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'PUBLIC AWARENESS TO GREY LITERATURE'

How Information in Grey Literature Informs Policy and Decision-Making: A Perspective on the Need to Understand the Processes

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Abstract

Effective advocacy for grey literature must be based on understanding the environments in which it is used. As advances in communications technologies continue to occur at a breath-taking pace, all forms of information are being affected. Evolving publication practices are presenting new communication opportunities, in addition to disruptions of established patterns, as long-standing genres are being reshaped by powerful technological and societal changes. Disruptions can cause discomfort and anxiety, but opportunities to promote the value of particular information genres also arise. Grey literature, for example, continues to be produced in large quantities, which suggests that its importance in communication may be increasing rather than diminishing. Advocates of grey literature may believe this genre is undervalued or misunderstood, but lobbying for grey literature in the absence of understanding the contexts in which it is or can be used will likely fail unless information activity in those settings is understood. One prominent context encompasses public policy and decision-making where grey literature is often present but typically unnoticed. Policy and decision-making are complex processes and increasing attention is being placed on developing an understanding of the science-policy interface and evidence-based policy making in particular. Conferences (e.g., Science Advice to Governments, Auckland, New Zealand, August 2014), evidence information services (e.g., one launched in the United Kingdom in 2014), research programs and institutes (e.g., Environmental Information: Use and Influence, Dalhousie University), and a considerable body of literature emphasizes the importance of understanding the relationship between research and policy. Drawing on findings from research conducted within the Environmental Information: Use and Influence program, which involves governmental, intergovernmental, and non-governmental organizations, we outline roles for grey literature in policy and decision-making contexts. We describe types of grey literature used in these contexts, identify preferences for specific features of useable information by managers and policy makers, and outline pathways of research evidence, some of which is produced as grey literature.

To be effective, advocacy for grey literature must be based on understanding the environments in which this literature is generated and used. A recent case about hydraulic fracturing, a controversial subject in North America and Europe (see for example, "Hydraulic Fracking," 2014), illustrates this point. After months of public consultations, publication of numerous open access papers, and extensive study, an independent review panel on hydraulic fracturing (fracking) appointed by the Province of Nova Scotia published its final report on the subject in August 2014 (Wheeler et al., 2014). Five days after the release of the report, the provincial government announced that it would introduce legislation "to prohibit high volume hydraulic fracturing for onshore shale gas" (Government of Nova Scotia, 2014). In a front page news story two weeks after the government passed the legislation to enforce the ban, David Wheeler, chair of the review panel, stated categorically that the panel's report was "very clear in not suggesting a moratorium" (McLeod, 2014). From Wheeler's perspective the government's opposition to fracking was "for the most part, not based on scientific evidence." He claimed "science doesn't cut it in the public-policy realm….Instead, a combination of social and political factors…come together to determine how a community assesses risk," which "includes everything from knee-jerk fear to an understandable skepticism of the government's track record of environmental management." Wheeler believes that "these views can change with research and discussion" (McLeod, 2014).

The relevance of this incident to the topic at hand, i.e., emerging and changing markets for grey literature and public awareness of this genre, relates not to the subject of hydraulic fracturing *per se* but rather to the purpose of the review report, its audiences (both expected and unintended), and how its use can inform discussion about how to lobby for or highlight the significance of information published as grey literature. The final report by that independent panel, and the ten discussion papers released earlier in 2014, are all examples of grey literature. Such documents are produced in the thousands by governments and their myriad agencies globally each year. The final report was designed primarily to inform the provincial government, although some might argue that politics rather than the evidence held sway in the government's decision announced very quickly after the report was released. The report served purposes other than simply to inform the government. Over several

months, scientists, engineers, environmental groups, First Nations (aboriginal) groups, industry, and the public, principally the interested public, offered their views on the discussion papers, and media coverage increased awareness of the panel's work. Many people encountered and engaged with the grey literature produced by the panel. Moreover, as the documentation was made available primarily via an online website, residents and non-residents alike could, and did, stay abreast of the work of the panel and contributed to the panel's understanding of the science, engineering, economic potential, and public interest in the subject.

