

Information, Public Decision-Making, and Climate Change: The Many Roles of Grey Literature

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Abstract

The far-reaching effects of climate change are among the leading global concerns today. The impacts of changing climate manifest in rising global temperatures (on land and in the ocean), escalating destructive extreme weather events, increasing biodiversity loss, shifting biomes, growing food insecurity, greater health risks (physical and mental), and involuntary migration of people, among other interconnected factors. The complexity of these problems individually and collectively is receiving extensive consideration in research and public arenas. Concerns about the influences of climate change have been increasing since the 1950s and through the last half of the twentieth century scientific understanding reached a consensus of the causes and numerous negative outcomes. The impacts have become clear in the first decades of the twenty-first century. Researchers in many disciplines are cautioning that the world is rapidly reaching a tipping point in the overall health of the planet, after which recovery will be very difficult. In addition, decision makers are grappling with how to evaluate multiple and sometimes competing calls for action and to decide how to address the issues best.

In both research and decision-making settings, grey literature has been a prominent information genre about the multifaceted aspects of climate. Large quantities of grey literature on climate and climate change subjects have been produced. Academic institutions, governmental and intergovernmental bodies, non-governmental organizations, professional associations, think tanks, and news media have turned out grey literature ranging from brochures to hefty technical reports. These materials have been generated in print and digital formats to fulfil a suite of roles: 1) to report research findings, 2) to compile and synthesize literature on research and professional practice, 3) to inform policymakers and the public, 4) to advocate for policy development, 5) to implement policy, 6) to promote change in professional and individual practice, 7) to educate; 8) to broker information and promote networking, and 9) to counter misinformation. In this paper we draw on research about decision making in public policy and management practice about coastal and marine environments to illustrate how grey literature on climate subjects has been deployed in delivering on these roles. Grey literature is widely used in many decision-making contexts. Recognizing its numerous roles can inform citizens, managers, planners, and policy- and decision-makers in addressing the climate challenges facing society today.

The far-reaching effects of climate change are among the leading global concerns today. In 2023, for example, devastating storms, droughts, floods, and record heatwaves and wildfires occurred in many locations around the world (European Environment Agency, 2023; Osaka, 2023; Owens, 2023; Ripple et al., 2023; Voosen, 2024; World Meteorological Organization, 2024; You, 2024). The costs of the destruction stemming from these weather extremes, which are becoming more frequent, are massive (Bowman & Sharples, 2023; Ness, 2023; Newman & Noy, 2023). In 2022, for instance, 18 separate disastrous events in the United States caused damages totalling US \$165 billion (Rott, 2023; Smith, A. B., 2023). The World Meteorological Organization estimated that economic losses due

to “extreme weather, climate and water-related events” between 1970 and 2021 totalled US \$4.3 trillion globally (World Meteorological Organization, 2023). Coupled with over two million human deaths in this period, due to these extreme events, and escalating major distresses on wider biodiversity (Díaz & Malhi, 2022; Isbell, et al., 2023), the implications of climate change for human and environmental health of the planet are without any question serious (Pörtner & Roberts, 2022),

Abundance of Information on Climate Change

Literature in all research areas, particularly scientific domains, has increased markedly over the past century. In 2018, the STM: International Association of Scientific, Technical, and Medical Publishers reported that more than three million scientific papers were being published each year rising at a rate of 4% annually (Johnson et al., 2018). Over the next two years that rate increased to between 5% and 6.5% (STM global brief 2021, 2022). UNESCO reported in 2021 that between 2015 and 2019 scientific publications increased by 21% (Schneergans et al., 2021; see also Castillo et al., 2023). Notably, these publication statistics do not include grey literature.

