Marine Information Matters:
Probing Its Use and Influence in Policy and Decision Making

EIUI-Partnership Workshop

20-21 September 2013

Environmental Information: Use and Influence Research Program

Dalhousie University

2014

Contents

1. Introduction

The EIUI-Partnership workshop included a public lecture on Day 1 and discussions about the partnership research on Day 2. The agenda for Day 2 of the EIUI-Partnership workshop is attached in Appendix 1. The two-day workshop hosted by the EIUI research program highlighted research being conducted in partnership with governmental and non-governmental organizations.

2. Day 1 – Public Lecture

"Communicating Fisheries Information: Challenges and Opportunities"

Fisheries governance and information pathways in fisheries management are exceptionally complex. At the same time, large quantities of fisheries information on numerous subjects are available from a wide range of providers for a diversity of users. These points were emphasized in a public lecture at Dalhousie University on 20 September 2013 by Dr. Richard Grainger, recently Chief, Statistics and Information in the Fisheries and Aquaculture Department of the United Nations Food and Agriculture Organization (FAO), Rome.

In his lecture, "How does information influence policy? The role of fishery organizations in policy-making for fisheries," Dr. Grainger drew on his extensive experience in providing advice to fisheries managers and policy makers at national, regional, and international levels. He identified challenges in communicating advice and outlined new initiatives aimed at improving access to fisheries data and information through interdisciplinary collaboration. He noted that communicating complex scientific concepts to policy-makers without distorting the accuracy and validity of the message can also be problematic. The findings of a 1998 study, for example, showed that the state of global fisheries is often misunderstood and public opinions on this subject may have very little basis in scientific fact (Alverson & Dunlop, 1998). In some instances, misinformation may be promoted by lobbyists who can deliberately distort scientific facts or misunderstand findings. In addition to these communication issues, Dr. Grainger drew attention to the increasingly

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important role that the media and non-governmental organizations are fulfilling in the communication of information and its influence on policy-making.

A paucity of fisheries data from small-scale fisheries and the need for new types of data to implement the ecosystem approach to fisheries management are current challenges in fisheries management. The Food and Agriculture Organization has a major role with regard to data and information since it is a repository for global fisheries statistics and provides global direction through its international instruments on aspects of fisheries management. FAO is involved in collaborative initiatives, such as iMarine, which involves establishing a data infrastructure to support the ecosystem approach to fisheries. The iMarine infrastructure is designed to ensure that dispersed and heterogeneous data are available to stakeholder communities through a shared virtual environment. Another global initiative is the FAO's "Strategy-STF [Status and Trends of Capture Fisheries]," a voluntary instrument aimed at providing a framework for the improvement of knowledge and understanding of fishery status and trends as a basis for fisheries policy-making (FAO, 2003).

Dr. Grainger concluded his lecture by reiterating the importance of reliable and accessible fisheries information and its communication to the public and policy-makers through clear, straightforward messages.

3. Day 2 – Presentations and Discussions

See **Appendix 1** for the schedule of presentations and discussions on Day 2 of the EIUI-Partnership workshop, "Marine Information Matters: Probing Its Use and Influence in Policy and Decision Making."

3.1. Introduction and Objectives of the Workshop

Grey Literature refers to information produced at all levels of government, academics, business and industry in print and electronic formats, but which is not controlled by commercial publishers (GreyNet, 2013). The importance of grey literature produced by governmental organizations is seen for example in the public attention to recent climate

change reports, e.g., the Stern Review on the economics of climate change (October 2006) and technical reports produced by the Intergovernmental Panel on Climate Change (IPCC) and UN agencies such as the World Meteorological Organization (WMO) and the United Nations Environmental Programme (UNEP). Within the UN system, considerable quantities of grey literature on the marine environment are produced by governmental organizations.

The Environmental Information: Use and Influence research program seeks to understand the role of environmental information produced by governmental and non-governmental organizations in policy-making. Our guiding framework for our research initiative highlights the complexity of studying information flow at the science-policy interface. The EIUI team is interdisciplinary and draws on the expertise of faculty and students within the Schools of Information Management, Public Administration, Resource and Environmental Management, and the Marine Affairs Program.