This Nova Scotian example demonstrates that information in grey literature and current information technologies facilitated an assessment and consultation process that is characteristic of modern policy making. Different types of grey literature were used and they served different purposes. However, it is likely that most who were involved with the process were unaware that a category of information that we call grey literature fulfilled an important role in the consultation process, or that, in the absence of such material, the ability to become informed about the issues and participate in the debates would have been very difficult to achieve. Because of the generally transparent nature of the consultative process, made possible by social media, web-based technologies, and media coverage, the Minister of Energy in the provincial government was likely aware of public reactions and responses to the panel's consultation activities prior to receiving the final report. He would not have been aware of the panel's conclusions and recommendations before receiving the report, but he would have known about vocal opposition to fracking. While the government acknowledged receipt of the report, and in fact requested it, it is believed that advocacy for grey literature or the merits of the scientific advice it contained would not have given this report any more authority at the political level in this decision-making context. By identifying and understanding the variety of steps in this consultation and decision-making process, the place of information presented as grey literature and its use by numerous individuals can be appreciated. If advocacy for this literature is needed, then its promotion is likely to be more effective by elucidating the life cycle of such reports.

Advocates of grey literature may believe that this genre is undervalued or misunderstood, and evidence suggests that is the case (McKimmie & Szumak, 2002; Ravindranath, 2010; Thaler, 2010). Advocacy for grey literature can be affected by confusion about what actually constitutes this genre and whether it is reliable (credible). Grey literature experts may assume that the genre is clearly demarcated, but many information users do not recognize the distinction or consider it important.

Grey Literature in Policy and Decision-Making Contexts – Some Challenges
Grey literature is commonly used in policy and decision-making contexts, but it may not be noticed or recognized as such. In these contexts, attributes of salience, credibility, and relevance can far outweigh peculiarities of definition (McNie, 2007). In a recent review, an author questioned why the reports produced by the Intergovernmental Panel on Climate Change were labelled as grey literature. After all, the reviewer pointed out, these reports "are probably some of the most thoroughly peer-reviewed publications in the world" (personal communication, October 2014). This reviewer simply did not view peer-reviewed technical reports as grey literature even though that individual acknowledged that the reports are "intergovernmental documents."

Within policy contexts, requested or contracted reports may be preferred and relied upon because their credibility can be confirmed, the relevance of the information they contain matches the expectations of readers, and the scale (local or regional versus national or global) fits the requirements for the decisions that need to be made. Moreover, the networks in which the policy specialists, managers, and/or scientists operate provide the assurance that the information is credible. These practitioners may not realize that this information is grey literature even though they may work with it on a daily basis. The term "grey literature" may unintentionally convey negative connotations in policy contexts, a point that advocates for the genre must take into account.

Public policy and decision-making can have different manifestations according to particular political regimes or governance models, a point that merits emphasis (Liverani, Hawkins, & Parkhurst, 2013). For example, recognizing the similarities and differences in the governance structures of countries, e.g., as regards public consultation, can be important for understanding the role(s) that grey literature fulfills and ultimately how the relevance and importance of this literature could be promoted.

Numerous studies (e.g., Lawrence, Houghton, Thomas & Weldon, 2014; Luzi, 2000; Schöpfel & Farace, 2010; Thelwall, Klitou, Verbeek, Stuart, & Vincent, 2010; Webster & Collins, 2005) have pointed to the growing production of information, often as grey literature, by government departments, international inter-governmental bodies, and non-governmental organizations, resulting in greater reliance on this type of publication for disseminating information and assisting with policy decisions. The quantity of information is now very large but the proportion that is published or otherwise distributed as grey literature is unknown. The number of scholarly documents available on the web, not including grey literature, was recently estimated at 114 million (Khabsa & Giles, 2014; see also Bornmann & Mutz, 2014 and Van Noorden, 2014). Another recent study estimated that a new journal article is published every 20 seconds (Munro, 2013). *Nature* reports that 47×10^3 primary journals currently exist adding more that 10^6 new articles per year to the primary literature. With the addition of grey literature, the number of available publications increases markedly. As of five years ago, 95% of the web, composed of over 220 billion pages, was still to be indexed by search engines (Scheeran, 2012). The growth of the web over the past five years now makes it very difficult to estimate the extent of web-based information, hence it may be impossible to determine the quantity of existing grey literature (BrightPlanet, 2014).