The quantity of information on climate and climate change subjects (both primary peer-reviewed journal articles and grey literature) has also rapidly spiralled upward since the early decades of the twentieth century following the discovery that rising global temperatures were primarily caused by carbon dioxide emissions (Dessler, 2022; UKRI, n.d.). It is difficult to estimate the total number of publications related to climate subjects. One quite rough measure of the extent is determined by a simple Google search of the term “climate change,” which returns results exceeding 1.2 billion (e.g., a Google search returned 1,260,000,000 hits on 12 January 2024). Many different aspects of climate change are found in this substantial output and it is likely that grey literature constitutes a sizeable portion (possibly the largest).

Grey literature has been defined as “that which is produced on all levels of government, academics, business and industry in print and electronic formats, but which is not controlled by commercial publishers, i.e., where publishing is not the primary activity of the producing body” (Schöpfel & Farace, 2010, p. 2029). While this definition is widely accepted, in practice other organizations, in addition to the types explicitly listed in the definition, produce grey literature. For example, large numbers of non-governmental organizations, many of which focus on environmental issues, annually turn out grey literature publications by the score.

Decision-Making Processes

To gain an appreciation of this vast body of grey literature, understanding the contexts in which the information is produced and used is essential. In an earlier iteration of this series of conferences on grey literature, we described the importance of grey literature in public policy development processes (MacDonald et al., 2015). Most policy decision-making processes are notoriously complex, as Sir Peter Gluckman, then Chief Science Advisor to the New Zealand Prime Minister, illustrated in a policy cycle diagram that he presented at a conference of the International Network for Government Science Advice in Brussels in 2016 (reproduced and expanded in Gluckman, 2018). That diagram vividly highlights the “messiness” of public policy development processes (Castán Broto, 2020; Lewis et al., 2023). The public arena of policy decision making at all levels of government is populated with many different actors and actions where information of many types and formats supports decision-making processes (SAPEA, 2019). It is important to recognize that this environment is where much of the climate-related grey literature functions.

Evidence (information) can be and is introduced at many different entry points in decision processes, e.g., in public hearings and consultations, in legislative committees, etc., by distinctly separate actors, e.g., researchers, policy analysts, journalists, citizens, etc.

(MacDonald et al., 2016). The context surrounding each access point often dictates the type and format of information that is used. For the evidence to be effective it must be relevant and be presented in a usable form at each location (Cairney & Kwiatkowski, 2017; Mitchell et al., 2006; Sarkki et al., 2014). Once introduced, the format of the information may evolve as it moves along the various pathways in the decision processes. For example, information may enter as a briefing note prepared by a researcher, which is presented to a policy analyst or a resource management committee, then transmitted through a variety of pathways in the hierarchical structures of government and concludes the course of its travel as a reference in a policy document. Most information transmission routes, however, are less straightforward and are drawn-out and convoluted with potentially numerous hurdles or blockage points. Typically, grey literature figures in every one of the pathways (Bogenschneider & Corbett, 2021; Cairney, 2016).

Types of Climate Change Grey Literature

As is well known by grey literature researchers, the types of grey literature are varied and extensive (see Table 1). This diversity is largely related to how and where information is used in decision-making processes, as noted above. Some types are widely used in organizational settings, e.g., briefing notes, often specifically designed and formatted to meet the contextual requirements. While some types are very common at both operational and political branches of governmental bodies, they may not be publicly accessible by default. Grey literature used within government ministerial cabinets in Westminster styles of government, for example, is considered confidential unless explicitly made publicly accessible (Campagnolo, 2018). In other organizational contexts, e.g., private think tanks or companies, grey literature used in decision processes can also be labelled confidential and not made available publicly.

Table 1. Types of Grey Literature about Climate Change

- Blog Posts
- Briefing (Policy) Notes
- Conference & Workshop Papers
- Databases and Data Sets
- Fact Sheets
- Government Publications (many types)
- Industry / Consultant Reports (many types)
- Infographics
- Literary and Artistic Works
- Maps
- Media Releases
- Meeting Records
- Newsletters
- News Media Reports (several types)
- NGO Publications (many types)
- Patents
- Photographs and Graphic Images
- Reports (many types)
- Social Media Posts
- Standards
- Theses / Dissertations
- Think Tank Publications (many types)
- Video & Audio Posts
- Websites – *and more ...*

The types listed in Table 1 also illustrate a range of producers of grey literature: individual authors, governmental and non-governmental organizations, intergovernmental bodies, news organizations, private companies, etc. The diversity of types and producers points to numerous roles that this literature fulfills.