Through the Partnership Development Grant Program, research in the social sciences and humanities will be developed, including knowledge mobilization, the involvement of students and new scholars, and the design and testing of new partnership approaches for research. Research partners include governmental (Canada Department of Fisheries and Oceans, Canada Department of the Environment, Nova Scotia Department of Fisheries and Aquaculture), intergovernmental (Food and Agriculture Organization of the United Nations, Northwest Atlantic Fisheries Organization), and non-governmental organizations (Bay of Fundy Ecosystem Partnership, Canadian Parks and Wilderness Society, WWF Canada).

The objectives of the workshop were (MacDonald, 2013a):

- to provide a progress report on EIUI-Partnership Grant case studies
- to review the key research questions and approaches
- to consider methodologies for measuring use and influence of scientific information
- to consider next steps in the research, including existing and potential collaborations

3.2. Key Research Questions

Research questions in the SSHRC supported partnership project include (Wells, 2013):

Information Generation and Use

- To what degree does information-based advice help the partner organizations prioritize their operational directions and research?
- Are there any significant patterns in the production and use of various types of information, including grey literature, in each organization?
- How are the organizations thinking about and planning for future changes in preparing, publishing, and distributing their information? Do the organizations take advantage of (new) information-related technical capabilities?

Information Management and Communication

- To what extent are the partner organizations revising their information management strategies for promoting awareness and use of their information, due to changes in the information technology landscape?
- Do policy makers have access to sufficient relevant information, including that in grey literature, when considering and making policy decisions?
- What common findings can be applied within and across the organizations to improve the flow of timely information at the science-policy interface?

3.3. Research Methodologies

The guiding framework of our research focuses on the science-policy interface between production of scientific grey literature and its use in policy and decision-making contexts Using this framework for the research we are developing techniques to measure information use and influence, and to identify and mitigate communication barriers (MacDonald, 2013b).

The use of scientific information in policy and decision making is a complex process. What evidence of use / influence should one look for? What evidence might exist that may not be

(easily) accessible? The literature describes a continuum of research where the stages of information or research use in policy-making exist as an iterative process (Nutley, Walter, & Davies, 2007). Furthermore, the generation, transmission, and use of environmental information is highly complex as seen in a diagram by Ascher, Steelman, and Healey (2010).

Research methods to determine information use are diverse. They include bibliometrics which provide, e.g., numbers of citations to publications, who are citing the publicaitons, and the location of citing authors. Webometrics, e.g., web statistics and web link searches provide evidence of networking. A range of surveys, including interviews, can reveal the nature of collaboration, information management behaviours of actors, and the use of reports in policy-contexts. Media analysis of, for example, news and social media, can provide evidence of awareness across wide audiences. Direct observations, content analysis, and discourse analysis can provide additional insights on information use in policy-contexts. Network analysis can provide details on the types of actors in information networks. Altmetrics provide data on, for example, the number of "followers," retweets, and networks of actors/informants.

Integration of the findings from all of the data sets will inform the development of theoretical models of the life cycles of marine environmental grey literature, and the creation of a general measure of the influence of marine environmental information.

3.4. Key Results of the EIUI Research Program

Results of our case studies, completed and current, follow and these cases represent studies with:

- national governmental bodies, regional and global inter-governmental, and non-governmental organizations,
- organizations that give extensive attention to marine environmental matters, and
- organizations involved in public policy development.

Our initial research questions (2002-2006) focused on:

- Production - What have various (inter)-governmental organizations published and how, i.e., their production?
- Distribution and use - What is the evidence of distribution and use of their publications?
- Influence - Which methods best measure the influence of (information in) grey literature on policy/decision making in environmental fields?
- How can marine environmental information published in grey formats be influential in decision making?

Then for the first SSHRC Grant (2007-2010) our research questions focused on:

- Influence - What is the impact (i.e., influence) of literature produced by governmental environmental organizations? How should the impact of this grey literature be measured and assessed?
- Perception of Grey Literature - In public policy, decision-making contexts, are research reports published as grey literature perceived differently from research papers published in primary journals?
- Awareness - Given developments in digital publications and search technologies, how should publications be designed for effective discovery and impact?