Unfortunately, the massive volume of new web-based information has affected abilities of decision makers to discover relevant, timely information. This situation merits a question: what proportion of the grey literature component of the information universe is worth paying attention to and, therefore, merits efforts to increase its visibility to search engines by enhanced information architecture and embedded metadata? Examination of information activities in decision-making contexts, including how people deal with information overload (Bawden & Robinson, 2009; Parsons, 2010), could provide grey literature advocates with insights to address this question.

Science-Policy Interface(s)
Since 2002, the Environmental Information: Use and Influence (EIUI) research program at Dalhousie University has strived to understand the use and influence of marine environmental and fisheries information and the processes at work at the science-policy interface (EIUI, 2014). Results from our recent studies support the view that an appreciation of the context(s) in which grey literature is used will inform efforts to recognize and promote its value.
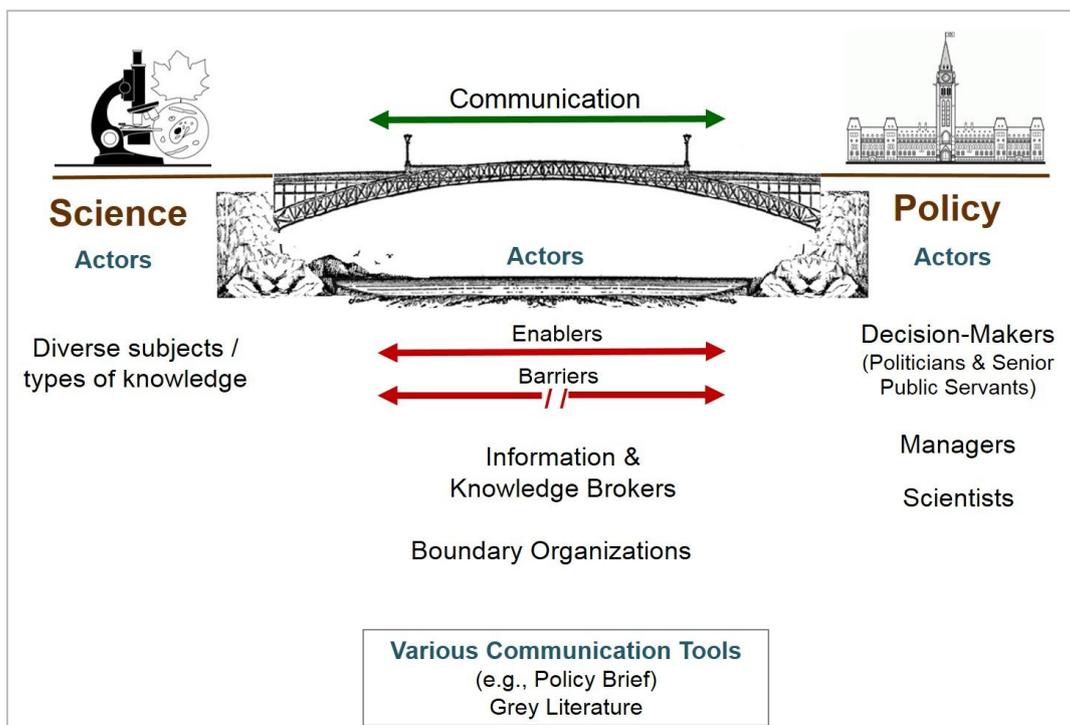
Figure 1. Science-Policy Interface(s)

Figure 1 provides a schematic illustration of our understanding of the science-policy interface(s). The "information universe" is multidimensional and information flow is often non-linear, leading to the complexity of activity at the science-policy interface. However, in its most simple form, the interface is

characterized by information production (science) and information use (policy) with often bi-directional communication between these two broad categories. In reality, the science-policy interface is more inclusive than the label implies, as it encompasses many social processes. In fact, numerous interfaces exist due to many decision-making contexts in which issues, information types, actors, jurisdictions, and other factors change (e.g., Sarkki et al., 2014). Actors or individuals at the interface compose both the "science" and "policy" arenas and they influence the production of and preferences for information types, especially grey literature. Bridging these two are a suite of additional actors who serve in various communication roles, such as editors, publishers, and distributors, now functioning in mostly digital capacities. Numerous enablers and barriers to communication can influence information flow and in some instances a particular factor, e.g., terminology used in research, or sensitivity to the topic, may enable or impede communication.

