Advancing Climate Change Policy and Governance: A Stakeholder Analysis

Martin N [1], _Rice J_[2]

[1] The Australian National University, Canberra, ACT, Australia
[2] Griffith University, Gold Coast, Queensland, Australia

Abstract
Public participation in environmental policy development and governance offers governments and private organizations opportunities to gather community views and test policy reforms, instruments and potential solutions. Consequently, this study was aimed at determining the critical climate change policy development, implementation and governance issues observed by the larger community. The research employed a concept mapping method to analyse the data and present the subsequent package of consolidated results. In executing the investigation, concept mapping software was used to structure, contrast, sort and analyse approximately 1,700 statements taken from online data sources related to the top-down (executive) and bottom-up (grass-roots) approaches to climate change governance prevalent in the United States. Using the inputs from 344 community stakeholders, the study generated nearly 100 different concept terms, and seven major concept themes and clusters, related to the development and implementation of climate change policies and reforms. The computer mapping results show that emotion charged debates over climate science and party-political intransigence on climate change actions form continuing barriers to the implementation of positive and practical reforms in global communities. The study also depicts the ongoing problems in securing community agreement on the implementation of climate change reforms, and shows how ineffectual disagreements can often slow the reform process, damage climate governance, and setback our best efforts to reduce carbon emissions and pollution.

1 Introduction
The practical and democratic approach to environmental policy development and governance is offered as an enabler of positive outcomes in modern societies. Stakeholder engagements across the community provides mechanisms to build grassroots support and gain commitment; advance knowledge and information dissemination; assure democratic and socially equitable involvement, and, empower citizens to boldly 'speak out' and take action. In essence, these types of self-governing approaches make for better policy development and implementation (Newig, 2007; Schenk et al. 2007; Dietz & Stern, 2008).

For policy makers and governmental reformists, the scientific modelling and observable physical impacts of climate change presents a highly complex and uncertain future (Caldeira & Wickett, 2003; IPCC, 2013; Hoegh-Guldberg & Bruno, 2010). While these complexities are problematic for long term policy development, implementation and governance, theory shows us that participative processes are critical for future planning and policy analysis (Karlsson, 2005). Hence, we would assert that open stakeholder engagements should represent a clear opportunity for governments and private businesses.

In this article, we examine and analyse the process of online stakeholder participation as it relates to the creation and implementation of US Climate Change Reforms (CCR) following the re-election of President Barack Obama in November 2012. In undertaking this research, we are not asserting that online channels (such as social media sites, web logs ("blogs"), chat rooms) are comprehensive in judging public opinion (Lorenzoni et al. 2007). However, in a practical sense, we submit that online channels free individuals and organisations from the expectations and encumbrances of more formal communications channels, thereby delivering a 'highly democratized platform' for public opinions (Lorenzoni et al. 2007; Tremayne, 2007). In this context, we have two major research aims. First, we are interested in critically assessing and understanding what issues stakeholders consider to be important when creating and implementing CCR (e.g., economic impacts on costs of living, environmental impacts of inaction). Second, we are seeking to uncover the potential sources of tension and conflict that might impact the implementation and ongoing governance of CCR (e.g. passing of laws and regulations, imposition of new taxes and charges). These aims should allow us to understand and appreciate some of the critical CCR issues and tensions.

While some studies have looked more broadly at participative practices and practical outcomes, citizen and community roles, use of the Internet, framing of climate issues and communications, and the impact of trust relationships in policy development and governance (Newig & Fritsch, 2009; Tsang et al. 2009; Soma, 2010; Soma & Vatn, 2010), we have deliberately focused our investigation and analysis on the online channel used to canvas opinions (Merry, 2010; Barr, 2011). Our intention is to make a valuable contribution to our understanding of environmental policy development and governance, particularly in the emerging discipline of Green Information Technology and Systems (GITS) (e.g. Web logs) (Melville, 2010). This technology enabled approach to practical environmental policy development and governance lays a further innovative strand in this area of research.

The balance of this article will discuss some of the background literature surrounding the development of CCR using online channel engagement, the research context and method, the results of the analysis, the implications for policy makers and governance entities, and some brief concluding statements.