3.4.1. Completed Case Studies

Intergovernmental groups

GESAMP

An initial study demonstrated that relying on a traditional source of citation data, i.e., Web of Science, does not account for all of the evidence of the use of grey literature (MacDonald, Cordes, & Wells, 2004). A subsequent study, Hutton (2009; 2010) shows that a composite metric of use and influence can be developed from citation data from several sources: Web

of Science, Google, Google Scholar, and monographs. Analysis of these citations provides a more complete understanding of the use and influence of grey literature.

Gulf of Maine Council on the Marine Environment / Canada Department of Fisheries and Oceans

Communication about all of GOMC's activities has been important from its beginning in 1989. Publications have been a key element of their communication strategy (Cordes, MacDonald, & Wells, 2006). Their role needs to be determined and possibly strengthened.

Interviews conducted with 19 key Working Group members of the Gulf of Maine Council on the Marine Environment identified enablers and barriers to the production, distribution, and use of its publications (Cossarini, 2010). This study advanced understanding about organizations relying primarily on publishing scientific grey literature, particularly with regard to the diverse methods of distribution of publications (now mostly digital).

A second study of awareness and use of *The State of the Gulf of Maine Report* theme papers showed awareness to be high among members of the Council and Working Group and among the readers of the *Gulf of Maine Times* (Soomai, MacDonald, & Wells, 2011a). The overall value of the theme papers is their importance as a source of baseline information for public education to increase public awareness of the key threats to the region, and as a starting point for managers to inform the formulation of policy, advocacy, and for guiding work and discussion on the environmental management of the Gulf of Maine and Bay of Fundy.

UN Food and Agriculture Organization/ Caribbean Regional Fisheries Mechanism

The flow of information between multiple stakeholders - the fishing industry, scientists, fisheries managers, policymakers, and fisheries advisory bodies (FAO based) - was studied through a survey of key individuals in order to document each of their roles in the creation, distribution, and use of fisheries information in Trinidad and Tobago (Soomai, Wells, & MacDonald, 2011). There is a formal technical report series on the fisheries in the region and reports are sent out by agencies and available on the website. The reports are used

primarily within the scientific community and there is limited evidence of use and impact (influence) on policy making.

Governmental groups - Federal

Environment Canada

Technical reports are written by agency scientists and published in various technical report series. Recent reports are distributed via the Environment Canada website; there are limited numbers of printed copies. It is unknown as to how many of the earlier reports of the department are being digitized.

Governmental groups - Provincial

The Nova Scotia Department of Fisheries and Aquaculture

The government was actively seeking stakeholder involvement in developing a coastal strategy and policy for Nova Scotia and released *The 2009 State of Nova Scotia's Coast Report* in various versions, e.g., technical report, summary, and fact sheets, and formats (print and digital formats). A study of the awareness of, use by, and influence on stakeholders of this report showed that each version has specific uses for specific audiences and several versions of the report are needed (Soomai, MacDonald, & Wells, 2011b). Several communication methods are needed to reach diverse audiences. The study showed that governmental awareness promotion strategies are more likely to reach the interested public than the general public in public policy development.

3.5. The Importance of the Science-Policy Interface

Understanding of the role of information at the science-policy interface is still limited and it is not generally understood how management advice is used in policy-making under different circumstances and in different agencies. The apparent disconnect between the information produced by scientists and that used by policy-makers has prompted global action to address problems at the interface, e.g., at the recent 2012 UN Conference on Environment and Development (UNCED) connecting science and policy was considered a

priority for urgent action to achieve sustainable development. Four main challenges to information use in policy-making were identified in a review of the literature on knowledge utilization. Scientific uncertainty is a challenge due to the inherent variability and uncertainty of outcomes in biological systems and to statistical uncertainty arising from the assessment methods and advice. Another challenge is the paradox of science and politics, relating to the production of value-laden rather than policy neutral advice. A third challenge is the different motivations of scientists and policy-makers to act. Lastly, governance aspects such as the type of institutional links can limit communication channels between information producers and users (Soomai, 2013a).