A diversity of subjects and types of knowledge contribute to the multiplicity of information products generated by the "science" component in Figure 1. Besides the natural and physical sciences, the social sciences and humanities, as well as traditional knowledge, may contribute significantly to the pool of information that can, and often should be, considered in decision making. Within government, policies themselves can be administrative, legislative, or regulatory. Various types of individuals participate in the policy and decision-making bodies, e.g., politicians and senior public servants, among whom are managers and scientists who conduct research within the mandates of government departments and agencies. Furthermore, actors at the science-policy interface can include information and knowledge brokers whose synthesis and communication skills enable them to translate the information generated by either the science or policy communities into a form suitable for either one. Some organizations, such as non-governmental organizations, are particularly effective as boundary organizations at this naturally complex interface. All of the individuals who work and pursue careers in the various components of this interface operate within a diversity of world views, educational capacities, and constraints that affect the production, distribution, reception, and use of information. Communication can be affected, and is often complicated by many converging factors. As a consequence, various tools have evolved to promote communication among the array of actors fulfilling the roles found at this interface.

Measuring Use of Information Available as Grey Literature
While grey literature is produced in large quantities by many organizations and is frequently used in decision-making contexts, the use of this large body of information in policy development is deemed extremely important but poorly understood (Ascher, Steelman, & Healy, 2010; Briggs & Knight, 2011; Holmes & Lock, 2010; Likens, 2010; McNie, 2007; Stojanovic, Ball, Ballinger, Lymbery, & Dodds, 2009). Surprisingly few organizations have undertaken an analysis of the use of their publications, and information pathways in decision-making contexts are still being elucidated (Economic Commission for Europe, 2003; MacDonald, Cordes, & Wells, 2004; Soomai, MacDonald, & Wells, 2011a, 2011b; Wells, 2003; Wells, Duce, & Huber, 2002).

As stated above, information use in policy and decision-making contexts is a complex phenomenon. It operates at various levels of scale: geographic, institutional, political, and temporal. Most models of scientific communication ignore the use of research information in public policy making, where information assimilation is different than in pure research contexts (Doern, 2001; Duff, 1997; Dunn, 2005; Søndergaard, Andersen, & Hjørland, 2003; Van der Veer Martens & Goodrum, 2005). Decision makers or their advisors may find it challenging to choose which information to use when there is an absence of consensus among scientific experts and the presence of competing views advocated by stakeholders. In policy settings, information in grey literature may be given greater importance than that in peer-reviewed journals because the language is more accessible and a more rapid and flexible delivery of relevant information can facilitate knowledge diffusion where decisions are based on competing factors, e.g., the pressures of political processes (Bremer & Glavovic, 2013; Pielke, 2007; Shanley & López, 2009). However, as open-access, peer-reviewed journals proliferate, papers published in these venues are becoming more easily accessible to decision-makers than has been the case previously (e.g., PLOS – Public Library of Science), which may affect the future mix of grey and primary literature used in decision-making contexts.

While information in grey literature may have a direct influence on the development of a policy, this type of "use" is only one of several. "Use" of information can, in fact, extend in meaning from general awareness, to increased understanding, to a change in attitude about a subject, or to actual implementation of the information in practice or policies (Figure 2) (Nutley, Walter & Davies, 2007;

Young, 2014). This spectrum of possible uses lays out a challenge to those wishing to promote the value and use of grey literature. An example drawn from one of our research projects illustrates this point.

Figure 2. Continuum of Information Use (Nutley, Walter, & Davies, 2007)

The Gulf of Maine Council on the Marine Environment is an American-Canadian intergovernmental organization consisting of representatives of three American states, two Canadian provinces, and the federal governments of both countries, as well as representatives from selected non-governmental organizations. This organization has produced several hundred publications over its history related to its mandate to maintain and enhance environmental quality in the Gulf of Maine and Bay of Fundy (MacDonald, Cordes, &Wells, 2004; Ross, Hubbard, Cordes, MacDonald, & Wells, 2014). In one of our studies, we interviewed members of the main Working Group of the Council about their understanding of the production and use of the Council's publications (Cossarini, MacDonald, & Wells, 2014). A member of that Working Group said the following about one of the publications:

We have a five or six page handout on [the] American Eel…and its status in the Gulf of Maine. So, I gave that to our pelagics advisor, fisheries advisor, and he found it very informative, a good synopsis and was quite impressed with it…now he never told me … that changed how [he] recommended to the Minister what our position is on it…but he found it informative in terms of getting his knowledge, in terms of playing that role as an advisor to the Minister of the issue.

