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Summary and Keywords

Across many parts of the globe the relationship between journalists and news sources has been transformed by digital technologies, increased reliance on public relations practitioners, and the rise of citizen journalism. With fewer gatekeepers, and the growing influence of digital and social media, identifying whose voices are authoritative in making sense of complex climate science proves an increasing challenge. An increasing array of news sources are vying for their particular perspective to be established including scientists, government, industry, environmental NGOs, individual citizens and, more recently, celebrities. The boundaries between audience, consumer and producer are less defined and the distinction between ‘factual’ and ‘opinion-based’ reporting has become more blurred.

All these developments suggest the need for a more complex account of the myriad influences on journalistic decisions. More research needs to examine behind-the-scenes relations between sources and journalists, and the efforts of news sources to frame the issues or seek to silence news media attention. Also although we now know a great deal more about marginalized sources and their communication strategies we know relatively little about those of powerful multinational corporate organizations, governments and lobby groups. The shifting media environment and the networked nature of information demand a major rethinking of early media-centric approaches to examining journalist/source relations as applied to climate change. The metaphors of ‘network’ and field’ capture the diverse linkages across different spheres better than the Hierarchy of Influences model.

Keywords: sources, climate change, news media, agenda, celebrities, NGOs, scientists, public relations, news production, social media

Introduction

Climate change is a highly contested issue with an increasing array of news sources all vying for their particular perspective to be established (Anderson, 2009). This includes scientists, government, industry, environmental non-governmental organizations (ENGOs) and, more recently, celebrities. When global warming, as it was referred as then, first began to gain news media attention in the early to mid-1980s scientists were the principal news sources (see Carvalho & Burgess, 2005; Trumbo, 1996; Weingart et al., 2000). However, from the late 1980s politicians increasingly influenced the agenda and it moved from being a story largely confined to specialist science sections to a more general news item focusing on political controversy (Carvalho & Burgess, 2005; Wilkins & Patterson, 1991). Gradually, as the issue moved increasingly into the political arena, the focus of attention became more about policy debates and journalists increasingly relied on political sources. What had once been seen as a narrow “science story” is now spread across a number of different news beats. With fewer gatekeepers, and a significant expansion of digital and social media, identifying whose voices are authoritative in making sense of complex climate science proves a growing challenge (Anderson, 2014; Boykoff et al., 2015). Across many areas of the globe the relationship between journalists and their sources has been transformed by digital technologies, increased reliance on public relations practitioners, and the rise of citizen journalism. In the early 21st century, rapidly increasing numbers of people are accessing news via their smartphones and, in the 26 countries surveyed by Newman et al. (2016), online news is now more important than television news for the under 45s. Celebrity influencers and the public play an increasingly significant role in shaping news content through filtering, amplifying, sharing, and repurposing media content via social media affecting sourcing practices and news algorithms. Also there has been a rapid proliferation of niche sites on climate issues, some of which, like the U.K. Energy and Climate Change Intelligence Unit (ECIU), are led by former mainstream media journalists and “have a profound influence over legacy media as a source and agenda-setter” (Painter, 2015). This article argues that the shifting media environment and the networked nature of information demand a major rethinking of early media-centric approaches to examining journalist/source relations as applied to climate change.

There is a long tradition of examining source influence on journalistic decisions within the sociology of news production in journalism studies spanning several decades. How journalists gather news stories and the types of sources they access is of considerable importance, since it reveals underlying assumptions about social dominance and legitimacy (Carlson, 2009; Ericson et al., 1991). As Carlson puts it:

> … patterns of who gets to be a news source lead to assumptions about who has power and who is powerless, who has authority and who is subjugated, who is to

> be trusted and who is suspect, and who is acceptable and who is deviant. To study news sources is to pry open these assumptions, question their impact, and posit alternative ways of conceiving of sources.
>
> (2009, p. 527)

Over the past 30 years a growing number of scholars have provided in-depth analyses of the influence of the news production process on environmental journalism and climate change specifically (see Anderson, 2009, 2015). In the environmental communication field, news ethnographies involving interviews and observation have tended to focus on examining the media strategies of marginalized sources such as ENGOs. In order to be successful news sources must not only gain access to the media, but also frame an issue in favorable terms—although in some instances the strategic goal of an organization may be to delay or silence coverage and stay out of the mainstream news. The media and sources are mutually dependent upon each other, and their relationship is often seen as "driven by a strategic complementarity of interests" (Franklin, 2003, p. 47). A common approach is to view the relationship between media and news sources as symbiotic, but a more critical perspective views the latter as having the upper hand. Thus according to Herbert Gans while "… it takes two to tango, sources usually lead" (1979, p. 116). Some argue that the power balance has shifted firmly in favor of sources in the current media climate where news outlets are struggling to survive, the public relations industry has gained more power, and news actors are able to bypass mainstream media and gain a voice online (Broersma et al., 2013).

However sources are not neutral and there is a hierarchy of credibility in how they are judged by journalists. News routines have been shown to systematically favor the voices of elites and exclude those who lack social dominance. But, crucially, this is neither an automatic process nor guaranteed, and journalists ultimately tend to control how an issue is framed—though this is becoming less the case with the rise of digital media.

Journalistic Dependence on Elite Sources

Over three decades of research has shown that the battle to gain favorable coverage is far from a level playing field since official sources, such as government departments, tend to enjoy advantaged access to the news media (Anderson, 1997; Hansen, 2010; Manning, 2001; Sigal, 1973). Journalistic norms that emphasize impartiality and independence recommend that a plurality of alternative voices be used to provide a range of perspectives. However elites are routinely privileged by news media due to their authoritative position and the considerable resources that they can devote to managing the media. Thus not all sources have an equal opportunity of being accessed by the news media.