2 Climate Change Reforms Development – Communications and Engagement
The community engagement and widespread communication of CCR and environmental policies has a strong cumulative tradition in the literature (Gelbspan, 2004; Anderson, 2009; Merry, 2010; Whitmarsh et al. 2011). In dissecting the relevant literature, we see three areas of interest. At the broadest level, several studies have examined the use of political communications for disseminating information and discussing key issues (Anderson, 2009; Lester & Hutchins, 2009; Carvalho, 2010; Jun, 2011). Some of these studies show the diversity of opinions and torrid debates that surround CCR and the underlying science (Carvalho, 2007; Anderson, 2009), including the ability to deliver climate change messaging (Gelbspan, 2004) and the linking of political agendas with CCR (Carvalho & Burgess, 2005). Importantly for our study, prior research shows that communications on CCR is closely linked to environmental policy development (Boykoff & Boykoff, 2007), and that these communications can provide a socio-political frame for a diversity of views, actions and governance (Boykoff & Roberts, 2007; Carvalho, 2007). In addition, segments of the literature depict how some of these communications can change behaviours and disrupt the passage of CCR (Brunsting & Postmes, 2002; Whitmarsh et al. 2011). Overall, we observe a close and enduring link between widespread communications, participative engagement, and environmental policy development and governance.

In the second area of literature, studies depict a growing and important linkage between the Internet and the creation and implementation of government policy (Bennett & Fielding, 1999; Dutton et al., 2009; Margetts, 2009; Merry, 2010; Schäfer, 2012). The breadth of the literature shows that practical 'cyber advocacy' and 'governance in the Internet era', as they relate to government policy, are typical results of participative online communications and stakeholder engagements (Bennett & Fielding, 1999; Dunleavy et al. 2006). Foundation studies and reports suggest that the Internet is a practical medium for vigorous discussion and debate, innovative real-time interactions, and information sharing (Song & Bucy, 2007; Anderson, 2009; Margetts, 2009; Margetts et al. 2009; Schäfer, 2012). Also, the literature shows that online channel communications deliver critical messaging characteristics in the form of transparency, democracy of voice and actions, and more trust in open socio-political systems (Hine, 2005; Dutton & Shepard, 2006; Hood & Heald, 2006; Margetts et al. 2009). In sum, the Internet and its various online channels are observed as tools for the expression and collective creation of government policy, and the garnering of democratic governance actions (Dunleavy et al. 2006; Hood & Margetts, 2007; Boyd & Ellison, 2008; Margetts, 2009; Merry, 2010).

The third important segment of the literature relates to Web logs. The creation and maintenance of blogs as forums for discussion and animated discourse date back to the late 1990s (Davis, 1999; Blood, 2002; Hood & Margetts, 2007; Margetts, 2009). In comparison to more formal messaging (Whitmarsh et al. 2011), blogs offer a conduit for free speech, immediate responses, and candid commentaries that can enable changes in human behaviours (Hine, 2005; Song & Bucy, 2007; Arlt et al. 2011; Barr, 2011). Indeed, while some studies might suggest that blogging is less interactive than considered optimal (Dailey et al. 2008), a swathe of other investigations demonstrate that blogs offer a policy tool that can deliver reformational change, widespread participation, stakeholder commitment, and socio-political advocacy (Bennett & Fielding, 1999; Hood & Margetts, 2007; McKenna, 2007; Margetts, 2009; Merry, 2010; Arlt et al. 2011; Barr, 2011). Accordingly, we support expert peer opinion that 'blogs are important' (Anderson & Mahadour, 2007; Anderson, 2009; Merry, 2010; Barr, 2011) and offer all stakeholders an opportunity to engage in the process of environmental policy development and governance.

3 Research Context

The research context has been created using two articles that focus on the creation of climate change policy (Merica, 2013; Zelizer, 2013). The contextual frame combines climate change issues that were raised during the US presidential campaign and in subsequent public statements and deliberations. The first article was published on January 24, 2013 and discussed how environmental groups were urging President Obama to ignore congress, and use executive orders and regulations to progress climate change policy plans and governance (Merica, 2013). This article was identified as supporting the 'top-down' approach to environmental policy development and governance.

The second article covered the 'Forward on Climate Change' march in the National Mall in Washington DC on February 17, 2013 where 35,000 people, supported by President Obama, protested on the issue of CCR (Zelizer, 2013). The article highlighted the importance of highly localized grass-roots CCR support and enviro-activism in order to target congress, and change and moderate the views of US state-focused congressmen (Zelizer, 2013). This article was identified as supporting the 'bottom-up' approach to environmental policy development and governance.