Roles of Grey Literature in Climate Change Decision Processes

In this section we describe a suite of roles that grey literature performs in decision processes (see Table 2). As Petzold et al. (2023) point out, grey literature can be the main type of information facilitating consideration of options to address the implications of climate change:

Many on-the-ground responses to climate-related hazards may not be included in peer-reviewed literature but documented in other forms of literature (that is, grey literature), for example, reports by the private sector or civil society actors. (p. 1528)

<p>Table 2. Roles of Grey Literature in Climate Change Decision Processes</p> <ul style="list-style-type: none"> To Report Research Results To Synthesize Information (e.g., Research and Professional Literature) To Inform Policy Makers and the Public To Advocate for Policy Change To Implement Policy To Promote Change in Professional and Individual Practice To Educate To Broker Information and Promote Networking To Counter Misinformation
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To illustrate each role, we present examples of grey literature published by a variety of different organizations: governments at different levels, NGOs, and policy institutes.

To Report Research Results



Figure 1. Examples of Research Reports

From a research perspective, initial reports of results may be published as grey literature (Figure 1). Technical reports, for example, have been produced by governments and other organizations in very large numbers and in various formats for many decades. This type of grey literature has received extensive attention by grey literature experts, librarians, and authors alike (e.g., Bielskas et al., 2022). Technical reports are often the first documentation of research results and usually contain more details than is included in journal articles arising from the research. Sometimes, the resources required to produce technical reports can be substantial.

To Synthesize Information (e.g., Research and Professional Literature)



Figure 2. Examples of Syntheses

As noted above, research and professional literature about climate change is extensive and growing rapidly. This large volume of literature is scattered among many publications, which has prompted the production of syntheses that vary in scope and comprehensiveness (Callaghan et al., 2020; Smith, L. C. 2023) (Figure 2). Governments and intergovernmental agencies produce syntheses, and probably the best known are the major periodic reports of the Intergovernmental Panel on Climate Change. Xuemei Bai recently emphasized that IPCC “reports primarily synthesize existing literature, and as such, ...[are] largely influenced by the existing body of knowledge” (Bai, 2023). As these syntheses are very large, global, and comprehensive, the IPCC also produces Summaries for Policy Makers to facilitate mobilization of research into policy.

