Journal of
Professional Communication jpc

A thematic review and synthesis of best practices in environment journalism

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Article Info

Article Type:
Research Article

Article History:
Received: *2013-08-02*
Revised: *2013-10-04*
Accepted: *2013-10-04*

Keywords:
Environment journalism
Best practices
Journalism practice
Guidelines
Reporting methods

Abstract

The environment beat is a relatively new journalistic field, having emerged in the 1960s, when growing awareness of social and environmental issues spurred the start of the environment movement. Today, journalists covering the environment find challenges in adapting traditional reporting methods to the beat, while dealing with space and deadline pressures as well as other demands. This mismatch of methods has led to numerous critiques of environment journalism but less robust discussion of best practices. To address this gap, we undertook an in-depth review and synthesis of 58 pieces of literature on journalism practices in environment reporting, which resulted in the development of eight distinct themes: "abilities," "variability," "range of information," "sources," "balance and objectivity," "newsworthiness," "storytelling methods" and "alternatives." Our thematic review reveals a stark hole in the theory-practice connections of the 58 studies analyzed: we have many problems, a few theoretical alternatives but largely no detailed, practical solutions.

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Since first emerging about 50 years ago, the environment beat has meant different things at different times. For example, early on the term 'environment' related to conservation and nature preservation (Einsiedel & Coughlan, 1993; Dennis & LaMay, 1991), while later, notions of sustainability and sustainable development led to a broadening of the environment beat's scope to include a range of topics, including population growth, energy issues and species extinction (Dryzek, 1997). In 1962, journalist and marine

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biologist Rachel Carson published *Silent Spring*, which helped shape the environment beat's investigative character (Boykoff, 2009). By the 1980s, interest turned to fear of environmental risk (Nelkin, 1995), as events including nuclear disasters at Three Mile Island and Chernobyl (Friedman, Gorney & Egolf., 1992; Peters, 1992) and the Exxon Valdez oil spill (Daley & O'Neill 1991) captured public attention.

By the 1990s, interest in environmental causes increased but news media seldom reported on this growing concern (Berger, 2002) until political figures, including former UK Prime Minister Margaret Thatcher, inserted environmental issues into the public agenda (Chapman, Kumar, Fraser, & Gaber, 1997). Meanwhile, interest groups garnered widespread attention and influenced public understanding of environmental problems by disputing these issues in the media – notably within the debate over whether climate change is the result of human activities or not (Boykoff, 2009; Cottle, 1998; Goodman, Boykoff & Evered, 2008). This trend spurred extensive academic study of how journalistic reports can accurately reflect constructed realities offered by official spokespeople. As risks associated with complex processes like climate change are not readily perceivable in day-to-day life, publics often draw information from news media, which amplify or downplay potential impacts (Cottle, 1998). While these effects are contested, it is generally accepted media generate a 'framework of expectations' (Nelkin, 1995) that gives meaning to otherwise isolated environmental issues. Furthermore, journalist reliance on government, business and institutional spokespeople as sources means news media regularly reproduce official interpretations of environmental issues (Gamson & Modigliani, 1989).

As recognition of the environmental impact of human development has increased and the role of journalism has experienced major structural changes, there has been an increasing urgency to discussions over the appropriate role of environmental journalism. Since the 1990s, much scholarship has concentrated on topics including the relationships between journalists and scientists (Maillé, Saint-Charles, & Lucotte, 2010; Nelkin, 1995; Nisbet & Scheufele, 2009); the accuracy of environment reporting (Dunwoody, 1982; Palen, 1999; Singer, 1990; Valenti, 1998); and critical analysis of journalistic norms like objectivity and newsworthiness (Allan, Adam & Carter, 2000; Dennis & LaMay, 1991; Goodman et al. 2008; Nisbet, 2011). Yet 50 years after the birth of the environment beat, there is no clear consensus on how environment journalism should be done. Further, there are few detailed reviews of best practice suggested by the literature, leaving little chance of integrating past knowledge into discussions on environment journalism's future. With the objective

of addressing this gap, this paper examines eight distinct themes synthesized from recommendations on environment journalism found through a systematic search of the peer- and non-peer reviewed literature. The themes reveal a stark hole in the theory-practice connections of the 58 studies analyzed: we have many problems, a few theoretical alternatives but largely no detailed, practical solutions.

The context of environment journalism

While this paper is, in itself, a thematic synthesis of best practices in environment journalism, it is nevertheless useful to first briefly highlight the context of environment journalism, since this serves to frame the choice of methodology for a more systematic review of the literature. Indeed, while much of the literature on environment journalism points to its flaws, recommendations on improved practice in environment reporting are scant. In their assessment of an educational module on sustainability for journalism schools, Kolandai-Matchett, Spellerberg, Buchan and Early (2009) note that in addition to a lack of proposed solutions to environment journalism's shortcomings (p. 6), journalism students report they do not learn adequate practical skills to help them better frame sustainability and environment stories.