In sum, the integration of the two articles shows that environmental policy development and governance can be positioned as a presidential (executive) priority with top-down (or leadership driven) and/or bottom-up (more grass-roots driven) approaches (Figure 1). Importantly, it also presents that CCR can be developed and implemented using multiple channels of governance (i.e., executive orders and regulations or laws and legislation). This provides stakeholders with a substantial scope to comment, exchange views and practically shape the proposed CCR and the various governance approaches (and processes).

Figure 1: Research Context – CCR Approaches
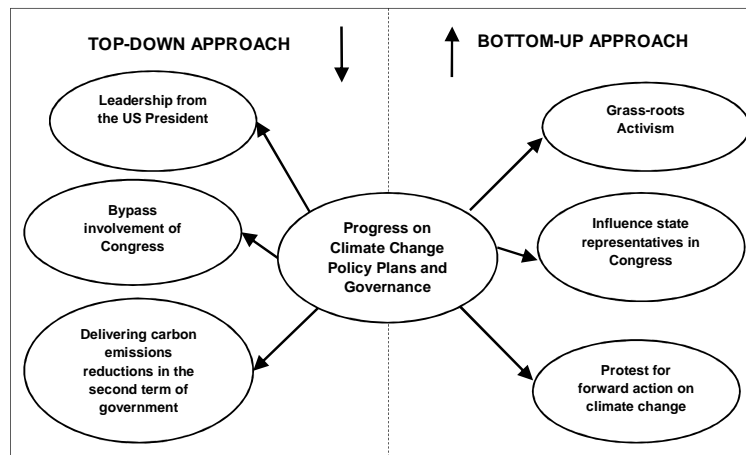
4 Methods

The Concept Mapping (CM) research technique allows us to analyse stakeholder data and describe a topic of interest using a rich picture format (Trochim, 1989; Freeman et al. 2004). First, stakeholders who will provide inputs to the study are briefed on the topic of interest. Second, inputs that address the topic are drafted by the stakeholders. Techniques for creating stakeholder inputs may include brainstorming, focus group exercises or, as in this study, 'blog' exchanges. Third, stakeholder inputs are integrated into a common document for automated processing. Fourth, specialist CM software applications are used to conduct concept statistics, clustering and multidimensional scaling manipulations and analyses (Leximancer CM software was used in this study). Finally, the maps and analytical outputs are interpreted as collective outputs (Trochim, 1989).

4.1 Data sources, collection and processing

A summary of the blog data we collected during the course of the study is presented in Table 1. A total of 1,702 blog comments (including server log times and dates) were collected verbatim from the article sites and allocated to a specific data file (i.e. either top-down or bottom-up approach) for analysis. This was done to enable the identification and recording of stakeholder statements that may relate to a specific CCR approach or associated issue.

4.2 Concept analysis and mapping software

Leximancer CM software classifies document concept terms and themes; identifies the relationships

between concept terms and documented themes; automatically codes stakeholder statements; and removes asymmetric information contained in the written corpus (i.e. statements that do relate to the topic of interest) (Leximancer, 2005; Smith & Humphreys, 2006). The software executes several linear functions to: (i) load written content files; (ii) remove stop words (e.g. 'and'), and insert text and electronic folder markers; (iii) extract the high level concept themes (dash marked areas on the map) and fine detail terms (dots or points on the map); (iv) edit the discovered concepts, including removing/adding concepts (e.g. names), merging similar or identical concepts (e.g. policy and policies), and reprocess the data; (v) establish the text block processing and software learning parameters; (vi) undertake the automatic location and coding of concept terms within the text block (i.e. automated equivalent of the 'manual coding process' in content analysis) (Krippendorff, 2004); and, (vii) construct concept maps and statistics profiles.