By virtue of their powerful position, government sources command attention as "authorized" and legitimate speakers and thus form part of the staple diet of news copy that journalists rely on. Equally government ministers are reliant upon the news media in maintaining their public standing. As Boykoff and Crow observe:

> Not only do media rely on government sources for much of the information necessary to tell stories, but government sources also depend on media coverage for publicity, positive public opinion and reelection. The relationship is not one-dimensional but rather inherently complex and muddy.
>
> (2014, p. 6)

In the late 1970s Stuart Hall and colleagues undertook a classic study examining the portrayal of mugging in the United Kingdom that involved a close examination of the relationship between news sources and national press coverage. They argued that official sources or "primary definers" (such as government ministers and industry officials) tend to gain advantaged access to the media and almost always succeed in shaping the news agenda (Hall et al., 1978). This was seen as resulting from journalistic professional ideologies and shared news values granting greater legitimacy and credibility to ruling elites, reflecting their institutional status in society. Official sources were thus seen to have a built-in advantage in levering media access, either by virtue of their status as representative of "the people," their standing in society, or their claims to expertise and authoritative knowledge. The media were viewed as "secondary definers" via their role in reproducing the views of the powerful. For Hall et al.:

> These two aspects of news production—the practical pressures of constantly working around the clock and the professional demands of impartiality and objectivity—combine to produce a systematically structured over-accessing to the media of those in powerful and privileged institutional positions.
>
> (1978, p. 58)

Editors often tend to follow the lead from political elites but there is a complex relationship between media agendas, political agendas, and public agendas (Anderson, 1997; Ungar, 2014). Hall and colleagues' analysis suggested that journalists tend to automatically approach a story by adopting the official sources' interpretive frameworks for making sense of issues. This, they contended, can then set the agenda for all subsequent debate; and once an issue is framed in this formative stage it can be very difficult to shift it to another interpretation.

During the 1990s, however, a series of empirical studies began to qualify these general observations through detailed studies of source-media relations suggesting that primary definition was neither hegemonic nor uniform. Numerous studies suggested that while institutionally powerful sources do tend to dominate news coverage, especially where a major crisis is concerned, they are not automatically guaranteed successful news entry. In an influential piece written in the 1990s, Schlesinger argued that the theory, while

offering a number of useful insights, was too static and media-centric (see Schlesinger, 1990). It underestimated the extent of competition, downplayed the conflict and division among powerful news sources themselves, and glossed over how access to news media shifts over time. It also neglected the issue of off-the-record briefings that involve unnamed sources that are difficult to investigate because of their very covert nature (Anderson, 1997; Carlson, 2013). Moreover, in focusing upon the processes through which official sources gain news access it diverted attention away from considering the question of how marginal sources attract coverage.

What Carlson (2009) labels the "competitive definers" approach emphasizes competition over news frames and conflict among news sources seeking to influence agendas (Table 1).

Table 1. Conceptualizing Source-Media Relations

Primary Definers Model (e.g., Hall et al., 1978)	Competitive Definers Model (e.g., Anderson, 1991, 1997)
• Official sources have privileged access to the media by virtue of their status in society • The media operate as secondary definers through reproducing the views of the powerful	• Emphasizes competition among sources over news frames • Official sources have structural advantages but are not guaranteed dominance • On occasion media can act as primary definers

The competitive definers approach recognizes that an understanding of public relations and promotional activities is absolutely crucial to understanding media reporting in general and to climate change governance in particular. It is concerned with interrogating the behind-the-scenes competition among sources vying for news entry though this may also involve private conduits of power that, by their very nature, tend to be closed to scrutiny. It directs attention to the importance of analyzing the factors that constrain or enhance their chances of getting into the news and, crucially, influencing how issues are framed. With the rise of social and digital media, in theory journalists can access a much greater diversity of sources with minimal effort. However this raises issues of credibility and trust that are central to the source-journalist relationship. The whole question of how news sources are becoming increasingly media savvy directs attention to the impact of public relations on news sourcing, an influence that has been steadily growing over recent years. The relationship between journalists and sources is heavily influenced by "information subsidies"—the provision of ready-to-use newsworthy material (Gandy, 1982). And increasingly it is public relations (PR) practitioners that supply this to news media and online media are ever more reliant upon such information subsidies.

Public Relations and Information Subsidies

Public relations sources have always been influential in environmental news reporting (Anderson, 2014). In the 1970s Sachsman found that PR sources contributed to around a half of all environmental news stories and approximately 20% of environmental coverage originated from press releases. However, their influence has accelerated in recent years and public relations is increasing global. As Sachsman and Valenti observe:

> … while news sources have always tried to bypass the traditional gatekeeping function of the news media and take their messages directly to the public, in the era of the Internet, they are able to do so, with Google currently among their most important gatekeepers.
>
> (2015, p. 161)

Reputation is now viewed as increasingly vulnerable, particularly on social media, and the digital age demands that corporate bodies engage with stakeholders via a variety of "new" media platforms (Lloyd & Toogood, 2015). While the numbers of people employed in journalism is declining, there has been a significant growth in the public relations sector. According to the Labour Force Survey in 2015 there were approximately 64,000 journalists in the United Kingdom (a fall from 70,000 in 2013), while the number of PR professionals increased sharply from 37,000 in 2013 to 55,000 (Ponsford, 2015b). In the United States, Labor Force Survey data suggest that in 2014 the ratio of those employed in PR to journalism was 4.6 to 1. Public relations companies often employ former journalists. According to one U.K. public relations agency director:

> If you look at a national newspaper anything up to 50% of the content will come from a PR company, whereas about 10 years ago it would only have been about 10%… . PRs are the gatekeepers of news and information but are becoming the sources: stories are being led by PR companies and PR companies are inhabited by journalists
>
> (Lloyd & Toogood, 2015, p. 30)

Moreover, this increasing reliance on prepackaged material is not just a feature of popular news outlets that focus on celebrity news. An extensive content analysis of U.K. quality press coverage revealed that almost a fifth of stories derived wholly or mainly from PR sources (Lewis et al., 2008a). In addition, news agencies often provide another important means whereby PR material frequently finds its way into the news through agency copy. In the study undertaken by Lewis and colleagues, approximately half of the stories were found to be wholly or mainly dependent on material from wire services; itself largely derived from press releases. Only a quarter of stories displayed no evidence of this at all. Other research conducted in Australia and the United States paints a similar picture with approximately 50% of newspaper stories thought to derive from prepackaged

material (see Davis, 2013). Pressure on journalists arising from staff cutbacks and increasing workloads, and dependence on agency and PR copy, is further exacerbated by lack of time to independently verify information from sources (Lewis et al., 2008B).). As the PEW State of the Media 2013 Report observes:

> Efforts by political and corporate entities to get their messages into news coverage are nothing new. What is different now—adding up the data and industry developments—is that news organizations are less equipped to question what is coming to them or to uncover the stories themselves, and interest groups are better equipped and have more technological tools than ever.
>
> (PEW, 2013)

Reliance upon a single source carries with it clear dangers, especially when that source is concerned to place an organization in a particularly positive light. Where journalists do not have the time to independently verify information through consulting other sources, they lay themselves open to being misinformed and manipulated. News sources (particularly those who are resource rich) have become increasingly sophisticated in spinning their messages. As Davis observes:

> The resources available to and deployed by sources (especially business, industry, government and other resource-rich sources) have increased, and promotional techniques have grown in sophistication, while at the same time resources available to media and media professionals have diminished, resulting in a radically changed balance of power between sources and journalists/media.
>
> (2008, p. 278)

Capacity issues and lack of training and support is a particular issue for journalists working in poorer regions of the world. In developing countries climate change is often viewed by editors as an international story and local reporting is not prioritized (Tagbo, 2010). Over the past 10 years there have been relatively few stories on climate change in national newspapers in Africa and South America, compared with other regions across the globe, resulting in an information gap (Boykoff et al., 2015). Moreover, climate change coverage in these parts of the globe tends to be heavily based upon Western news agencies or repackaged media releases without any local context. For example, over 70% of articles on climate change in South Africa's *Mail* and *Guardian* newspapers between January to March 2009 and January to March 2010 were found to be international containing no South African, or even African, content. Just 6% of the coverage comprised of local stories originated by reporters (Tagbo, 2010). Different kinds of cultural values may be identified in articles on climate change written by staff writers and those written by Western news agencies. For example, evidence suggests that articles on climate change in national daily newspapers in the Philippines written by Filipino staff writers are more likely to express collectivist values than those written by wire agencies, which are more

likely to exhibit individualist values (Evans, 2016). Also, journalists working for domestically oriented media during climate summits have been found to view their role very differently from those working for transnational media (Lück et al., 2016).

In comparison with pressure groups, there has been relatively little research undertaken on the role of corporate sources in promotional strategies. However, evidence suggests that industry is increasingly investing in the services of public relations consultants. Between 1979 and 1999 there was an 11-fold increase in the hiring of PR consultants by U.K. corporations (Davis, 2002). More and more, transnational companies have appointed their own in-house public relations personnel and this has important consequences for the battle over control in framing climate change.

Strategic Communication by Industry Actors

There is an emerging body of literature that examines how business and political sources are seeking to actively shape environmental reporting (e.g., Beder, 2002; Davis, 2007; Greenberg et al., 2011; Schlichting, 2013) Large corporations, particularly concentrated in the United States, have spent millions of dollars on strategic communication challenging the scientific basis of climate change (Antilla, 2005; Greenberg et al., 2011; Miller & Dinan, 2015; Newell, 2000). Increasingly "front groups" have been established by industry to promote particularly powerful interests while ostensibly representing the public interest as a whole (Beder, 2002). One such group, the Global Climate Coalition (GCC), representing the interests of the U.S. fossil fuel industry, was established in 1989 and has spent vast sums of money on lobbying and public relations. A major strategy of conservative think tanks (CTTs) and lobby groups has been to sow the seed of doubts about anthropogenic climate change:

> The central tactic employed by CTTs in the war of ideas is the production of an endless flow of printed material ranging from books to editorials designed for public consumption to policy briefs aimed at policymakers and journalists, combined with frequent appearances by spokespersons on TV and radio.
>
> (Jacques et al., 2008, p. 355)

In 1993 alone, one member of the group, the American Petroleum Institute, reportedly paid $1.8 million to a public relations company to try and defeat a proposed tax on fossil fuels (Gelbspan, 1995). There have also been very close connections between the oil company, Exxon Mobil, and U.S. climate skeptic think tanks, such as the Competitive Enterprise Institute and the American Enterprise Institute (Gelbspan, 2004). The U.K.'s Royal Society found that in 2005 Exxon Mobil distributed $3.9 million to 39 organizations challenging the science of global climate change. Moreover, the U.S. Union of Concerned Scientists claimed that between 1998 and 2005, Exxon Mobil contributed in the region of 16 million dollars to a network of 43 groups that questioned the scientific consensus on climate change. An article in the U.K.'s *Guardian* newspaper revealed that the American Enterprise Institute had offered scientists and economists $10,000 each as payment for articles designed to undermine the release of an IPCC report (see Sample, 2007).

Owners can also exert a powerful influence on editorial content and as we shall see below, this may be the subtle outcome of news conventions and journalists' own internalization of news values and norms as well as instances of direct editorial intervention (Anderson, 1997; Petley, 2013). Owners have a myriad of close connections with networks that have very powerful interests inside and outside the boardroom.

The Influence of Editors and Proprietors

Journalistic decisions about coverage of climate change in legacy media may be influenced by editors and proprietors who themselves have a multitude of connections with powerful news sources. In a recent inquiry Rupert Murdoch, executive chairman and formerly CEO of News Corporation, conceded that in relation to the U.K. tabloids he had "editorial control on major issues" (House of Lords, 2008). Evidence from former editors of other newspaper chains suggests that direct interference from newspaper owners is not unusual though this is often through subtle means (House of Lords, 2008).