To Inform Policymakers and the Public

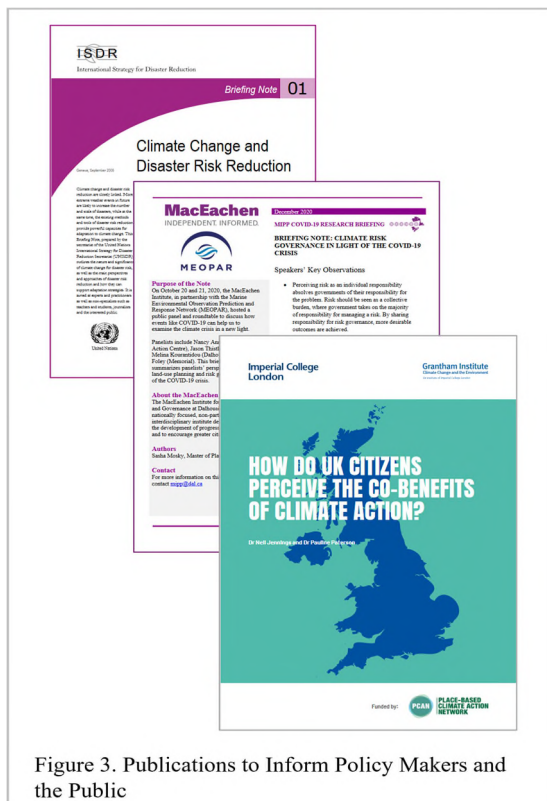


Figure 3. Publications to Inform Policy Makers and the Public

The prominence of grey literature is evident in the significant role of informing both policymakers and the public (Figure 3). Briefing notes are widely deployed to serve in this capacity. Such publications are frequently used to convey information to politicians and decision makers in many, if not most, governmental organizations. While briefing notes are common, due to confidentiality and the typically short life span of the documents, they may not be readily accessible. Briefing notes are used both within and outside governments primarily because the format (short documents, often two pages) fits the important role of informing. In addition, readability in an accessible manner is a key characteristic of these publications.

To Advocate for Policy Change

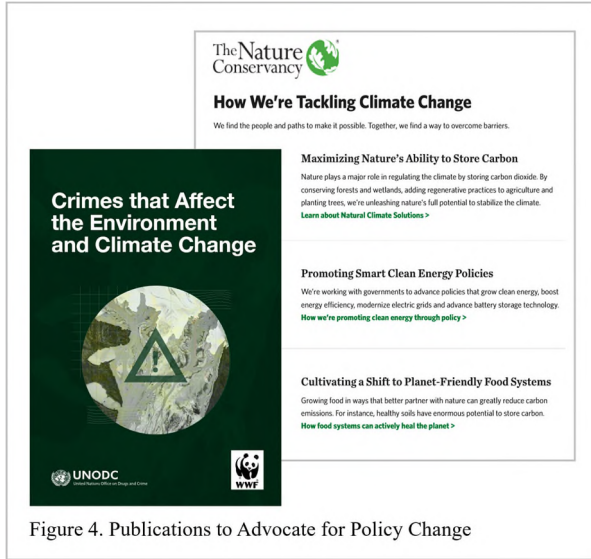


Figure 4. Publications to Advocate for Policy Change

Grey literature fills a fourth role by serving as tools for advocacy (Figure 4). Non-governmental organizations, such as WWF [Worldwide Fund for Nature], Nature Conservancy, and many others, pursue advocacy agendas as a matter of their mandates. They carry out their objectives by directing information specifically to governments and/or to wider publics. Frequently, these organizations maximize use of digital resources in this work. Grey literature in the form of multifunctional websites and active social media platforms, for example, are commonly used.

To Implement Policy

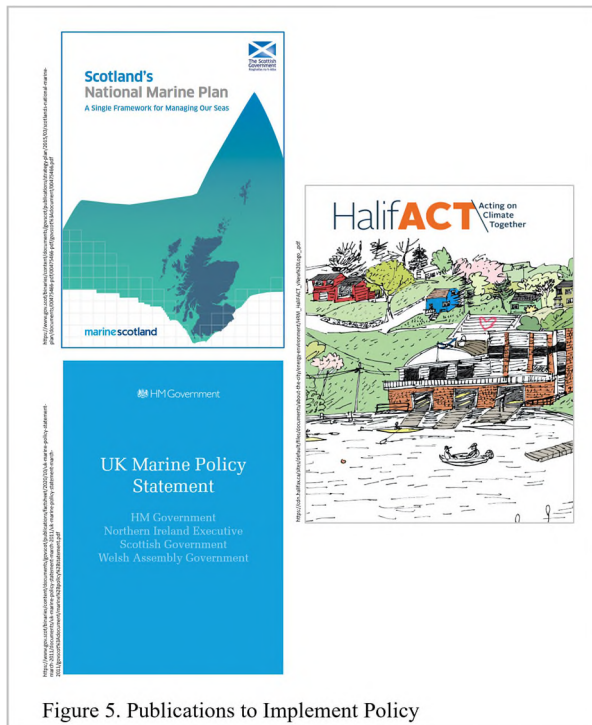


Figure 5. Publications to Implement Policy

Once policies have been approved, implementation follows and grey literature fills yet another role, namely, to support the implementation of policies in diverse sectors (Figure 5). Planning documents are a prime example of this role. Plans are designed for local to international levels. The policy itself is set out in an approved plan and further grey literature is used to specify the steps and actions to implement the plan. The examples of planning documents included in Figure 5 range from an urban municipal climate action plan for the city of Halifax, Nova Scotia to a country level marine spatial plan for Scotland.