Table 1: Summary of Data

Data Set Dimension	Top-Down Approach Article 1 Merica (2013)	Bottom-Up Approach Article 2 Zelizer (2013)
Number of Blog Comments	806	896
Number of Bloggers	186	158
Total Number of Words	37,749	38,090

The software provides several outputs including a frequency distribution and statistical summary of discovered concept terms. The output files also display measurements of the associative behaviours between the concept terms (i.e. co-occurrence of the terms), with the central concepts being those that most frequently co-occur within the aggregate written document (displayed on the map as a high number of direct links to the larger concept terms). Also, the software measures conceptual similarity and specific attraction (i.e. conceptual clustering). Groups of concept terms appearing in comparable, or semantically similar (but not identical), contexts will cluster together on the map and typically represent a specific issue. The Leximancer User Manual outlined set points for a standard analysis (Leximancer, 2005).

4.3 Analysis Process
The analysis was conducted in two stages. In the first stage, we maximize (100% setting) the number of concept terms (points on the map) and concept theme/s (high level themes related to topic of interest) on the map. This identifies all the concept terms and the primary concept themes for the complete data set (i.e. what are the main CCR issues and the associated concept terms) (Trochim, 1989; Leximancer, 2005). Next, the software's Multi-Dimensional Scaling (MDS) feature was activated to steadily reduce the concept theme size in order to develop a set of workable concept clusters and terms. This enabled us to identify the concept clusters within the complete data set by rescaling the primary concept themes, and allowing secondary concept themes, and the clustering of terms to develop in the map (Jackson & Trochim, 2002). The resultant maps are shown in Figures 2 and 3.

The concept co-occurrence mapping feature was used to record the strongest relationships between the concept terms and activate the automated coding function (i.e. related concept terms are displayed in a table with the coded text logs in adjacent columns) (Leximancer, 2005). Each text string is codified with a three or four digit identifier number (e.g., s1_123, s1_6543), and enabled comparisons and correlations between the coded text and the clusters and terms depicted in the maps (see examples in the following discussion) (Leximancer, 2005; Smith & Humphreys, 2006).

5 Results and Discussion
The concept mapping results are summarised in Table 2. The results show a balanced level of participant discussion with similar numbers of concept terms and themes emerging in the resultant maps. The interactive responses to Merica (2013) showed three major (climate change science, balancing environmental and financial concerns, and executive orders versus congress passed laws) and one minor (diesel as a fuel choice) discussion; while the responses to Zelizer (2013) were more concentrated in the major areas of climate change science and the ability to exercise freedom of expression in relation to climate change, with a small scale technical discussion on rising planet temperatures since the last ice age. In aggregate, the results provide us with some interesting observations on this participative mode of environmental policy development and governance.

Figure 2: Concept Map – Top-Down Blogs

Figure 3: Concept Maps – Bottom-Up Blogs

5.1 Climate change – the unending debate

The results of the concept analysis show that, despite a level of consensus in the scientific literature, the underlying debate surrounding the science of climate change and global warming is still very active in communities (Cook et al. 2013). A review of the major concept themes shows us that the climate change and global warming science debates accounted for 49 per cent (Top-Down) and 80 per cent (Bottom-Up) of the respective blog discussions. This included minor discussions on the suitability of diesel fuel when attempting to reduce sulphur emissions, and the debate surrounding the rise in the earth's temperature following the last ice age event over 11,000 years ago. Surprisingly, limited discussion (i.e. 20-23 per cent) was directed at the major environmental policy development and governance approaches outlined in Merica (2013) and Zelizer (2013).

Table 2: Mapping Results

Map Dimension	Top-Down Approach	Bottom-Up Approach
	Responses to Merica (2013)	Responses to Zelizer (2013)
Number of Concept Terms on Map	44	49
Total Number of Concept Terms	2106	2662
Major Concept Themes (Concentration of Concept Terms)	Climate (848) People (604) Executive (479) Fuel (175)	Climate (1744) People (540) Age (378)
Cluster Summaries (weight of discourse in percentage points)	**1 Climate (41%):** Debate of the understanding and beliefs related to climate change and global warming periods. **2 People (28%):** People's thinking on the balance between environmental and financial (money) concerns. **3 Executive (23%):** Mixed views on the use of presidential executive orders and passing laws through congress. **4 Fuel (8%):** Micro-discourse on diesel as the wrong fuel choice due to higher sulphur emissions levels.	**1 Climate (66%):** Continued strong debate on the science of climate change and global warming periods. **2 People (20%):** People's ability to stand up and exercise their democratic rights in relation to climate change. **3 Age (14%):** Micro-level debate as to whether the earth's temperature has been steadily rising since the end of the last ice age due to elevated levels of carbon emissions.