Two interpretations of the science-policy interface describe a linear or science-based interface and a collaborative or participatory interface. Advocates of the science-based interface see the inherent uncertainty in science as a lack of available information, warranting the creation of new science to fill gaps in information delivered to decision-makers. Alternatively, advocates of the participatory approach view uncertainty as inevitable, necessitating the integration of existing knowledge, including scientific knowledge and local knowledge among others, in an interdisciplinary approach. Knowledge mobilization may be dependent on the characteristics of each science-policy interface.

Boundary work, extended peer communities, adaptive management, and increased public participation seek to bridge the divide between science and policy making by facilitating interaction between the producers and users of information. The overall impacts of these advances are increased perceptions of salience or relevance to the policy process, increased legitimacy related to inputs from multiple sources, and credibility related to the validity of findings. The main gaps in the knowledge of the science-policy interface include the increasingly important roles of other actors, e.g., NGOs; how policy-makers determine the "right" information among the vast quantity of available information; how policy and decision-makers interpret scientific advice; and how boundary organizations link science and policy-making.

3.6. Current EIUI Case Studies

3.6.1. The Role of the Information of the Marine Stewardship Council Certification Process in Developing Countries: A Case Study of Two Certified Fisheries in Mexico

The Marine Stewardship Council (MSC) is a key player in the field of seafood ecolabelling and certification. To determine the relation between the information of the certification process and fisheries management practices in developing countries, two MSC certified fisheries in Mexico were selected as case studies: the Baja California red rock lobster (*Panulirus interruptus*) fishery and the Sian Ka'an and Banco Chinchorro Biosphere Reserve spiny lobster (*Panulirus argus*) fishery (Cano Chacón, 2013). This study involved a review of literature on the MSC certification process, content analysis of documentation about the certification process available on the MSC website, analysis of citations of reports generated in the certification of the Mexican fisheries, and semi-structured survey questionnaires sent to stakeholders in the two lobster fisheries. The questionnaires asked participants about the production, distribution, acquisition, and awareness and use of the reports produced by the certification process.

The MSC certification process is a driver in the production of scientific information and can inform fisheries management and increase the research capacity of developing countries. The process can also enhance the social, governance, and environmental outcomes for developing countries through its fisheries assessment methodology. Reports produced in the certification process are substantial assessments of the state of fisheries and their management. Use of the certification reports was limited; however, use was more indirect than direct in fisheries management. Awareness of the reports by stakeholders and policy-makers indirectly affected their knowledge and attitudes about a fishery. Language (primarily English), the technical format of the reports, and their limited distribution can be barriers to the use of the information in the reports. Recommendations to promote wider use of the reports include the production of summary versions of reports for the fishing industry in the native language of the country, initiatives to increase awareness of

the location of the reports (primarily only on the MSC website), and involvement of government authorities in the dissemination of information of the MSC reports.

3.6.2. Measuring Use and Influence: An Assessment of *The State of World Fisheries and Aquaculture*

The *State of World Fisheries and Aquaculture* (SOFIA) report is published bi-annually by the Food and Agriculture Organization (FAO) of the United Nations. The goal of the report is to provide policy makers of both developed and developing countries with credible information relating to fisheries and aquaculture with which to formulate policy. Despite this, an assessment of whether the report has been successful in doing so has never been completed. The goal of this study is to measure the use of the SOFIA report through citation analysis, document analysis, and content analysis (Avdic, 2013).

To date, citation searches have been conducted in Google, Google Scholar, Scopus, and Web of Science. So far, ~6500 documents have been found from these databases that cite SOFIA. From the 6500 documents, there are ~10,500 citations. The documents consist of journal articles, books, theses, conferences papers, government documents, grey literature, websites, blogs, and news articles from a variety of sources and countries. These citations will be further analyzed to understand the context of the references to SOFIA. Additional policy documents from the Canadian government were found on government and government department websites, as well as policy document databases. From these, it was found that the most common use of SOFIA was to describe the state of fisheries resources worldwide (i.e., overexploited, exploited, etc.) while the second most common usage was of data regarding aquaculture and aquaculture expansion. Additional analysis of policy documents will be conducted on those found in the above-mentioned database. Overall, this work will provide the FAO with guidance on how to structure future editions of SOFIA and to provide a methodology that can be applied to assess the use of other FAO reports and information.