Murdoch's intervention as an owner is clear in relation to climate change news coverage. Having screened Al Gore's film, *An Inconvenient Truth* at a News Corporation Summit in California in 2006, in 2007 he pledged all his businesses would be carbon neutral by 2010, and set out a new vision to News Corporation employees:

> The climate problem will not be solved without mass participation by the general public in countries around the globe. And that's where we come in. We're starting with our own carbon footprint… . We can set an example, and we can reach our audiences. Our audience's carbon footprint is 10,000 times bigger than ours… . That's the carbon footprint we want to conquer. We cannot do it with gimmicks. We need to reach them in a sustained way. To weave this issue into our content—make it dramatic, make it vivid, even sometimes make it fun. We want to inspire people to change their behavior …

However, it was apparent that this decision was very much influenced by business interests. He went on to explain:

> … there are limits to how far we can push this issue in our content. Not every hero on television can drive a hybrid car. Often times it just won't fit. We must avoid preaching. And there has to be substance behind the glitz … the debate is shifting from whether climate change is really happening to how to solve it. And when so many of the solutions make sense for us as a business, it is clear that we should take action not only as a matter of public responsibility, but because we stand to benefit.
>
> (Murdoch, 2007)

In 2006 a shift in stance toward climate change was already evident in *The Sun* (owned by News Corporation and at that time the U.K.'s highest-circulating newspaper). Prior to this climate change was almost invisible on its pages; between October 2000 and the end of December 2006 *The Sun* and its Sunday counterpart, *The News of the World*, only carried 18 headline stories on the issue (Gavin, 2007). Opinion pieces that ridiculed concerns about climate change were commonplace (McKnight, 2010). However, on September 11, 2006, *The Sun's* editorial ran "Too many of us have spent too long in denial over the

threat of global warming. The evidence is now irresistible." Its front page declared: "Today and every day this week, the *Sun* urges its army of readers to think green." A banner appeared across 27 of the newspaper's first pages, and 2 double-page spreads were devoted to the announcement that the film *An Inconvenient Truth* was opening soon.

In 2007 as the issues rose in prominence on the political agenda former British Prime Minister, Tony Blair, authored a number of articles in *The Sun* on tackling climate change. In the United States, too, there was evidence that News Corporation-owned outlets started to give the issues greater prominence. For example, MySpace introduced a channel dedicated to climate change, National Geographic Channel launched the Preserve Our Planet series, and Fox News Channel launched their "Green It. Mean it" campaign for Earth Day 2008 (see Anderson, 2014). This was short-lived though. An investigation into coverage on three major cable news channels in the United States in 2007 and 2008 found that Murdoch's Fox News channel took the most dismissive tone toward climate change and devoted much more space to views that challenged its reality or severity.

In the run-up to the Copenhagen Climate Summit in December 2009 there was evidence of a significant change in outlook and a major editorial backlash. This came in the wake of the Climategate affair of November 2009, when a large volume of emails, either to or from climate scientists at the U.K.'s University of East Anglia (UEA) Climatic Research Unit, were made public over the Internet via a hacker. Climategate, as it became known, developed into a major international scandal. Selected contents of the emails were used by some individuals to suggest that prominent climate scientists had hidden or manipulated data, and that they had colluded to try to suppress the publication of papers that suggested climate change was not occurring. However, a series of independent investigations concluded that there was no evidence of scientific misconduct or fraud (Maibach et al., 2012; Russell et al., 2010).

A series of interviews with journalists and broadcasters in the United Kingdom undertaken by Margot O'Neill following Climategate found that editors appeared to be increasingly of the view that environmental correspondents had "gone native," and had not exercised enough critical distance from the subject matter (O'Neill, 2010). One senior U.K. journalist observed: "I've never been this hated by our editors" (O'Neill, 2010, p. 30). According to former BBC environment correspondent, Richard Black, after Climategate and the hype leading up to the Copenhagen climate summit a number of editors became convinced that "… climate change was a scam.' One [press] member [was] cold-shouldered by editors and … accused of wasting time and resources… . We were back at the end of the bulletin, if at all" (Black, 2012).

A leaked email sent in December 2009 by Fox News' managing editor in Washington to its journalists in the run up to the Copenhagen climate summit warned them to "refrain from asserting that the planet has warmed (or cooled) without IMMEDIATELY pointing out that such theories are based upon data that critics have called into question It is not our place as journalists to assert such notions as facts, especially as this debate

intensifies" (Goldenberg, 2010). And when a climate change skeptic, Paul Ingrassia, joined Reuters as a senior editor its climate change coverage dropped by 48%. Veteran reporter, David Fogarty, who had been climate correspondent for Asia for four and a half years, claimed that by the start of 2012:

> Progressively, getting any climate change-themed story published got harder. It was a lottery. Some desk editors happily subbed and pushed the button. Others agonised and asked a million questions. Debate on some story ideas generated endless bureaucracy by editors frightened to take a decision, reflecting a different type of climate within Reuters – the climate of fear.
>
> (Goldenberg, 2013)

While there are clearly some instances of direct editorial interference in the coverage of climate change in legacy media, as discussed below, on a day-to-day basis it is the underlying journalistic conventions, assumptions, and commercial pressures that tend to drive it.

Journalistic Values and Norms

Journalists work with a set of ingrained assumptions about what makes a "good" news story, what will appeal to audiences and news editors, and what will likely make its way into the headlines. On a daily basis they make judgements about the legitimacy of sources and the credibility of information. The notion that news articles should be "factual," "neutral," and "balanced" is a powerful norm that guides working practices. Adherence to the balance norm (the notion that impartial reporting must give approximately equal space to both sides of the story) has had particularly deleterious consequences for the quality of reporting of climate change.

In the early 2000s Boykoff found that the journalistic norm of balance led the U.S. prestige press to frequently produce a misleading account of climate change, suggesting the scientific community was split down the middle (Boykoff, 2007; Boykoff & Boykoff, 2004). The tendency to give space to climate change skeptics has been particularly evident in the U.S. and U.K. news media. A study of three major U.S. cable news channels in 2007 showed how coverage was not monolithic with Fox News significantly more likely to air climate skeptic views compared to CNN. According to Schmid-Petri et al. (2015), the amount of attention to skepticism in the U.S. press has remained fairly constant but there has been a shift from fundamental skepticism to impact skepticism. By this they mean that while earlier coverage was dominated by denial concerning the existence of global warming and its anthropogenic causes this has been replaced by a focus on the necessary (or unnecessary) actions to combat climate change, with skeptics claiming that binding regulations would have a negative impact on the economy and pose a threat to individual freedoms. In a similar vein, Painter and Gavin (2016) found that over the period 2007 to

2011 climate skepticism was still in evidence across a range of U.K. national newspapers. A close relationship has been found to exist between the leanings of national newspapers in the United Kingdom and the United States and their coverage of climate change; with right-leaning papers being much more likely to include climate skeptic editorials and commentaries and written by climate change denialists (Carvalho, 2007; Feldman et al., 2015; Painter & Gavin, 2016). However, there is considerable variation across countries in the amount of space given to climate change skeptics (see Painter, 2011).