The results suggest that the seemingly unending debate around climate change science and the global warming phenomenon tend to subsume and drown out discussion of policy options or governance that might be implemented to deal with this issue. The following example shows the ferocity of some of the arguments (note, this discourse on 'wrong' or 'junk' science is mapped into the upper section of the climate concept theme in figure 3).

> I am against using junk science to promote a political agenda. I am FOR actual science with validated results and proof of cause-effect (s1_1245) ('MS' – blog posting 7.05am, 19 Feb 2013).

> SO AM I ....ONLY NONE OF THIS IS "JUNK SCIENCE". THE SCIENCE IS REAL - THE JUNK IS THE POLITICAL AGENDA OF THE FOSSIL FUEL INDUSTRY AND THEIR MOUTHPIECE - THE REPUBLICAN PARTY! (SOON TO BE EXTINCT) (s1_1247) ('Danglars' – blog response 7.08am, 19 Feb 2013).

> It actually is junk science - and it's easy to spot as such. The "science" and the policies are completely dependent on unvalidated models. They remain no more than that until the models are thoroughly validated. Thus far every prediction has proven wrong. If this were not junk, people would acknowledge this fact, but not here (s1_1250) ('MS' – blog retort 7.14am, 19 Feb 2013).

Hence, while the democratic process of open discussion and debate may be healthy and inclusive, the continuous arguments about the science of climate change present a serious policy and governance barrier. We would argue that the inability to move past the science, may ultimately lead to unsustainable extensions in the policy development cycle, and bring communities temporally closer to predicted climate events. One possible solution for governments is to allow the scientific debate to run in parallel with the development of climate change policy and ongoing governance. This would allow decisions to be based on the best available information at that point in time (Weimer & Vining, 2005; IPCC, 2013). In essence, bloggers and other members of the community can continue with the climate change and global warming science debate, while appropriate priority and resources are given to policy development and governance activities (i.e. brings balance to the issues of climate change science, policy and governance).

5.2 Environmental governance – a democracy of sorts
The strongest variation observed in the results related to the implementation and governance of national climate change policies. Interestingly, the top-down approach saw largely partisan support for presidential executive orders or the use of congress as a mechanism to pass climate change laws and legislation (Merica, 2013). We observed comments that were highly critical of the congress (particularly the inability to reach agreement and pass laws and legislation) or of the centralized

control that might be exercised by the president in forcing through CCR. The following examples provide some of the more tame (less abusive) responses from participants.

> Focus on executive orders? I thought this was a democracy? I didn't elect a King I elected a president. There is no rule by decree in America, once there is, this becomes a dictatorship (s1_480) ('Michael Pristave' – online posting 9.15am, 24 Jan 2013).

> Congress is a place where good ideas go to die, [Melinda Pierce] said. There is a tremendous amount that his administration can do without Congress. He has the authority; he doesn't have to wait for Congress (s1_355) ('Ricksta' – online posting 10.24am, 24 Jan 2013).

However, the analysis also exposed one very important aspect of climate change governance that appears based on political party alignments. Critically, the majority of combative responses from participants were structured along party lines (i.e. Democrat support for environmental movements and reforms, or Republican support for the industrial capitalist status quo). Note the following example blog comments.

> I won't deny that it ('global warming') is happening, but the LIBERALS/ENVIRONMENTALISTS/DEMOCRATS are waving the "man made" flag purely to take advantage of the situation and further their agenda. Never let a good crisis go to waste, right? Unless you want to turn in your computer, cellphone, car, and virtually every other convenience you own, move into a hole into the ground, and walk around naked, then you are being a hypocrite (s1_705) ('Lookidat'– blog posting 8.38am, 24 Jan 2013).

> The only reason Obama has to work around Congress in the first place, is that the GOP ('Grand Old Party') controls the House, and won't let anything he does (other than cutting taxes) pass. Any attempt by Obama to resort to executive orders (which he's done less than any other recent President), would simply be a reaction to nullify the anti-democracy shenanigans of the REPUBLICAN party (s1_346) ('n8r0n' – blog posting 9.19am, 24 Jan 2013).