A common critique of environment journalism is the pressure to conform environment reporting to institutionalized journalistic practices, such as placing emphasis on breaking stories and exposing conflicting opinions as a form of balance (Berglez, 2011). Journalists' own perceived roles, ranging from objective reporter to environmental advocate, also influence how they construct stories (Giannoulis, Botetzagias & Skanavis, 2010).

The portrayal of environmental issues in news stories impacts how people interpret and act upon information. Hansen (2011) argues that in an age when public discourse is strongly influenced by spin, researchers should examine the influence of powerful stakeholders on mediated communication about the environment by reconnecting three areas of communication study that have generally been kept distinct, namely the production of media and public messages; the content of these messages; and their impact on audiences. Several contemporary articles examining environment journalism in various geographical contexts echo the notion that powerful political and business interests exert influence on environment news coverage, particularly at the national level (e.g., Öztürk & Çıtak, 2010; Waisbord & Peruzzotti, 2009).

Meanwhile, a 2008 survey of American audiences discovered that

newspapers were the primary media source for environmental news, particularly for stories that were local or regional. Nevertheless, those surveyed found newspaper coverage poor in conveying possible solutions to environmental problems (Riffe & Reimold, 2008).

While contemporary literature outlines many of the dilemmas facing environment journalism, few authors offer more than generalized suggestions that go beyond individual studies or attempt to draw together threads from disparate research. This paper therefore seeks to identify common environment reporting guidelines found in the literature, analyze them in reference to their ability in addressing common critiques and investigate areas have not yet been addressed.

Methodology

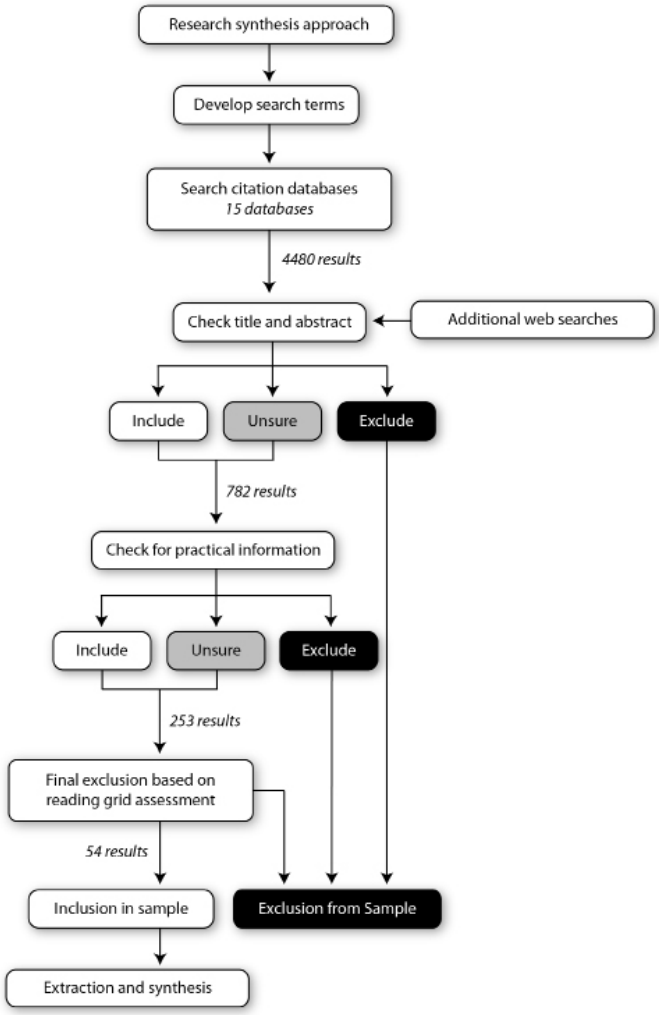
Drawing inspiration from the research synthesis literature (Paterson et al., 2001) and our approach to qualitative metasynthesis of literature (for a detailed description see Amend & Secko, 2012), we set out to discover what literature is available on best practices in environment journalism, synthesize this material and connect this summary to journalism practice (Fig. 1). This effort was constructivist in its philosophical approach (Paterson et al., 2001), seeing no piece of available literature as holding the absolute truth but instead generated by the context of its production.

Although it is difficult to locate every single piece of literature related environment journalism, we attempted to be as comprehensive as possible in our search strategy. We searched both peer-reviewed and non-peer reviewed literature, as non-peer reviewed items have also been identified as containing valuable data (Estabrooks, Field & Morse, 1994). The literature collection process involved several steps, beginning with the formulation of the core search strategy using a "building block" approach (Amend & Secko, 2012) made up of three concepts, namely "journalism," "environment" and "best practices." We adapted these three concepts to each of the 15 databases searched. For example, the search strategy for the Communication & Mass Media Complete database used the following keywords: (journalis* OR mass media OR "reporting&reporters" OR "news" OR newspaper* OR press OR broadcast* OR blog* OR investigative reporting OR media spillover OR digital media OR photojournalis*) AND (environment* OR "climate change" OR ecolog* OR sustainab*) AND ("best practice*" OR "guideline*" OR "recommend*" OR criti* OR method* OR suggest* OR guidance OR propos* OR advocate OR

direction OR instruct* OR advise OR tip* OR outline OR practice*).