Interview and survey-based studies with environmental reporters suggest that they tend to view sources with differing amounts of legitimacy reflecting broader power structures in society and this can shift over time. The emphasis on neutrality leads some journalists to be wary of news sources that are seen to have a clear "agenda" and who supply stories that are perceived as needing greater verification. For example, a former environment correspondent for Independent Television News commented that his view of environmental groups had become increasingly tainted as expressed below:

> Partly because they have become more shrill and more radical as the mainstream political parties have stolen their political agendas … and I think that means that people who are editing programmes have become more suspicious of them and less trusting. And they have become a business.
>
> (Interview by author, 1997)

A journalist from a national scientific publication maintained:

> The sources I tend to use are the primary scientific literature … I don't think I have ever used NGOs or pressure groups as a source of scientific information and I wouldn't recommend it to anyone. Not because they get it wrong, I think Greenpeace are usually quite careful, not everyone is, but they tend to be, not always but on the whole, but they have an agenda.
>
> (Interview by author, 2010)

There may also be some resistance against being seen to be "stage managed" by groups such as Greenpeace. Chris Rose, former Greenpeace campaigner and director of Media Natura, observed that many environmental specialist reporters tend to dislike Greenpeace because they are often bypassed in the news production process:

> They don't like Greenpeace and they don't like Greenpeace because Greenpeace goes past them. It gets straight onto the front page of the newspaper because the news editor will say I don't care whether you think this is news or not … it looks like news as far as I'm concerned and the public will think it's news.
>
> (Interview by author, 1991)

Studies have revealed that while media stunts may help ENGOs get their stories into the news media, the novelty quickly wears off and it is much harder to get sustained coverage that draws attention to the substantive issues (Cox & Schwarze, 2015; Hansen, 2010). Also when the science has been called into question a media backlash has often occurred. For example, there was a backlash from senior media executives against Greenpeace following the Brent Spar controversy over decommissioning a redundant oil rig at sea and over the Climategate scandal (Anderson, 2003, 2014).

A survey of U.S. reporters covering environmental affairs across U.S. regions in the early 2000s suggests that journalists are much less likely to view environmental pressure groups as reliable sources compared to state departments with responsibility for environmental affairs (Sachsman et al., 2010). When questioned, reporters ranked large ENGOs with a nationwide presence as of much less importance and Greenpeace came right at the bottom of a list of all the various news sources that they were asked to rank. However, at the regional level the journalists claimed local environmental groups were frequently used as sources.

ENGOs, then, often face an uphill battle in getting news media visibility and influencing framing processes. However, the growth of digital and social media, along with a sophisticated ability to manipulate news values, has enabled some organizations to bypass traditional gatekeepers and exert considerable influence.

Strategic Action by Environmental Challenger Groups

While the behind-the-scenes struggles among news sources competing for media attention has often been neglected in studies focusing on climate change and the media, we now know much more about environmental journalism and source strategies through interviews with journalists and sources, examination of press releases and policy documents, or through observational methods (see Anderson, 1997; Hansen, 1993; Hutchins & Lester, 2011; Lester & Hutchins, 2009). The bulk of previous research has focused on analyzing ENGO strategies rather than those employed by industry, politicians, or scientists (see Anderson, 2009; Hansen, 2011; Miller & Riechert, 2000; Mormont & Dasnoy, 1995). Research specifically on climate change news coverage has found that official sources such as government elites tend to gain the greatest voice, echoing the findings of more general studies of media-source relations (Anderson, 2014; Doyle, 2011; Hansen, 2010; Takahashi, 2011; Zamith et al., 2013). However, the extent to which this occurs varies depending upon the type of media outlet and cultural factors. For example, a comparative study of climate change coverage in Chinese newspapers during the period 1998–2010 suggests that there was particularly heavy reliance on official sources compared with Norway and Ghana (Midttum et al., 2015). Russian news media coverage of climate change also appears to be particularly reliant upon official sources (Poberezhskaya, 2015). Additionally local media have been found to often depend less on elite sources than national outlets in their coverage of environmental issues (Anderson, 2014). There are also significant differences in media-source relations depending on whether the journalist is a specialist or general news reporter, or a news agency reporter (Lück, 2016).

News production studies suggest that since the 1980s ENGOs such as Greenpeace and Friends of the Earth have become increasingly sophisticated in dealing with the news media (Anderson, 1991, 1997). Large established organizations employ professional communications staff including those with significant experience in journalism and corporate communication consultancies (Greenberg at al., 2011). However the complexity of climate science and drawn-out timescales, combined with high levels of information saturation, mean ENGOs experience considerable challenges in finding novel angles that will generate sustained media interest. As Lester and Hutchins note: “Environmental groups are forced to (re-)strategize continually in order to find new means to circulate their preferred frames. This has commonly meant the adoption of new and creative styles of protest, images and other symbolic references” (2009, p. 583).

In the 1990s a series of studies focusing on news production and environmental issues showed that in some instances challenger groups could disrupt traditional hierarchies of news access and mobilize symbolic resources (Anderson, 1991; Hansen, 1993). Though they may not enjoy the status, finance, and PR personnel advantages of accredited sources ENGOs can exploit advantages of their own and sometimes lever prominent news entry to

mainstream media. This is particularly so in crisis situations when official sources are placed in a reactive position. ENGOs are often able to respond to media demands much more rapidly than officials because they are not held back by lengthy bureaucratic procedures and political restrictions. Also in the face of silence among officials, journalists may more actively seek out their views (Anderson, 1991, 1997). Another factor is that as newsrooms have cut back resources and there are fewer staff available to travel to geographically distant locations, activists are often able to step in with their own video footage (Anderson, 2003). ENGOs are sometimes able to bypass traditional source dependence through their grasp of news values and large organizations are increasingly using consultancies to help them maximize their media appeal (Anderson, 2003). As Greenberg et al. observe:

> It would be misleading to suggest that conservative-minded governments and oil companies are the only ones that use PR to influence the media, public and policy agendas. In an effort to appear more politically relevant, environmental NGOs and activist coalitions increasingly utilize public relations techniques and rely heavily on corporate communication consultancies to assist them in reaching the hearts and minds of key publics and policy-makers. From protest songs to media mind bombs, environmental movements have always been adept at using media technology for campaign purposes.
>
> (Greenberg et al., 2011, p. 73)

Environmental groups have long been at the forefront of embracing new media technologies and adapting them for their own campaigns. They rely extensively on digital and social media to get their voices heard but alongside this they value mainstream media to reach a broader audience (Lück et al., 2016). Online media provide a more level playing field for them compared with traditional news media where they often struggle to get their voices heard and journalists tend to have a preference for official sources.