3.6.3. What Do Users Want From An Environmental Assessment? A Study of *The State of the Scotian Shelf Report*

The State of the Scotian Shelf Report was created by the Department of Fisheries and Oceans (DFO) and is hosted online and promoted by the Atlantic Coastal Zone Information Steering Committee (ACZISC) through their COINAtlantic website. Originally intended as an evaluation support for the Eastern Scotian Shelf Integrated Management (ESSIM) Initiative (created under the Oceans Act), the report was published as a "standalone" resource for coastal zone managers in the Scotian Shelf region. In 2014, a case study will be undertaken to investigate the awareness and use of the report (Ross, 2013).

Due to a lengthy preparatory period for this case study, preliminary data was collected in the form of citation searching and web analytics of the COINAtlantic site, for the purpose of informing the approach of the case study. Citation searches in the major databases Web of Science and Scopus, and in Google Scholar produced a mere three results for the report, suggesting that, unlike other state of the environment reports, the *State of the Scotian Shelf Report* has not found a secondary academic audience. Google Analytics data for the report's page on the COINAtlantic website revealed only ~1000 unique visitors during the two years the report has been available for download. Combined, these two data points suggest limited awareness and use of the report. As a result, the original conception of the case study has been altered: rather than focusing exclusively on the reception of the *State of the Scotian Shelf Report*, the case study will use the report as a focus to consider what end-users want from a state of the environment report (also see Wells, 2003).

The study will utilize updated analysis of citation and web analytic data, but will primarily use qualitative methods: surveys of recipients of the ACZISC's Coastal Update Newsletter (the primary audience for the report's promotions) and members of the former ESSIM Initiative's Stakeholder Action Committee (SAC), as well as in-depth interviews with select SAC members. The findings of this study will advance progress towards leveraging EIUI's body of research into the development of best practice recommendations for the developers of state of the environment reports.

3.6.4. The Role of Scientific Information in Policy Making: An Example from Marine Fisheries Bycatch Management

Doctoral research on developing an understanding of the role of scientific information in policy-making for marine fisheries bycatch management is in progress and is examining the processes involved in production, use, and dissemination of fisheries scientific information in policy contexts and the role(s) of knowledge networks in decision-making (Soomai, 2013b). Research questions will be asked within case studies of three inter-related governmental organizations, involved in the production of scientific information and policy-making related to bycatch management – the Canada Department of Fisheries and Oceans (DFO), the Northwest Atlantic Fisheries Organization (NAFO), and the UN Food and Agriculture Organization (FAO).

Data collection is being conducted during three separate internships with each case study organization. The key actors and the information production and communication processes will be identified through content analysis of key scientific publications, interviews of scientists, managers, and policy-makers, and direct observations at relevant science and policy meetings at DFO, FAO, and NAFO. The research will describe the actors' roles, drivers in producing information, and enablers and barriers to information use in policy-making. Using network analysis, maps of networked actors will be developed and will identify each stakeholder's contribution to knowledge and their ability to influence policy through science advice to managers and policy-makers, as well as gaps or overlaps in network linkages. The findings will develop models of information flows and a tested methodology for assessing information use. The research will be one of the first comprehensive studies within governmental organizations on the role of fisheries scientific information in policy-making.

4. Day 2 - Discussion with Partners

4.1. Introduction

Research questions from the Partnership Development Grant Application guided the discussion among the partners. Representatives of the partner organizations included: Alexis Pacey (Northwest Atlantic Fisheries Organization - NAFO), Heather Breeze (Canada Department of Fisheries and Oceans - DFO), Susan Rolston (Bay of Fundy Ecosystem Partnership - BoFEP), and Richard Grainger (UN Food and Agriculture Organization - FAO). Representatives of other organizations included Andy Sherin of the Atlantic Coastal Zone Information Steering Committee (ACZISC).

4.2. Northwest Atlantic Fisheries Organization (NAFO)

The EIUI obtained official status as an Observer to NAFO and will be attending the 35th Annual Meeting. At this meeting, the Contracting Parties to NAFO will make decisions for conservation and management measures for 2014 based on the fisheries information produced during the year within the NAFO constituent bodies. Decisions at the annual meeting will be made by NAFO's Fisheries Commission, generally based on advice from the Scientific Council. Information used at the meeting is included in reports and working papers prepared by the Contracting Parties and the NAFO constituent bodies. The new conservation and management measures will be published in a new operations handbook for 2014. NAFO will be using a survey conducted at the 35th Annual Meeting to determine the preferences of its members with regard to accessing information, e.g., online access through Sharepoint, the NAFO website, or print copies.