In total, the 15 databases searched were: Communication & Mass Media Complete (CMMC), Communication Abstracts, Academic Search Complete, Web of Science, PubMed, GreenFILE, TOXNET, Factiva.com, Historical Abstracts, Lexis-Nexis, CBCA Current Events, CBCA Complete, Canadian Newsstand, ProQuest Dissertations and Thesis and Theses Canada.

Figure 1: Flowchart on selection process (adapted from Amend & Secko, 2012)



Initial searches, performed between August and September 2010, yielded 4,480 results and were repeated in April 2012 to include any new studies. In order to narrow the results to items most relevant, we performed three exclusion phases. The first stage involved examining the articles' titles and abstracts to exclude items not dealing directly with environment journalism and journalists, which reduced our data set from 4,480 to 782. The second exclusion phase specifically focused on narrowing search results to articles that offered practical information of use to environment journalists, as opposed to solely theoretical interpretations thereof. This reduced our data set to 253 articles.

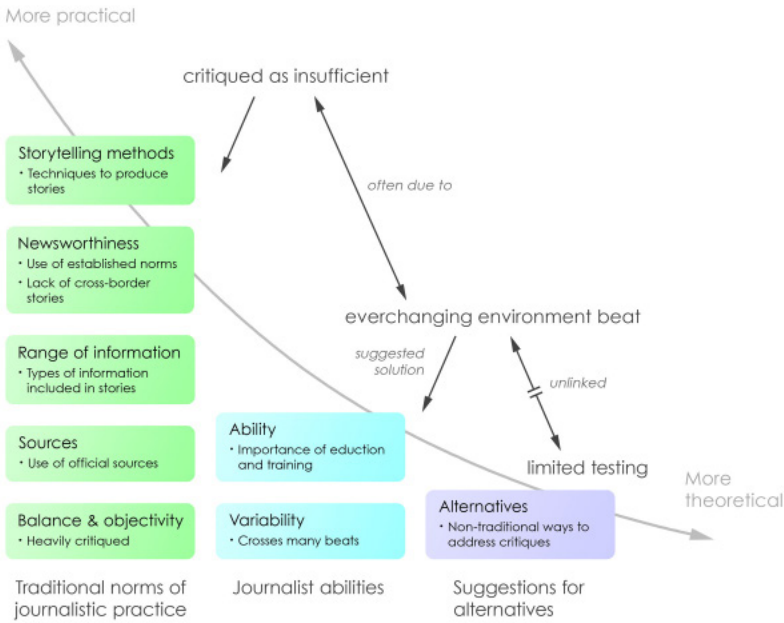
Following an initial review of our preliminary data set, we identified 12 of the 253 items as "gold standard" articles offering insight into best practices. We used a reading grid assessment tool to extract content from these articles (Paterson et al., 2001, p. 135) and to systematically analyze them according to five areas, namely: (1) the research questions investigated; (2) research method; (3) major findings; (4) the conclusions, implications and limitations; and (5) key quotes. We used these results to formalize criteria for the final exclusion. Specifically, articles had to offer *clear practical guidelines, strategies, recommendations or standards for environment journalism of use to working journalists.* Such guidelines included, but were not limited to, advice on sourcing practices, communicating complex information, personalizing environment stories, writing styles and training. This process resulted in a final data set of 58 articles (these articles are marked with * in the reference section). The bulk of the articles, 42 to be specific, were from between 2000 and 2010. Three articles in our data set were from the period between 1980-1989, while 10 were from the 1990s and three were from post-2010.

We extracted data from the 58 articles using the reading grids (See: Amend & Secko, 2012). We identified a "unit of data" specifically as elements from the literature – ranging from full paragraphs to sentences to single words – that offered guidance for environment journalism practice (i.e. information on how environment journalism is or should be done). The synthesis of the extracted data followed the methods of Sandelowski and Barroso (2003) and resulted in the conceptualization of the eight distinct themes described in the following section.

Findings

Based on the thematic analysis and synthesis of the data extracted from the literature examined, eight distinct themes emerged: "abilities," "variability," "range of information," "sources," "balance and objectivity," "newsworthiness," "storytelling methods" and "alternatives" (Fig. 2).

Figure 2: Summary of eight themes extracted from the practical literature on environment journalism



Abilities

The "abilities" theme includes information and recommendations regarding the skill-sets of environment journalists. The reviewed literature points to

a common concern over widespread lack of specialized training among reporters covering the environment, which is argued to result in inadequate reporting (Archibald, 1996; Bruggers, 2002; Friedman, 2008; Masia, 2007; Sachsman, Simon, & Valenti, 2006; Ward, 2006). One author criticized journalists who do not understand the basics of science reporting and thus struggle to communicate the complexities of environmental issues to their audiences (Friedman, 2008). A number of problems associated with this deficiency in knowledge were identified in the literature, most notably inability to ask the 'right' questions due to a lack of understanding or confidence. One author describes this by writing: "when reporters feel unable to challenge the experts, they may default to being passive stenographers" (Ward, 2006, p. F06). Lack of knowledge can also lead to gaps in coverage as non-specialist reporters may misconstrue or completely ignore complex environment stories (Bruggers, 2002).