Environmental challenger groups may also piggyback off celebrities. Increasingly they are calling upon celebrities to back climate change campaigns given their growing importance as a news peg (Anderson, 2011; Lester, 2006). A recent study examined the amount of space that environmental issues attract in mainstream U.S. news coverage (print and television) (PIEC, 2015). While climate change attracted relatively large amounts of coverage compared with other environmental issues, and achieved increased visibility between 2010 and 2014, taken as a whole environmental stories make up just 1% of headlines (PIEC, 2013). Stories mentioning the pop singer Beyoncé were more than 11 times more common than stories mentioning deforestation, and more than 5 times more common than stories mentioning ocean health as a topic area.

There has clearly been a significant increase in the number of celebrities who have become prominent news actors. Boykoff and Goodman examined newspaper coverage of celebrities and climate change between 1987 and 2006 in Australia, the United States, Canada, and Britain and found a significant growth of celebrity involvement in 2005 and

2006 (Boykoff & Goodman, 2009). In a case study focusing upon celebrities involved in environmental advocacy Thrall et al. (2008) found 165 celebrities connected to 53 environmental groups. However, celebrity advocacy appeared to have relatively little direct impact on environmental news coverage, and some large, well-resourced pressure groups were found to rely very little on celebrity publicly and yet enjoy considerable news access. Conforming to news values and the increased emphasis on entertainment news inevitably involves making compromises. Celebrities have now become legitimate news actors but this often comes at a price and may soften the environmental organizations' message resulting in a shift in movement frames (Anderson, 2011, 2013; Brockington, 2009). However, celebrity opinion leaders help propel climate change into the news media through appealing to news values increasingly centered around human interest and show business. This culture where images and sound bites rule is especially associated with the ever-growing permeation of digital media to which we now turn.

Shifting Dynamics Between Journalist and Sources

In the digital era there has been a shift from a relatively closed to a more open and fluid system of news creation with a much greater range of content providers and types of media outlet. In the newspaper industry revenues from readership and advertising are contracting, particularly in the United States and Europe. Commercial advertising is thus having less of an influence on news providers than in the past as funding has become reliant on multiple sources.

Many newspapers are folding or going online and there have been considerable reductions in staffing (Broersma & Peters, 2012). Over recent years there have been significant cuts to science and environment beats with many reporters shed in the United States and Europe. Climate change reporting has been hit particularly hard in the United States. In January 2013 the *New York Times* took the decision to close its specialist environment desk, reallocating its nine journalists to other sections of the newspaper (Sheppard, 2013). Two months later it discontinued its Green Blog. In December 2015 Geoffrey Lean, Britain's longest serving environment correspondent, claimed that he was pushed out of the *Daily Telegraph* in the run up to COP-21 (Ponsford, 2015A; Ramsay, 2015). The entry in his blog reads:

> In the British press … there are, in my estimation, some ten columnists who reject or underplay the dangers of global warming, with precious few columnar voices on the other side. I write with feeling, and declare an interest. Until recently I was perhaps one of such voice but in the summer I lost my half page column in the

> Daily Telegraph, – while rejectionist columnists across a whole range of newspapers have retained theirs – and I am now being pushed out altogether.

As such trends accelerate increasing numbers of environmental journalists are working freelance and publishing their own blogs on the Internet. Others have taken up communications roles in nonprofit organizations or government agencies (Sachsman & Valenti, 2015). Questions have been raised about the extent to which newsroom cost-cutting measures impact on the practice of journalism and make sustained investigative journalism much harder to undertake (Davies, 2008). News agencies have also experienced a similar drive to lower costs, particularly staffing, combined with a search for new ways in which information and agency services can be commodified (Manning, 2008).

But a host of alternative investigative news outlets have sprung up on the Internet, among them *InsideClimate News*, which won a Pulitzer prize in 2013 (see Boykoff et al., 2015). However, small start-ups are vulnerable and there is a limit to which they can compensate for the decline of environmental reporting in traditional newsrooms. As Boykoff et al. note:

> While blogs have allowed scientists and other legitimate experts in fields from politics to economics, to communicate more easily and directly with the media and the public, a vast cacophony of voices makes the Internet a bewildering place where the quality of information can be hard to judge.
>
> (2015, p. 172)

Cut backs in specialist environmental reporters have led this gap to be filled by bloggers and advocacy journalists. However, this raises issues regarding the credibility and accuracy of information. As Nisbet and Fahy observe:

> In today’s ideologically divided media culture, instead of providing context or analysis, many bloggers, commentators, and advocates specialize in provoking moral outrage, spreading partial truths about opponents, promoting dire forecasts of doom, and exaggerating the evidence in support of their preferred positions.
>
> (Nisbet & Fahy, 2015, p. 224)

We know relatively little about the online communication activities of politicians and industry actors, and even less about other stakeholders such as artists and religious organizations (Schäfer, 2012). While ENGOs extensively engage in climate change communication online, climate scientists and scientific institutions tend not to be principal actors (Schäfer, 2012). Schäfer and colleagues (2012) surveyed German climate scientists and Tøsse (2013) interviewed climate scientists in Norway, but generally relatively little research has focused on climate scientists and their strategies toward gaining media coverage.

There are a limited number of blogs maintained by scientists actively doing research on climate change, and most blogs on this topic tend to be pseudoscience. Climate scientists do not tend to be that active on Twitter either. Schäfer (2012) posits that this could be to do with limited time resources and a dislike and/or suspicion of the novel format. A recent survey of German climate scientists suggests that they are often reluctant to engage with the media for fear of their work being misrepresented or exploited (Post, 2016).