4.3. Canada Department of Fisheries and Oceans (DFO)

Recent departmental restructuring in DFO has introduced new challenges in communication pathways and the communications capacity within the federal government. While a large quantity of DFO's information is already available on its website, many of its old reports have not been digitised. Digitising may not be a priority and this information

may eventually be lost and will not be available to the public (note the ongoing controversy on DFO library consolidation).

A large concern is how to discern information to be used for management when there is so much available information. A question to be asked is how do policy-makers decide what is relevant to them in their decision-making with regard to format, e.g., a digital version; type of information, e.g., a summary; or other considerations. Other potential studies include studies on the use of the current *The State of the Scotian Shelf Report* and recent climate change reports. DFO is interested in understanding who are the users of particular reports – are they the target audience for the reports or other groups? DFO has had difficulty at "debunking myths," and studies on the government's efforts to correct misinformation can be useful.

4.4. Bay of Fundy Ecosystem Partnership (BOFEP)

BOFEP is staffed by volunteers and has been in existence for over 20 years. BOFEP hosts a biennial Fundy science workshop and working groups on physical and biological sciences. The organization mostly assembles information rather than generates science. However, through grants, its various working groups have conducted science. The target audience for BOFEP's publications are academic communities and the general public. Reports, e.g., the proceedings of its biennial workshop, are available in print and digital format and on the organization's website. BOFEP also produces peer-reviewed fact sheets.

Moving forward as an organization, BOFEP is interested in understanding how its publications are being used by the intended audience and others. The organization is also interested in learning how to use its current information to re-engage its members and in learning new methods to engage its audience. The organisation measures the number of visits to its website but is uncertain as to its audiences.

4.5. UN Food and Agriculture Organization (FAO)

The shift from the top-down approach to fisheries management to increased involvement of the public including the media, non-governmental organizations, fisheries organizations,

and academic institutions has made governance more transparent yet more complex as more information is being produced. FAO recognises the importance of grey literature as it produces large volumes in the form of project reports, for example, which may never be published but contain baseline information going as far back as 23-30 years and are the only sources of information on a topic. Summarized information such as brochures and flyers can be very powerful tools for getting messages out to people who will never read the full documents. They present facts and are useful, for example, for preparing to speak with the press. Such information is also an effective form of communication to the general public as was seen for SOFIA.

Policy documents rarely include references and citations and it is difficult to follow the trail of information that led to policy-making and for studying influence. A possible source of data to study influence is the annual UN Secretary General resolutions on sustainable fisheries and oceans and law of the sea which contain details on activities at the time of meetings. The work of many agencies, including regional fisheries bodies, is guided by these resolutions.

4.6. General Discussion and Next Steps

The group discussed general approaches to the research and methods to measure influence of information in light of ongoing advances in information technologies. The group also considered subject areas for future studies.

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Appendix 1

Marine Information Matters:

Probing Its Use and Influence in Policy and Decision Making

Workshop

Saturday, 21 September 2013

Room 3089, Rowe Management Building

6100 University Avenue

9:00 - 9:15 am	Introduction and objectives of the workshop
9:15 - 9:30	Key research questions
9:30 - 9:45	Research methodologies (measuring use/influence)
9:45 - 10:00	Some key results of the EIUI Progam
10:00 - 10:15	The importance and complexity of the science-policy interface
10:15 - 10:30	*Break (coffee/tea)*
10:30 - 11:50	Current EIUI case studies
11:50 - 12:00	Morning wrap-up
12:00 - 1:30 pm	*Lunch*
1:30 - 2:30	Partner engagement (partners speak about interests/questions)
2:30 - 3:30	Roundtable discussions
3:30 - 3:45	*Break (coffee /tea)*
3:45 - 4:15	Reporting and observations of the day's discussion by Richard Grainger
4:15 - 5:00	Discussion of next steps