The reviewed literature also criticizes journalism schools for failing to include basic science reporting methods and science literacy in their curricula (Block, 2010; Fitzgerald, 2002; Newhook, 2009). The literature presents some suggestions on how to better train journalists to cover environmental issues, including personal initiatives, such as joining professional networks and attending conferences (E, 2001, pp. 22-24), to broader recommendations that range from redefining journalism education, to ensuring environment writers have fundamental knowledge of a wide variety of disciplines and global perspectives (Ward, 2006, p. F06).

Variability

The second theme to emerge – "variability" – indicates the broadness of the environment beat lends an irregular or unpredictable element to the job (Archibald, 1996; Bruggers, 2002; Masia, 2007; Sachsman et al., 2006; Shoenfeld, 1980). Environment journalism is not a clear-cut beat but rather represents the "business-medical-scientific-economic-political-social-pollution story" (Schoenfeld, 1980, p. 458). This variability's impact is not widely agreed upon. While some note this indicates reporters on other beats will at times cover environmental issues that cross into their turf (Sachsman, Simon & Valenti, 2002, p. 411), others suggest editors must better coordinate reporters to ensure specialized environment and science reporters are involved in covering stories with environmental aspects from numerous fields, such as politics, health, travel and so on (Russell, 2008, p. 45). Overall, however, the reviewed literature indicates environment reporters must continually learn about new

and unfamiliar topics to deal with this variability.

Range of information

The "range of information" theme covers data regarding decisions reporters take on what information to include in environment stories (Archibald, 1996; Berglez, 2008; Detjen, 2002; Fishkoff, 1996; Lafountain, 2004; Masia, 2007; Russell, 2008; Stocking & Leonard, 1990). As Newhook (2009) writes:

> You can't encapsulate ten years' work... into a short news or feature story. Reporters are trained to focus on explaining an aspect of that work to more people in one day than will ever read a journal article or a magazine that speaks to the converted (p. 98).

Journalists must make decisions on how to transform information from complicated, jargon-laden research articles into language that is accessible to broad audiences. A number of obstacles associated with journalistic routines constrain such decisions, specifically tight deadlines and space limitations that require reporters to restrict coverage to certain aspects of an environmental story. As the data indicate, these constraints lead to limiting the range of information included in environment stories, much to journalists' dissatisfaction (Vanderpool-Kassel, 2009, p. 10). Lacking sufficient information and relying on personal experiences to tell environment stories (Lafountain, 2004) has been noted to make environment reporting "unidimensional," taking focus away from broader contexts (Young & Dugas, 2011, p. 6) at the expense of more in-depth, explanatory reporting (Archibald, 1996).

Furthermore, pressing deadlines lead time-strapped reporters to rely on press releases for story ideas, allowing PR to have disproportionate influence on environment coverage (Masia, 2007). Relying on press releases can also lead to dangerously deceptive reporting, as stories that reference PR efforts may appear to audiences to have originated from independent sources (Valentine, 2010).

Another obstacle is the difficulty of conveying the uncertainty of environmental issues. As Archibald (1996) discovered in examining studies of uracy, "errors of omission" were far more common than "outright mistakes" (p. 19). In addition, the journalistic norm of focusing on 'just the facts' can misrepresent science, which seldom reaches final conclusions and is not 'absolute' (Henry, 2002; Lewenstein, 1996; Schneider, 2010).

When it comes to including proposed solutions in environment news stories, the data indicate most are divided on this issue, opening up wider questions about the role of environment journalists and the lines between objectivity and advocacy (Detjen, 2002; Streitmatter, 1984). Russell (2008) claims: "As climate change moves further into the policy and political arena, the traditional wall between analytical reporting and advocacy is in danger" (p. 49). This is an important factor to consider since perception of the beat defines how it is covered (Archibald, 1996, p. 93). The data suggest definitions of the beat vary widely, from merely reflecting on abstract ideas to explicitly saving the environment (Archibald, 1996, pp. 93-117).

Sources

The "sources" theme includes data regarding news story research and the sources environment reporters consult for information in their stories (Archibald, 1996; Lewenstein, 1996; Masia, 2007; Revkin, 2010; Schneider, 2010; Valentine, 2010).