This manager's description about the "use" of the handout, a fact sheet on the American Eel, underscores the different aspects of information "use." Both the manager and the fisheries advisor were clearly aware of the fact sheet. That awareness led to greater understanding about this fish species; however, whether the increased understanding led to direct implementation of the information in policies revised or developed by the particular department of government is not revealed. Nonetheless, the manager's observations illustrate three types of information use. Although only one example, the manager's comments also show that advocates of the use of grey literature cannot assume that simply drawing such literature to the attention of potential users is sufficient. Each stage of use (awareness, understanding, change in attitude, and implementation) may require different promotional techniques, or a focus on different features of the information so that how it might be used becomes obvious to a targeted recipient.

Types or Formats of Grey Literature
Experts on grey literature are well aware of the wide variety of types of information formats and products that constitutes this genre: internal policy documents, briefing documents, technical reports, contract or consultants' reports, internal reviews, fact sheets, infographics and posters, conference proceedings, newspapers, monographs, websites, social media posts, and a host of others. Acknowledgment that there is an array of types may lead to overlooking the role(s) that each fulfills and the need for different strategies for raising awareness and use of each type. Furthermore, given ongoing constraints on resource allocation and the vast quantity of grey literature, efforts to improve its use will benefit from understanding the different functions.

Briefing notes and memos, for example, are frequently used in public policy and decision-making contexts (see Figure 3). Policy briefs are frequently used to convey information to politicians and decision makers in many, if not most, government organizations. This type of document, while very common, is often not readily accessible, due to confidentiality and the short life span of the documents. Few studies have investigated the effectiveness of this form of communication (see Beynon, Gaarder, Chapoy, & Masset, 2012; Masset, Gaarder, Beynon, & Chapoy, 2013), although two of us (Soomai and Wells) in previous government positions saw briefing notes being used for their

intended purpose, e.g., briefing a Minister. Interestingly, in contrast one recent study found little evidence that policy briefs actually led to a change in prior beliefs (Rajabi, 2012). In our view, the quantity and wide-spread use of this form of grey literature points to the importance of briefing notes and memos. As stated, our experience in government (Soomai and Wells) showed that briefing notes submitted to managers and decision-makers at various levels were regularly used as an effective way to distill information on a problem and offer options for solutions.

Type	Role
Briefing Notes/Memos	Advice / The "Facts"
Technical Reports	Document Detailed Research Results
Social Media	Brief, Rapid, and Frequent Communication

Figure 3. Selected Types of Grey Literature

Technical reports have been produced by governments and other organizations in very large numbers and in various formats and styles for decades. This type of grey literature has received extensive attention by grey literature experts, librarians, and authors alike. Often, the resources required to produce technical reports can be substantial. State of the environment reports, for example, may entail the commitment of many contributors, editors, illustrators, designers, and publishers, at considerable expense (Wells 2003). Enhancing awareness and use of these reports is merited on several grounds, one of which is accountability for fiscal resource allocation, including the costs associated with not preparing such environmental reports. Other types of technical reports may have a smaller audience and consequently a lower probability of use. As the roles for technical reports vary, the expectations about readership need to be taken into account (very few politicians have the time or the expertise to read lengthy technical reports, for example) and should have a direct impact on decisions about promoting this form of grey literature.

Rapid communication and rapid-fire feedback are not new to the research fields. But now widespread online publishing and social media are changing how people learn about new developments and how people incorporate this information into decision-making processes. The degree to which researchers and decision-makers engage in and monitor social media is also evolving. There is little doubt that this form of communication is taking on increasing importance and that its role merits careful consideration. However, the sheer volume of information flowing through social media presents considerable challenges for deciphering what portion is significant enough to warrant development of strategies for promoting its awareness and use.

Communication and Information Pathways
While understanding the types and roles of grey literature can inform advocacy for this genre, further appreciation of decision-making processes is needed to increase the likelihood that the advocacy will be relevant and effective. Communication patterns are changing due to the prominence of the internet and social media (Cossins, 2014), and other ever advancing information technologies, and this trend will likely continue. Non-governmental organizations have become more active and successful at disseminating scientific information to policy communities at various levels of government (Grainger, 2013). However, "inherent differences between the fundamental structures and traditions of science and policy" (Francis, Whittaker, Shandas, Mills, & Graybill, 2005, p. 35) contribute to sub-optimal "flow of knowledge between researchers, policy makers, and resource managers" (Roux, Rogers, Briggs, Ashton, & Sergeant, 2006, p. 5). Therefore, tracing out information pathways that identify the points where grey literature plays a role is important. For example, information pathway models have

informed our recent marine environmental and fisheries research (as seen in Avdic, 2013; Cano Chacón, 2013; Cossarini, MacDonald, & Wells, 2014; Hutton, 2009; Soomai, Wells, & MacDonald, 2011).

