generate risks where government science challenges the strategic directions set by forest policy in response to societal values. Another associated risk is that publicly-funded research will result in "irrelevant" knowledge in the context of current policies. These risks are difficult to manage and can affect relationships. Nevertheless, the OMNR will need to continue taking calculated risks to effectively monitor the dynamic relationship between forests, policy and society into the future.

1. Introduction

Over the last half century, the forest research community has witnessed waves of government restructuring, public research budgets boom and bust, and the "roll out and roll back" of forest regulations across many jurisdictions (Schiellerup, 2008). In conjunction, important changes in science policies have taken place encouraging new forms of multi-sector collaborative ventures to enhance the economic and public relevance of publicly-funded research (Gibbons et al., 1994; Etzkowitz and Leydesdorff, 2000). The social contract between science and society has been changing fast, which has had far reaching consequences on how we conceive norms of scientific quality and relevance (Hessels et al., 2009). These changes have given rise to questions about the role of government laboratories as knowledge producers in the broader research community, and in relation to public policy (OECD, 1989; Lawton Smith, 1997; Cox et al., 2001; Laredo, 2001). While the arguments that science is a public good and that the role of a government is to correct market failures are both common rationales for the continued support of government laboratories (Laredo, 2001; Callon, 1994), in the context of forestry, the status of government science appears to be tenuous.

Increasingly, the question arises: what distinguishes government science from university and other research providers? According to Irwin et al. (1997), government science, otherwise known as "regulatory science", "trans-science" (Weinberg, 1972) or "mandated science" (Salter, 1998), can be characterized by five categories of research activity: "exploratory research" of a fundamental, theoretical or experimental kind,[1] the development and validation of regulatory tests, regulatory compliance testing, investigative problem-solving and regulatory submission. These activities range from "exploratory" science in projects that may not be directly applicable within regulatory assessment frameworks, through more narrowly "technical" research on the testing of regulatory standards and guidelines, to "bureaucratic" administrative tasks. These research activities are often conducted in collaboration with universities, industry, and other knowledge providers. Government science is, therefore, not institutionally confined to government laboratories, but conducted within and across different institutional locations. However, government science is bounded by scientific, political, and economic norms and expectations (Irwin et al., 1997). In contrast to university research, government science is much more likely to be constrained by external pressures of time and politics and it may tend towards "issue closure",[2] propriety and legitimacy,

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[1] Fundamental, theoretical or experimental research seeks to advance scientific knowledge. Immediate practical application is generally not its direct objective.

[2] One of the policy analyst/developers who reviewed an earlier draft of the manuscript suggested that "One might argue the opposite as well in that there are constraints to academic research as results are required in short-order to produce a masters or PhD and thus are constrained from the long view so critical in slow growing northern forest research."

subject to a variety of types of review mainly to serve policy-making (Jasanoff, 1990, 2005).

From a historical point of view, "scientific forestry" was developed to inform and support state building initiatives, through the efficient exploitation of forest resources and the provision of royalties to the State (Scott, 1998). Since then, other knowledge producers (e.g. universities, industry, foundations, non-governmental organizations, among others) have influenced the development of scientific forestry. As a result, the relationship between forest research, its producers and forest policy has become more complex over time. While there is a growing body of work on the role of university research in informing forest policy, comparatively little attention has been paid to how government science is used in forest policy.

It is this gap in the scholarship on knowledge utilization in forest policy that spurred our study. The questions that interested us were: what are the characteristics of government science that make it relevant to, and subsequently used in, forest policy? Our case study focused on the Ontario Ministry of Natural Resources (OMNR), which houses the oldest provincial forest service agency in Canada (Lambert and Pross, 1967).

2. Theoretical framework

2.1. Science in the forest policy process

Over the last decade, there have been a large number of studies conducted to improve our understanding of the use of scientific information in environmental and forest policy (Buttoud, 2000; Cortner, 2000; Ellefson, 2000; Norse and Tschirley, 2000; Shaw et al., 2000; Mills and Clark, 2001; Guldin, 2003; Innes, 2003; Konijnendijk, 2004; Mayer and Rametsteiner, 2004; Spilsbury and Nasi, 2006; Janse, 2006, 2008). Many studies have used an "ideal type" model of forest policy development as a framework to study research utilization. This policy process model is illustrated by the following series of events: setting the policy agenda, policy formulation, policy selection and legitimization, policy implementation, policy evaluation, and policy revision (Ellefson, 2000; Janse, 2006, 2008). Both the scientific method and the associated research evidence may be used throughout this policy process to focus attention on critical uncertainties, broaden the range of policy options, clarify the relationship between means and ends within particular policy options, simulate policy outcomes, engage in problem-solving activities and provide expert opinion on potential risks of implementing particular policy options. However, in reality, the public policy-making process is much more complex than this linear model suggests.