Much of the literature addresses the relationships developed between reporters and their sources, specifically those sources that control access to information. The data indicate official sources tend to spin information to suit their purposes (Block, 2010), which can be especially dangerous to publics that are not aware of environmental issues (Valenti, 2000, p. 546). Furthermore, journalists are cautioned to double-check source accuracy to avoid continued misinformation between media and politicians (Archibald 1996; Breen, 1994; Henry, 2002; Masia, 2007; Russell 2008). As Moore writes: "In an era when everyone gets spun - by business, government and interest groups - the best tool a journalist has is a well-tuned 'B.S. indicator'" (Moore 2007, p. C3). Nevertheless, scientists can play a critical role in getting the story right. The reviewed studies indicate using scientists as sources can lead to more accurate reporting (Schneider 2010, p. 174), particularly as they are more likely to look at science with a "discerning eye" (Lafountain, 2004, p. 51). When it comes to their own work, however, scientists can be so intent on protecting and promoting their research that they may conceal its weaknesses or hold back information (Fischkoff 1996, pp. 43-44). The data also point to a hierarchy of sources and their influence on reporting, with journalists privileging official sources, followed by institutions, advocacy groups and the public (Valentine, 2000, pp. 24-25). Several studies suggest environment reporters should look outside traditional source hierarchy and talk to "everyday people" or "citizens" in

order to get a fuller story (Archibald, 1996; Schneider, 2010; Vanderpool-Kassel, 2009). As Karlberg (1997) articulates, "dialogue and deliberation are most effective when a diversity of perspectives is elicited and considered" (p. 28).

Balance and objectivity

Data encompassed in the "balance and objectivity" theme covers implications surrounding these intertwined journalistic norms (Archibald, 1996; Boykoff & Boykoff, 2004; Breen, 1994; Gill, 2010; Karlberg, 1997; Masia, 2007; Valentine, 2010). The data in this theme addressed the practice of seeking 'balance' in reporting (in an effort to be 'objective') as leading to false portrayal of conflict (Lewenstein, 1996) and basing environment stories on opinions rather than science (Lemonick, 2010). The journalistic convention of attempting to establish objectivity by 'balancing' a statement with a contradictory opinion has been well recognized as a superficial tactic when applied to environment reporting (Breen, 1994). The troubled notion of "balance" was also recognized as potentially distorting science by implying falsely that both sides carry equal weight (Boykoff & Boykoff, 2004; Valentine, 2010) and often reflects the extreme sides to a given discussion, rather than in-depth analysis (Mauser, 1989).

The emphasis on conflict in environment stories also leads to problems in reporting, such as the omission of issues that do not involve clear conflicts, like soil degradation or declining wildlife populations (Archibald, 1996). Focusing on conflict can also interfere with problem resolution. As Valentine (2010) states: "By creating two opposing sides to an argument, the news writer inadvertently creates a gridlock emphasizing conflict rather than the cooperation required for change" (p. 14). This also deprives audiences of information that could lead to potential changes or actions on controversial issues. However, representing stories through conflicts is a common tool, as journalists without time, knowledge or experience may resort to duelling opinions as a simplified way to cover stories while conveying a sense of neutrality (Valentine, 2010).

Newsworthiness

The "newsworthiness" theme represents data that examine factors determining what stories are considered worthy of being printed or broadcast, or not (Archibald, 1996; Masia, 2007; Schoenfeld, 1980; Stocking & Leonard, 1990;

Young & Dugas, 2011; Vanderpool-Kassel, 2009). This theme suggests stories that are short-term, uncomplicated and generate conflict, emotion and extremism are considered newsworthy, while complex, long-range stories involving calm rationality or co-operation are not (Manning, 2007). Environment stories without immediate impact common in daily news routines may be excluded from coverage (Detjen, 1997; Hertsgaard, 1989; Vanderpool-Kassel, 2009). As Stocking and Leonard (1990) write: "Current environmental crises get the coverage. Future crises are tough to sell," and suggest this dilemma may be circumvented with specialty sections dedicated to complicated stories (pp. 40-44).

'Novelty' is another element journalists use to judge a story's newsworthiness that often leads to environment stories being overlooked (Stocking & Leonard, 1990, p. 40). This can lead to a formerly fashionable topic eventually being viewed as tiresome or depressing, especially when it involves a continuous stream of bad news (Cheam, 2011). Therefore, when a story is complex or subtle, editors may insist on spicing it up with new angles, such as conflict emphasis, or condemn it altogether as "boring" (Masia, 2007, p. 17), especially when the story is competing with breaking news (Archibald 1996, p. 98). Such pronouncements can be self-fulfilling, however, as studies indicate interest increases with awareness (Intermedia, p. 9).

Finally, emphasis on local events can blur understanding of environmental problems that cross regional boundaries (Detjen, 2002; Young & Dugas, 2011). Cheam (2011) writes: "Climate stories were but page-fillers in Pakistan, for example, until the country experienced massive floods that claimed many lives, then they were given the same top coverage as terrorism, governance and the economy" (para. 13).

Storytelling methods

The "storytelling methods" theme covers data on techniques and styles for environmental storytelling (Archibald, 1996; Berglez, 2011; Fischkoff, 1996; Karlberg, 1997; Lemonick, 2010; Shoenfeld, 1980; Smith, 2005). Much of this literature offers recommendations on including the "human element" in stories to both compensate for the fact environmental issues have been identified as abstract and dry (Smith, 2005) and to ensure audiences are able to relate to stories and connect them to their daily lives (Archibald, 1996).