In the first pathway model (Figure 4), the production and movement of information among five significant groups in fisheries activities in the Caribbean was studied, namely, industry, scientists, fisheries managers, advisory bodies, and policy makers (Soomai, Wells, & MacDonald, 2011). Identifying which information was assembled, produced, and used and in what format by each group provided an opportunity to determine where information flow and use were working well and where barriers to information exchange and use existed. This information flow model equips an advocate for grey literature with an understanding of where promotion of the value of this literature needs strengthening and also what information formats are preferred by each group. For example, while some members of this specific fishing industry can read and understand technical reports, most cannot. Thus, this model shows less use of technical reports by the fishing industry. It is quite likely that efforts to promote use of this literature by this group would be unsuccessful.
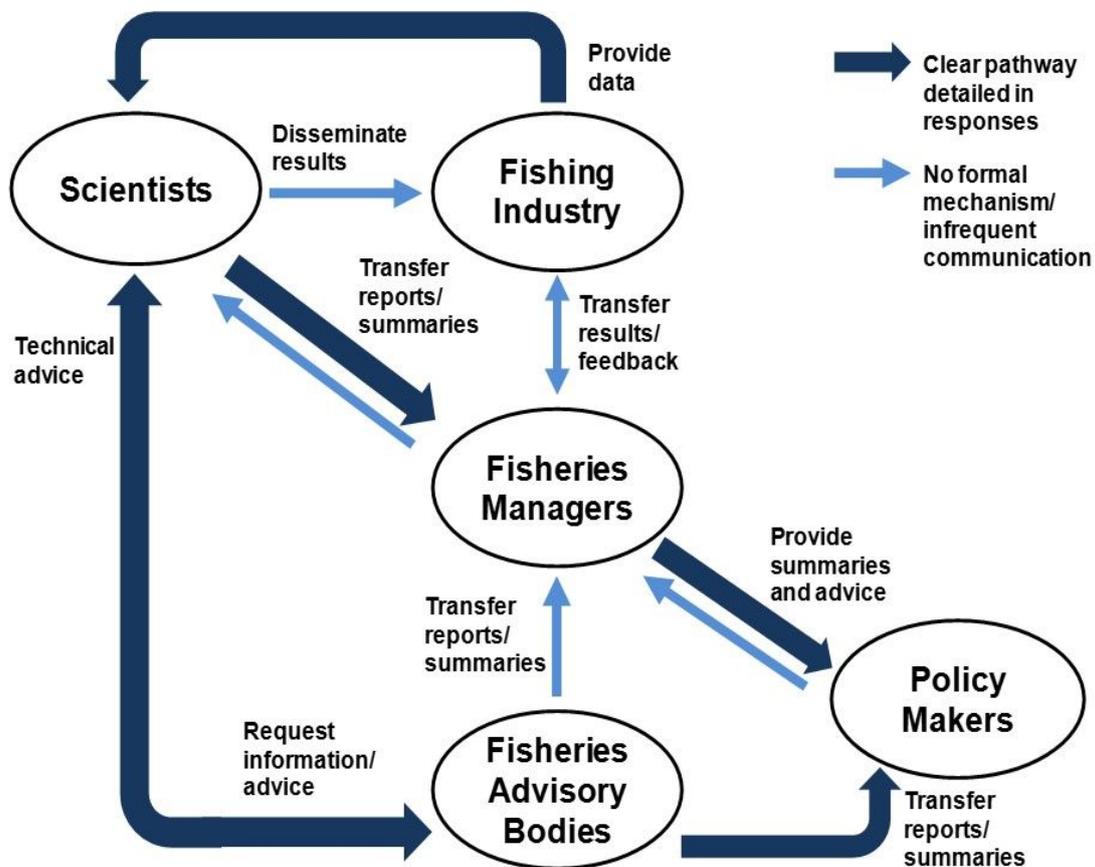