Models of the policy process can be ascribed to two broad categories: rationalist and political (Neilson, 2001). The rationalist models adopt the classical political economic theory of the "rational actor" who is presumed to have the capacity to develop all possible alternatives on the basis of full information and prioritize options in an optimal way to reach a stated goal (Lindblom, 1980). There are a number of different models of the policy process which use this conceptual framework. Examples are, the linear model described above, and the incrementalist, or "muddling through", approach, which attempts to address the unrealistic claims of the linear model by adding a large dose of (inter)subjectivity and the use of expert judgment to assess incomplete information within a policy reform process (Lindblom, 1980). Indeed, more recent studies have questioned the validity of the "linear model of science uptake" in forestry policy (Pregernig, 2007; Grundmann, 2009).

The political models of the policy process derive largely from the comparative politics and international relations literature. It is beyond the scope of this article to review the numerous political models of science–policy development (e.g. multiple stream theory, punctuated equilibrium theory, social construction theory, advocacy coalition framework) (Weible, 2008 provides a good review). Suffice to say that these models assume that various external (f)actors play an important role in determining the boundaries of policy options and, by consequence, the use of scientific information in the policy process. This large body of literature emphatically illustrates that information flow in the policy process is, more often than not, diffuse.

2.2. Research utilization

For the purposes of this study, the term "research utilization" refers to a process characterized by different stages in which information is assimilated cognitively by policy developers/analysts. This meaning of "utilization" is given by Knott and Wildavsky, (1980) who developed a widely used scale designed to measure knowledge utilization in public policy (Landry et al., 2001). The Knott and Wildavsky scale measures the absorption of information by decision-makers and its consequences on the policy process (Webber, 1992). In the study of Belkhodja et al. (2007) of the extent and organizational determinants of research utilization in Canadian Health Services Organizations, their Knott and Wildavsky scale included seven stages: 1) *reception* (i.e. I have received research results concerning the areas for which I am responsible); 2) *cognition* (i.e. I have read and understood the research reports that I have received); 3) *reference* (i.e. I have cited research evidence to colleagues and in my work); 4) *adaptation* (i.e. I have adapted the format of the research results to provide information useful to our decision-makers); 5) *effort* (i.e. I have made efforts to promote the adoption of research evidence in my field); 6) *influence* (i.e. research evidence has led me to make professional choices and decisions that I would not have made otherwise); and 7) *application* (i.e. the utilization of research evidence has led to concrete change in the programs or services provided by my organization). The scale is cumulative in the sense that cognition builds on reception, reference builds on cognition, adaptation builds on reference, effort builds on adaptation, influence builds on effort, and application builds on influence (Landry et al., 2003).

The complexity of the science–policy interface does not preclude the scientific study of how research is utilized in policy-making. However, it does require that our models of research utilization move beyond the "input–output", "delivery–uptake" and "supply–demand" communication models which tend to assume a relatively linear model of policy-making, and which focus almost entirely on the relationship between university research and government policy-makers (Ellefson, 2000; Reynolds et al., 2003; Janse, 2006, 2008). Models of research utilization in forest policy must take into consideration the characteristics of the knowledge producer (e.g. university, government, private, NGO, etc.) and its particular objectives and constraints, which will influence the "relevance" of its research products and their utilization in policy. Such models should also include explanatory factors determining the extent of research utilization, which we next present.

2.3. Explanatory models of research utilization

In Landry et al'. (2003) systematic empirical study regarding the factors predicting research utilization in government agencies, four major categories of explanations were posited and their significance was confirmed: engineering explanations, organizational explanations, cultural explanations, and interaction explanations. The following is a characterization of each of these explanations.

According to Amara et al. (2004), the engineering explanations suggest that the uptake of research depends, on the one hand, on the characteristics of the research findings. For example, the compatibility, complexity, observability, validity and applicability of research contents (Weiss and Bucuvalas, 1980; Lomas, 1993; Dearing et al., 1994). On the other hand, the type of research is also a determining factor. For example: basic-theoretical/applied science, general/abstract, quantitative/qualitative, depending on the research domains or disciplines