In contrast to official sources and experts, including the perspectives of "real people" in the story can also convey a sense of tangibility when tragic

incidents are caused by environmental problems (Henry, 2002), as well as provide audience members insight into how day-to-day actions affect the environment and vice-versa (Cheam, 2011). This theme also indicates criticism of certain storytelling methods for oversimplifying the issues (Valentine, 2010), most notably the concept of "risk" in environmental stories (Lafountain, 2004; Ropeik, 2002; Sachsman, 1999). In a survey of journalists across the US, Sachsman, Simon and Valenti (2004) asked reporters to rank, in order of importance, elements that should be present in environmental stories. Human interest was rated as most important, while risk assessment was last, with 28% claiming they rarely included risk factors in their stories. Some literature has offered tools to aid in conveying risk in news stories, such as using specific numbers and clarifying scientific terms (Fischkoff, 1996) and using indicators such as carbon footprints and insurance risks (Smith, 2005).

Alternatives

The "alternatives" theme emerged from data that suggested options outside of traditional reporting methods, namely sustainable journalism, weight of evidence reporting, global journalism and focus on ethics (see Berglez, 2008; Detjen, 2002; Griswold & Swenson, 1993; Valentine, 2010).

Detjen (2002) describes a form of reporting called "sustainable journalism" that "incorporates the best aspects of traditional journalism—diligent research, precise language and fair reporting," while striving to educate the audience and initiate public discussion of environmental issues (p.38). For journalists, the model involves seeking more access to environmental information, linking environmental problems to economic and social issues, making multi-national corporations more accountable for their role in environmental conundrums and presenting the audience with possible solutions to these problems (Detjen, 2002, p.39).

Meanwhile, Valentine (2010) discusses how to base reports on evidence agreed upon by the majority of scientists, rather than using opposing viewpoints to achieve a "balanced report" (Valentine, 2010, p. 68). Drawing on research by Dunwoody (1999; 2005), the weight-of-evidence model suggests an approach outside prevailing journalistic conventions discussed in other data, such as conflict. Valentine (2010) claims the technique is effective "when a story reports on a controversy in which both science and society have agreed that truth lies more firmly on one side than on the other" (p. 23).

In the global journalism model, Berglez asserts environment journalism

demands "a global outlook on social reality, something which has by tradition only been associated with financial news" (2008, p. 845). This model "makes it into an everyday routine to investigate how people and their actions, practices, problems, life conditions etc. in different parts of the world are interrelated" (Berglez, 2008, pp. 846-847). Similarly, Griswold and Swenson (1993) advocate working a holistic worldview into their ethically-based prescription for environment journalism. The authors say reporters should see the environment "as a development issue and adopt the global perspective prevalent in environmental ethics as a way to improve their reporting on environmental issues" (p.62) and urge reporters to see themselves as educators, thereby playing an important role in democracy.

Discussion

In its relatively short history, environment journalism and its journalists have come under numerous critiques, such as a lack in background research and context in environmental stories (Dennis & LaMay, 1991; Friedman, 2004; Singer & Endreny, 1993), limited technical knowledge of complex environment issues (Dunwoody & Peters, 1992; Friedman, 2004; Sachsman et al., 2006; Singer 1990; Valenti, 1998), excessive reliance on official sources (Einsiedel & Coughlan, 1993; Greenberg et al., 1989; Miller & Reichert, 2000; Nisbet & Lewenstein, Peters, 1992; 2002; Sachsman, 1999), dependence on PR (Hansen, 2011; Masia, 2007; Valentine, 2010), inaccuracy (Dunwoody, 1992; Singer, 1990), errors of omission (Singer & Endreny, 1993), characteristics of reductionism (Carvalho, 2007; O'Donnell & Rice, 2008; Wyss, 2008) and dramatization and 'hype' (Nelkin, 1995; Soroka, Farnsworth, Lawler & Young, 2009). Added to these criticisms are a number of obstacles – such as lack of proper training (Kolandai-Matchett et al., 2009; Friedman, 2008; Ward, 2006; Fitzgerald, 2002), tight deadlines and space constraints for environment stories (Masia, 2007; Vanderpool-Kassel, 2009). Our search for peer-reviewed and non-peer-reviewed articles indicates literature that professes to practically address these critiques does exist. However, the relevance of these practical guidelines and their abilities to truly respond to the widespread critique of environment journalism are not clear-cut.