However, source-dependence varies according to a number of different factors including the type of news trigger. Peaks in climate change coverage are driven by international events such as climate summits and the production of IPCC reports.

Here scientists tend to gain privileged access to the media. For example, in a study of TV reporting of 2013/14 IPCC reports Painter (2014) found that almost three-quarters of those featured on screen were IPCC authors or other scientists. Another study which examined media coverage of the IPCC Fifth Assessment Report in U.S. and U.K. broadcast and print coverage (including legacy and social media) found very different framings across different media outlets, no doubt partly reflecting different patterns of source dependence (O'Neill et al., 2015). Moreover the exceptional circumstances of these events can facilitate a temporary blurring of the professional boundaries between actor groups fostering greater collaboration between journalists and ENGOs (Lück et al., 2016).

The Growth of Citizen Journalism

Over recent decades there has been a significant growth in user-generated content, though this is more by way of reactive comment on news stories than citizens producing their own journalistic material (Atton, 2013). Citizens have become the main providers of breaking news. Also non-elite sources are able to sometimes very effectively utilize social media to shame corporations (e.g., Greenpeace's Barbie and Ken campaign over Mattel and deforestation). Social media are more and more being used as sources in mainstream news reporting (Paulussen & Harder, 2014). Newspaper reporters are increasingly using Twitter to gain story ideas and monitor emerging trends (Broersma & Graham, 2013; Hermida, 2010). This has led some scholars such as Hermida to conclude that traditional distinctions between sources, producers, and consumers are disappearing. As journalists are more and more likely to perform newsgathering via a computer screen, and there is a greater tendency for the same sources to be recycled again and again across multiple media outlets, there appears little to suggest that this is opening up the news to a greater diversity of voices (see Paulussen & Harder, 2014).

The primary definers model is increasingly under challenge as new social media technologies such as Twitter enable a range of official and non-elite sources to comment on the news in instantaneous short sound bites (Hermida, 2010). Also evidence suggests that the traditional hierarchy of credibility that tends to govern mainstream media does

not automatically apply to social media; journalists appear more likely to access the voices of ordinary citizens and celebrities rather than institutional voices via these outlets (Paulussen & Harder, 2014). As Greenberg et al. observe: “Despite the asymmetry in relations of power among these groups … there are increasing opportunities for groups traditionally on the margins of influence to shift the terrain of the debate. (2011, p. 76).

Certainly in relation to climate news climate scientists do not appear to generally be very active on Twitter (Schäfer, 2012). However, it needs to be borne in mind that Twitter is used by a select group of people. Data from the United States suggest that those who use Twitter (around 23% of adult Internet users) tend to be young people living in urban areas, and are slightly more likely to be male than female (PEW, 2015). Similarly, U.K. data suggest that Twitter users are likely to be young people in higher social classes and slightly more likely to be men than women (Ipsos MORI, 2016). Also research suggests that although social media sites such as Twitter and Facebook are increasingly referred to in the news they are of limited importance as a source of news (Paulussen & Harder, 2014). As Cottle observes:

> Traditional newspapers and mainstream broadcasting still predominate within this news ecology, but they are increasingly surrounded by and/or actively immersed within the ubiquitous Internet with its enhanced connectivity, interactivity, and invigoration of new forms of online journalism and blogosphere(s). For the most part, however, mainstream journalism organizations, news outlets, and associated ideas of professionalism continue to enact traditional ideas and practices of editorial control, agenda-setting, and source access, selecting who enters “their” news domain and how and when—though they increasingly make use of forms of citizen journalism and growing blogosphere(s).
>
> (2009, p. 497)

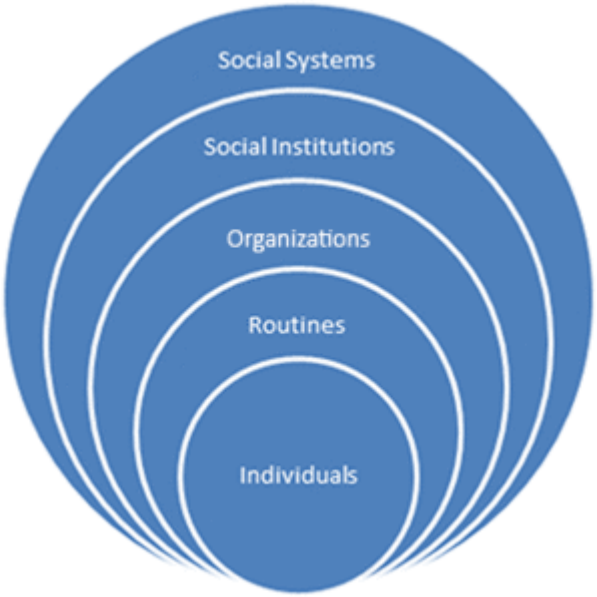
There is limited amount of research on how online discussion groups and social networks operate in relation to climate change (Schäfer, 2012; Williams, 2015). However, research suggests that climate change activists tend to be more active on Twitter than skeptics and have a greater number of followers (Williams et al., 2015). A study by Veltri and Atasanova (2015) found that Twitter users on climate change themselves tended to draw most on traditional sources such as newspapers and television.

A large scale study of journalists (specialist and non-specialist, prolific and occasional) covering climate change in a range of news outlets including mainstream and legacy media in five different countries suggests there is a difference in source use evident depending upon their view of the science (Brüggemann & Engesser, 2014). The findings suggest that:

> The more climate journalists are affirmative of the IPCC consensus, the more they use a triad of sources: environmentalists, scientific sources (e.g., researchers and their publications), and mass media reports. Journalists who want to give equal

> voice to skeptics use less scientific sources … the interpretive community that evolved around the IPCC consensus tends to include certain types of sources (environmentalists, mass media, and scientific sources), while the climate change–skeptical community avoids scientific sources.
>
> (2014, p. 20)

The study of source-media relations in the blogosphere, then, suggests further complexities. While there are more opportunities for user-generated content and citizen journalism on climate change, and it is clearly growing in importance, the proliferation of information (much of it of questionable accuracy), and the trend toward narrowcasting and personalized news, suggests that hopes that it would lead to a fundamentally more democratic space have yet to be realized. All these developments suggest the need for a more complex account of the myriad influences on journalistic content. One particularly influential analytical framework in media and communications studies is the Hierarchy of Influences model, first developed by Shoemaker and Reese in the early 1990s and updated in 2014 (Shoemaker & Reese, 1991, 2014). This model identifies five layers of influence shaping news production and content incorporating micro and macro level factors (see Figure 1).