To Promote Change in Professional and Individual Practice

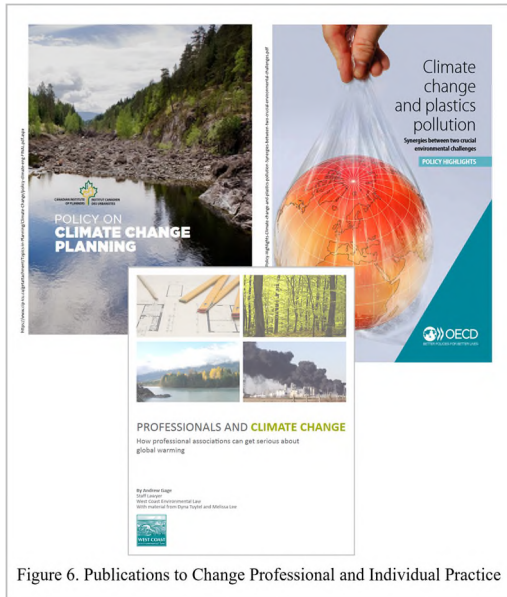


Figure 6. Publications to Change Professional and Individual Practice

Grey literature also serves to promote change in professional and individual practice (Figure 6). To mitigate and combat the increasing risks caused by climate change, academic institutions and professional organizations are examining their practices and implementing changes in their operations to achieve positive outcomes.

Many governmental and non-governmental organizations disseminate grey literature to deliver prominent messages, often with engaging graphic images, about the urgency of the issues and to encourage changes in individual habits and practices.

To Educate



Figure 7. Publications for Education

Complementing initiatives to promote change in professional and individual practices, non-governmental organizations have been set up explicitly to fill educational roles (Figure 7). Invariably, these organizations develop and distribute educational materials in the form of grey literature. A full toolkit of educational strategies may be used in designing such grey literature in order to be effective at different educational levels from grade school to adults. To promote awareness of and raise understanding about climate change and efforts to build resilience, governments also use grey literature for educational purposes.

To Broker Information and Promote Networking

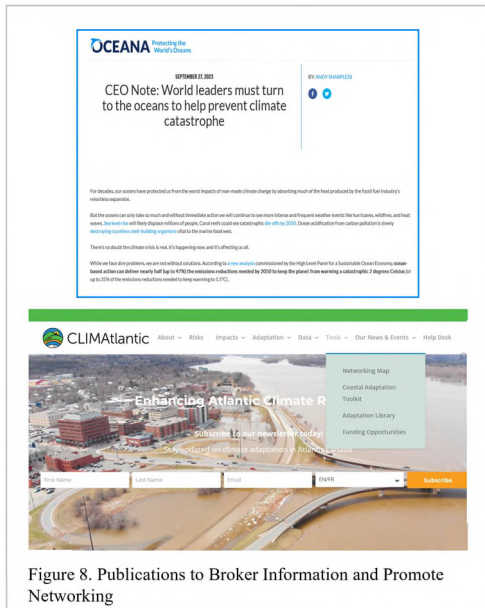


Figure 8. Publications to Broker Information and Promote Networking

The next role for grey literature may not be as obvious as the preceding examples. Some organizations, either intentionally or unintentionally, take on the responsibility of information brokers among groups, e.g., between stakeholders and governments (Willems & Giezen, 2022; Willems et al., 2023) (Figure 8). They may also serve as information brokers between levels of governments when particular departments or agencies are not on “speaking terms” with their counterparts in other levels of government. Grey literature generated by brokering organizations can serve as boundary objects between levels of government since the organizations and the grey literature are viewed as “neutral” and not directly tainted by negative characterizations of government units (Cadman et al., 2020).