This is an important gap related to the evolution of study on environmental journalism, which is increasingly in need of addressing as related to the role of journalism in public discussions of the environmental impact of human development. The 58 articles reviewed and synthesized here revealed

eight thematic themes that, while often importantly addressing what needs to change, offered little in the way of specific, practical answers to criticisms of environment journalism. Firstly, we found a "range of information" theme that included data on the types of information environment journalists include in their stories, the routines and decisions that lead to the inclusion of certain information and the exclusion of others and the impact of journalists' own perceived roles, such as 'objective storyteller' or 'environment advocate' (Detjen, 2002; Streitmatter, 1984). This category focused on the journalistic practice of 'translating' complex environment stories into accessible news articles (Newhook, 2009), as related to a lack of time and space (Masia, 2007; Vanderpool-Kassel, 2009), a difficultly in expressing ideas of uncertainty in environmental stories (Henry, 2002; Lewenstein; 1996; Schneider, 2010) and a heavy reliance on PR material for stories (Masia, 2007; Valentine, 2011). Guidelines on how to navigate these roles and balance the range of information in environment stories was not elaborated on in the literature included in this study.

Secondly, the "sources" theme points to a well-recognized reliance on official sources, scientists and other experts in environment stories (Lafountain, 2004; Schneider, 2010; Valentine, 2000). While using scientists as sources has been noted to lend a certain degree of accuracy to environment stories (Lafountain, 2004; Schneider, 2010), it was often strongly argued that environment journalists need to expand their sourcing practices to non-traditional voices, such as "the citizen" to improve the narrow framing of stories (Archibald, 1996; Karlberg, 1997; Schneider, 2010; Vanderpool-Kassel, 2009). However, the practical guidelines offered -- for example, instructing journalists to always consider the accuracy of their sources and information -- do not extend much beyond the surface. They certainly do not examine how to navigate this as related to the obstacles in journalists' daily routines, such as time and space constraints noted the literature (Masia, 2007; Vanderpool-Kassel, 2009).

Thirdly, "balance and objectivity" were generally discussed as not working in environment journalism, as these concepts often lead to oversimplification of stories (Valentine, 2010), inaccuracy and errors of omission (Archibald, 1996) and misrepresentation and distortion by portraying the issues as two-sided, with both sides carrying equal weight (Boykoff & Boykoff, 2004; Breen, 1994; Lewenstein, 1996; Lemonick, 2010; Mauser, 1989; Valentine, 2010). This is a recurring critique that conveys a sense that objectivity and neutrality in environment stories should be abandoned, as they deprive audiences of the whole story and, thus, the potential to take meaningful actions (Valentine, 2010). Equally, the "newsworthiness" theme discussed established norms – impact, conflict, urgency, timeliness, novelty and proximity, which have

traditionally led to stories being considered "newsworthy" (Cheam, 2011; Manning, 2007; Masia, 2007; Stocking & Leonard, 1990) – that were deemed to cause a lack of international or "cross-border" stories (Cheam, 2011; Detjen, 2002; Young & Dugas, 2011), as well as misrepresent environment stories by favouring short-term and immediate coverage of complicated long-term environmental issues. The same was true of the "storytelling methods" theme, which focuses on techniques journalists use to produce stories on environment issues (Archibald, 1996; Cheam, 2011; Henry, 2002; Smith, 2005;) and was criticized for being unable to report the cross-regional significance of environmental stories (Berglez, 2008), as well as the concepts of risk (Fishkoff, 1996; Lafountain, 2004; Ropeik, 2002; Sachsman, 1999). Again, while these are important critiques, we were unable to find the presentation of explicit, practical alternatives to these well-established journalistic norms.

These five thematic groupings – range of information, sources, balance and objectivity, newsworthiness and storytelling methods – have one major trait in common: they all tie back to and fail to offer journalists alternatives to *traditional norms of journalistic practice* (Fig. 2).

The "abilities" theme does take on issues of environment journalism education and training and largely attempts to identify causes of deficits in current methods. Much of the literature claims many journalists lack the abilities needed to grasp complex environment stories and consequently fail to ask the right questions and undertake necessary background research to report accurately and fully (Bruggers, 2002; Friedman, 2008; Ward, 2006). Here, the literature offers two broad suggestions for improvement: (1) personal initiatives, including joining professional networks and attending conferences to maintain up-to-date skills and (2) training initiatives, specifically on the part of universities and journalism schools, that involve reimagining how and what journalism students are taught to ensure increased knowledge of and capabilities in covering environment issues. This is clearly linked to a commonly argued theme of how "variable" the environment beat can be, as it does not fall specifically into one beat, but rather stretches across many topics (Russell, 2008; Sachsman et al., 2002; Schoenfeld, 1980). These two themes – abilities and variability – are strongly interrelated, as the skills required to navigate the complexity of environment stories are related to *journalists' abilities* gained through education, on-the-job training and other personal initiatives. Without improved education and training aimed at increasing environment journalists' ability to navigate the vast and ever-changing environment beat, the critiques of environment journalism seem to have remained unanswered – or are perhaps unanswerable.