Figure 4. Information Flow: Fisheries Technical Reports
(Soomai, Wells, & MacDonald, 2011)

In the second pathway model (Figure 5), the production and movement of information in the certification of sustainable fisheries by the international Marine Stewardship Council (MSC) process are set out (Cano Chacón, 2013). This process results in labelling consumer products when a fishery is determined to be sustainable. Information as grey literature is found at a number of points in the decision-making process. Learning that the major reports are typically only produced in English and made accessible primarily by posting to the Council's website enhances an understanding of how to tailor advocacy tactics. For example, simply drawing attention to the existence of the reports is not likely to increase use by small fishers in countries where the MSC certification process is being applied.
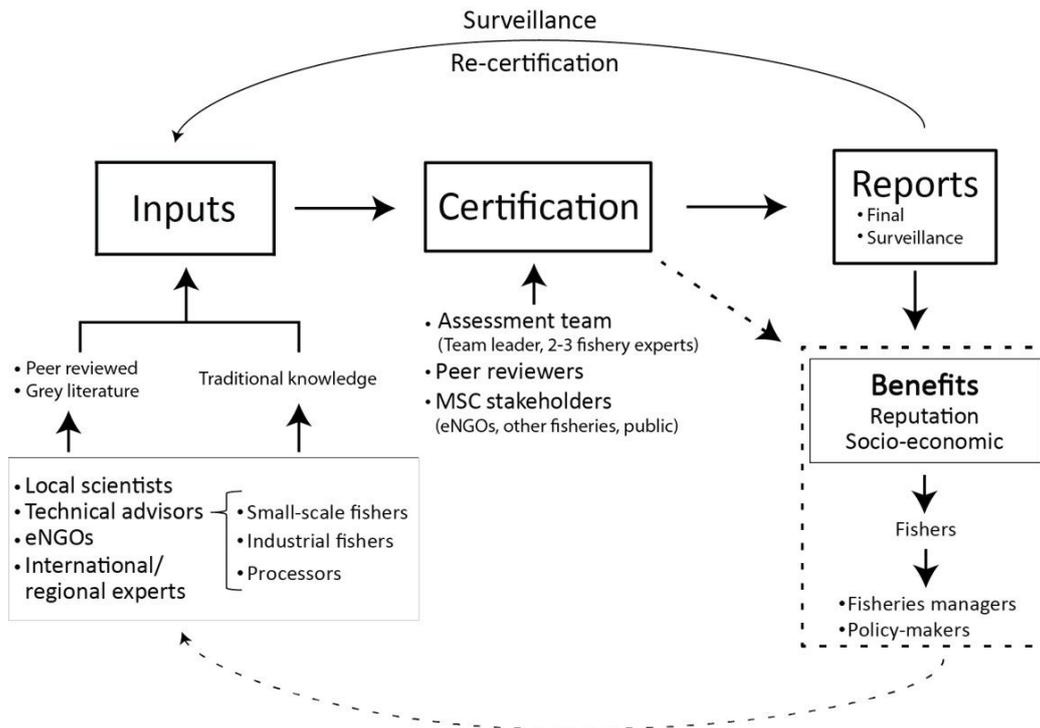
Figure 5. Information Flow: Marine Stewardship Council (Cano Chacón, 2013)

Conclusions

As illustrated by the Nova Scotian example given earlier, information published as grey literature can fill an important role in policy-making contexts. Promotion of the value of such literature, in our view, is merited, particularly when it offers evidence that will help to resolve societal problems. In an age of information abundance, or even information excess, many factors affect which if any information resources will be used to inform decision-making. As well, use itself is a complex phenomenon that is closely related to context. Published evidence clearly competes with other factors that are brought to bear in decision making.

Lobbying for the value of grey literature should not begin with the assumption that the value is obvious to potential users. Rather, advocacy should begin from a position informed by an understanding of the range of settings in which it is used and with the various audiences or readers taken into account. The role that grey literature fulfils must be viewed within the larger background of information production and communication where the relative importance of information in grey literature versus information in primary literature can and will vary. While understanding the types and roles of grey literature can inform advocacy for this genre, appreciation of decision-making processes is needed to increase the likelihood that the advocacy will be meaningful and effective. Further research on information use is needed. With increased understanding resulting from such study, advocacy for grey literature will be better informed.

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