In addition, non-governmental organizations may be trusted and carry greater credibility than governmental bodies in the eyes of some stakeholders. In such situations, the NGOs can use grey literature in their brokering and networking role.

To Counter Misinformation

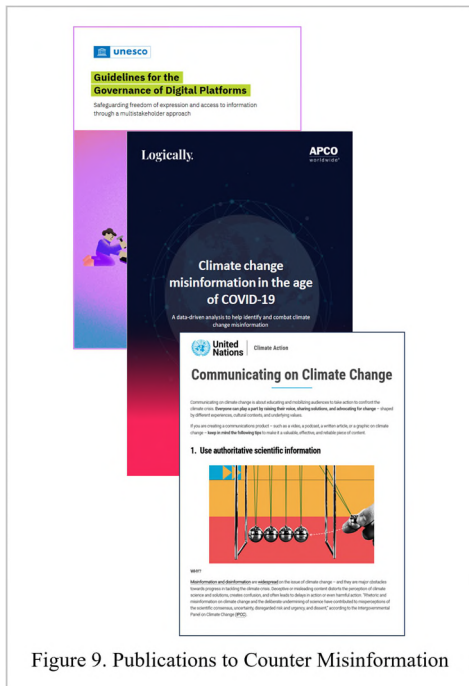


Figure 9. Publications to Counter Misinformation

The ninth role we have identified in our assessment of climate change grey literature has become increasingly important over the past decade as digital communication technologies have evolved and become widely used. Misinformation is a growing concern in dealing with the implications of climate change and more and more initiatives are being implemented to mitigate the effects of this problem (Henley, 2023) (Figure 9).

Many governmental, intergovernmental, and non-governmental organizations have focused greater attention on this issue and are producing reports and other types of grey literature designed to understand and counter the effects of misinformation.

Conclusion

Our survey of grey literature related to climate change has identified a suite of significant roles that this literature fulfills globally in all levels of society. This wide range is available to inform and support policy- and decision-making processes. Due to the complexity and messiness of these processes and almost countless contexts, grey literature is produced for different purposes, in different formats, and for different audiences. Many actors, both individuals and organizations, are involved in producing and using grey literature on climate and climate change topics. In a recent paper about developing resilience to climate disasters, the relevance of grey literature was described as “where perspectives of community based organizations and marginalized citizens are more likely to appear on their experiences of local governance participation” (McNaught, 2024, p. 13; see also Piggott-McKellar, 2019). Similarly, Brubacher et al. (2024) state that the “community voices” included in grey literature can extend understanding about health and well-being in the midst of climate change and biodiversity loss (p. 7).

The roles that grey literature fulfil are typically connected to specific stages or actions in the many interconnected information pathways in policy- and decision-making processes that we outlined above. These roles play out at many levels of decision making. Thalheimer et al. contend, for example, that grey literature is important because it “contextualises adverse impacts of climate change” on various industry and societal sectors (2021, p. 8). Moreover, as Galappaththi et al. point out, giving attention to grey literature is “essential...because much of the evidence on climate change adaptation is documented there” (2022, p. 6).

Due to its different roles, grey literature products can consist of a diversity of components and may fulfil different roles simultaneously. For example, a multipart website can serve to inform, to advocate, and to educate. This flexibility ensures that grey literature can reach various audiences with different education levels and understanding more easily and likely more effectively than peer-reviewed research literature. Although the latter may be accessible, it is read and understood in much narrower circles (see, for example, Sampson et al., 2024).

Finally, due to its ubiquity and accessibility, many people (probably all people) encounter grey literature in their daily lives. Consequently, given its roles in informing and educating, this genre may have far greater societal influence than other types of information. People of all levels of society need accurate and accessible information to make decisions necessary to avert climate disaster. Thus, recognizing the numerous roles that grey literature fulfills can inform citizens, managers, planners, and policy- and decision-makers in addressing the climate challenges facing society today.

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