Click to view larger

Figure 1. The Hierarchy of Influences Model.

Source: Shoemaker and Reese (2014).

At the *individual level* this article has highlighted the significance of the background, personal attitudes, values and professional orientation of mainstream journalists and other communicators, such as bloggers, in covering climate change. It identified differing perspectives on their role and the extent to which they see themselves as a neutral provider of information. These differences among the creators of media content are partly influenced by the type of media outlet. For example, new digital-born players such as the *Huffington Post* appear more likely to take an activist slant than legacy media (Brüggemann, 2015; Mullin, 2016). Blogs hosted by independent non-news media may also allow individuals to have much greater autonomy and to be less constrained.

At the *routines level* editorial policies and practices, as well as internal communication, can all contribute to shaping news selection (Rosen et al., 2016). This article has suggested that news values play a key role in influencing whether climate change stories are covered and how they are framed. News is filtered by sources through the operation of news values even before it reaches the news desk or circulates online. Where the interests of sources and journalists converge, and the same type of news values are deployed, the greater the likelihood of co-production occurring. Routine organizational factors and the diminishing pool of specialist environmental reporters often means there is heavy reliance on PR copy.

The metaphor of a gate implying restricted and controlled flows of information is of limited applicability in the digital era. Instead the concepts of “networked gatekeeping” and “networked framing” better capture the fluid processes that move beyond the organizational logic of legacy media (Meraz & Papacharissi, 2016). The process is not necessarily by default top-down. Official sources may have greater information subsidies but they are not guaranteed privileged access to the media; this is achieved as a consequence of successful strategic action. Also on occasion journalists take a more active role in initiating stories, and celebrity influencers and citizens play an increasingly important role in filtering, amplifying, sharing, and repurposing media content via social media. For example, Reddit allows ordinary citizens to submit items and vote on popular stories, and then algorithms determine which ones appear more prominently on the site. In the digital era there is more of a two-step gatekeeping process, whereby initial editorial decisions to include or reject a news item are followed by user decisions to upgrade or downgrade its visibility for a secondary audience, and “gate-watching” is performed by social media news aggregators such as Google News (Meraz & Papacharissi, 2016; Singer, 2014).

At the *organizational level* the ownership of media organizations clearly impacts upon the journalistic framing of climate change, as illustrated by the example of Rupert Murdoch. Journalistic practices may be constrained by written policies or, more likely, unwritten codes of conduct. Organizational influences are likely to be particularly significant in large media outlets where there tends to be less autonomy, though different media outlets owned by the same company, but with differing target audiences, have their own individual professional cultures and ideological standpoints. Such influences are clearly less significant for independent social media content providers.

At the *social institutional level* news sources can exert considerable influence either through gaining advantaged access to media and successfully framing messages, or by withholding information. News media, industry-funded think tanks, and official sources may have similar institutional goals where the status quo is threatened and they share the same ideological viewpoint. This article has also suggested that reliance on advertising and PR professionals can also impact on editorial independence and reinforce the power of elites. Finally, markets and audiences can shape media practices. However,

boundaries between institutions are increasingly fluid and the media do not form one homogenous institution.

At the *social systems level*—culture and ideology play a critical role in influencing the relationship between news sources and media content providers. This article has shown how ideological, cultural, political, and economic forces impact on the production of news and how climate change is framed. Comparative studies illustrate how global forces are affecting media to varying degrees. It has been widely observed that journalists covering climate change in the Global South often lack sufficient training or access to resources, may have unsupportive editors, and can be highly constrained by the political environment (Kakonge, 2013; Painter, 2010). However, the numbers of journalists from the Global South attending climate summits has considerably increased over the past decade; recent developments paint a varied and shifting picture of climate change coverage in developing countries rather than a complete dependence on Western news agencies.

As Shoemaker and Reese (2014) acknowledge in their revised model, the media landscape is considerably more complex in the early 21st century. The original model tended to be rather media-centric reflecting the orthodoxy at the time. In the new version the social systems level comes first (though not in a deterministic sense) because it is viewed as: "… the foundation from which all media content is constructed, the macro-level base upon which influences from other levels rest" (2014, p. 93). However, the boundaries between audience, consumer, and producer are currently much less clear and the metaphors of "network" and field' better capture the diverse linkages across different spheres. Journalists working for domestically oriented and transnational media tend to view their roles differently. There is now a two-step gatekeeping process and audience analytics and distributed content (the virality of news) is playing a greater and greater role in shaping journalistic decisions. Finally, the organizational level is less important for some new media content providers (Brown Jarreau, 2015).

Concluding Comments

Most of the focus of research thus far has been on the degree to which news sources are capable of influencing journalists, achieving access, and their ability to frame the issues on their terms. Much less attention has been paid to examining strategies designed to keep issues *off* the news media agenda (Anderson, 2014). While there is growing recognition that "control over the media is as much about the power to silence and suppress issues as it is to publicise them" (Anderson, 2006, pp. 122–123), much remains to be done. More research needs to examine behind-the-scenes relations between sources and journalists, and the efforts of news sources to prevent competing groups from gaining news media attention in relation to climate change. Also, although we now know a great deal more about marginalized sources and their communication strategies we know relatively little about powerful multinational corporate organizations, governments,

and lobby groups (Hansen, 2015). There is still a considerable amount to be done in examining journalistic attitudes to scientists as news sources on climate change, particularly in the context of calls for scientists to make greater efforts to engage with the public and demonstrate impact.

This prompts a number of questions that could usefully guide future research. How is the new media landscape shaping the relationships between journalists and their sources? As the line between “factual” reporting and “opinion” based reporting becomes increasingly blurred, how do journalists covering climate change see their role? What power do news sources have to respond to inaccurate coverage and to challenge dominant framings? And, finally, how has climate change reporting and source-relations been affected by the new breed of long-standing environmental journalists with their own blogs who now operate outside of the mainstream news media?

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