From seven of the eight themes presented, it can be understood that the literature is heavily weighted to seeing traditional journalistic norms and routines – relying on expert sources, using the "human element," relying only on "two sides of the story" and using traditional indicators of journalistic newsworthiness – as insufficient to cope with the complexities of environment issues (Fig. 2). It is only in the final thematic theme, "alternatives," that this is sparsely addressed. The four reporting methods covered under this theme –sustainable journalism (Detjen, 2002), weight of evidence reporting (Dunwoody, 1999; Dunwoody, 2005; Valentine, 2010), global journalism (Berglez, 2008) and focus on ethics (Griswold & Swenson, 1993) – provide suggestions for alternatives to traditional journalistic methods. These alternatives provide models for reporting that seek to accurately present environment stories while linking these stories to other topics and promoting discussion among audiences (Detjen, 2002), basing environment reporting on evidence rather than opinions commonly used to achieve a sense of balance in stories (Valentine, 2010), producing stories that cover the effect of the global on the local and vice-versa (Berglez, 2008) and provides education in support of democracy (Griswold & Swenson, 1993). However, while such alternative models step away from traditional journalistic norms, research has not yet indicated whether such theoretical methods can bridge to journalistic practice and actually be employed in the production of environment news stories that respond to critiques while balancing daily obstacles and news media industry realties, such as satisfying editor demands for clear-cut portrayal of the issues (Archibald 1999) while competing for audience attention against more sensational or trendy stories (Manning 2007; Stocking & Leonard 1990).

Conclusion

We undertook this research to support a line of scholarly inquiry that seeks to identify best practices in environment journalism. This research set out to review both the peer-reviewed and non-peer-reviewed literature on environment journalism to extract and analyze common practical guidelines offered to journalists to produce "good" environment journalism. Since most erature on environment journalism centres on critical analysis, our focus was on articles that offered advice on specific practices, such as finding sources for stories and techniques for explaining complex scientific information.

To our knowledge, such a study has not previously been attempted. However, after reviewing 58 articles, developing eight themes informed by

the data and connecting the information offered, the results were not inspiring at first. While there is a body of literature that offers suggestions on how to produce environment journalism, the literature investigated in this research largely claims traditional journalistic norms used in environment reporting are not adequate and it is up to educators and journalism training to respond to the common criticisms of environment journalism; how exactly to do this, however, remains largely unanswered. Alternative methods of environment reporting suggested by, for example, Detjen (2002), Valentine (2010), Berglez (2008) and Griswold & Swenson (1993) may present opportunities for improved practice, yet their applications to and impact on environment journalism remain largely in the realm of theory.

Before concluding, it is worth noting some limitations that should temper the interpretations of our findings, as well as three key takeaways that may benefit future research on environment journalism practice and could serve as guiding ideals for journalists currently working in the field. Although we attempted to make our literature searches as comprehensive as possible, we did this with the realization that it is difficult to ensure collection of every single study, with databases and literatures not being static but continuing to evolve. Furthermore, many of the articles reviewed represent the interpretations of other authors, rendering us a step removed from their original data. Additionally, although retrieved literature was the basis for our thematic review, it should be noted the researchers' backgrounds in journalism influenced assumptions on how to define the themes presented.

Despite these limitations, we believe the data and themes revealed in our analysis point to three issues for consideration by both working journalists and scholars seeking to improve journalistic practice (Figure 2):

> (1) While hard won, traditional norms of journalistic practice are at the center of critiques and the data suggests are limiting audiences' ability to understand how scientific research "really works" in environment stories. This limit linked to a journalist's ability to convey methodological limitations, timeframes and funding biases in order to avoid misrepresenting science as absolute. This further linked to official sources and PR being the driving sources of environment journalism, which reinforces the need for innovation in how stories are made transparent to audiences to reveal how they were researched and why certain sources were included. With the growing importance of digital and social media, it is time to reassess how these traditional norms can be balanced with the

emerging ecology of online environmental journalism.

(2) In response to data that suggests environment journalism often fails at demonstrating the open-endedness of environment stories, journalist and scholars can consider new story-telling approaches that move away from traditional journalistic criteria, such as timeliness and novelty and toward considering the "big picture" and long-term implications of most environmental stories. (A first step for scholarship would be to investigate the frequency of follow-ups on individual environment stories.)

(3) Broadly speaking, the limited treatment of non-traditional models of environment reporting in the data suggests journalism education and news media institutions should seek out new story-telling tools and methods that move beyond conventional journalistic norms in order to encompass the complexity of environment stories, by building on the four alternative reporting methods identified in the "alternatives" section of this paper.

To conclude, this research serves as a map of information available on environment journalism best practices and may be used in future research to help bridge the gap between the theoretical and the practical. While the reviewed studies may not offer definitive answers on how to improve environment journalism practice, their analysis suggests a major avenue for future research to help attain such a goal. Specifically, experimentation with alternative theoretical models and methods to investigate their feasibility for and impact on actual environment journalism practice is needed. There is a stark hole in the literature and, we hope, this review will spur more robust discussion of how past results can be built on to generate more informed journalistic practice.

Acknowledgements

This work was supported by Genome Canada and Genome Quebec as part of the GE3LS component of the Genozymes for Bioproducts and Bioprocesses Development project.

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* = Included in data set of 58 articles.

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