In addition, we observed that participants collectively used the terms the 'Grand Old Party' (GOP), 'Republican' or 'Democrats' over 120 times in various blog exchanges with strong party–aligned climate change views. Importantly, this finding supports the results in McCright and Dunlap (2011) and displays the very deep political divisions that exist when CCR and governance are raised as public policy issues. We argue that this level of community division can only work to reinforce the political barriers to CCR and governance, and does little to advance climate change policy development and future implementation. At some future point, a national policy position may be required in order to move the issue of climate change forward.

In contrast, the bottom-up approach allowed participants to argue and exchange views on the concept of grass-roots activism and the issue of equality in taking action on climate change (Zelizer, 2013). Noting the lesser amount of participant discourse compared with the climate science arguments and debate, the prevailing view was that people must take positive (sometimes emotional) actions to raise the consciousness of climate change in communities. In sum, the bottom-up approach was generally supported, with participants urging positive and collective action (across socio-economic lines) on environmental issues, such as CCR. Certainly, nothing in the concept mapping results suggested that freedom of expression on the development of CCR, or seeking to influence state representatives in congress, was necessarily bad or negative in the context outlined in the written article.

5.3 Making choices – weighing up environmental and economic wellbeing
As a final issue drawn from the concept map for the Top-Down approach (Merica, 2013), we observed participants exchanging views over the balance between environmental and economic concerns. These blog exchanges were not considered unreasonable (or necessarily unexpected) given that studies in other international settings present large price inflation, job losses and business closures, uncontrolled cost increases, and reduced business competitiveness, as likely outcomes from climate change and carbon pollution reduction reforms (Varma, 2003; Pearce, 2006; Jeswani et al. 2008; Vespermann & Wittmer, 2011). Understandably, the flat US economy (i.e. GDP growth at 2%) and 7.6% unemployment rate serve as key 'whole-of-life' considerations when weighed against the environmental benefits of CCR (International Monetary Fund, 2013; US Department of Labor, 2013). In sum, while people may harbor serious concerns over growing carbon emissions and the state of the environment, these matters will ultimately form part of a broader life context when determining the level of support for future environmental policy development and governance actions.

5.4 Limitations of the study
We acknowledge that the study is limited to just 344 registered ('bloggers') participants that represent a minute number of the total online population. This, in turn, limited the total number of web logs to

just over 1,700 statements. Clearly, this is a limitation of internet based research where the recruitment and control of online participants can be less than ideal (Jones, 1999; Hughes, 2012). In this respect, the results are exemplar rather than wholly representative of the US online population.

6 Conclusion

In conclusion, our analysis of the web blog exchanges raised several important and contentious issues. In aggregate terms, the debate over the validity of anthropogenic climate change science and theories continues to stymy and diminish the importance of developing environmental policies and key CCR. In our observations, a large and disproportionate amount of time and effort is directed towards fierce climate science debate and counter argument, rather than looking to the development of balanced public policy and practical measures (Dunlap et al. 2001; McCright & Dunlap, 2011).

In a similar way, arguments over the types of governance mechanisms (either top-down or bottom-up) that might be applied, and the introduction of political party policy alignments into CCR and governance, provide further barriers to positive progress (Layman et al. 2006; Dunlap & McCright, 2008; The Pew Research Center, 2012). A large number of counterproductive and emotion-charged blog exchanges that were exposed during the analysis process, left us wondering whether any meaningful consensus could be reached in the immediate term (i.e. within President Obama's second term in office). That said, predicted future improvements in the US economy out to 2020 (i.e. 3–4% GDP growth and 4–5% unemployment) (Byun & Frey, 2012) may allow for some 'softening' of rigid party aligned policy positions in the community, bringing with it opportunities for greater progress on CCR.

In relation to the online blog forums used in our study, the results indicated that the primary issue of interest (in this case the CCR approach) can be intentionally subjugated in favour of other matters (climate change science, political party policy positions). This shows that web blog exchanges can be 'hijacked' by online parties and used to further personal and factional aims that are quite distinct, and separate to the intent of the original discussion or source article. Arguably, this is an intrinsic weakness of using the Internet for the purpose of transparent and democratic canvassing of public policy and governance (Hood & Margetts, 2007; Margetts, 2009). The implication for environmental policy is that any related, extraneous or tangential matters may need to run separately, and in parallel with the policy development process (Weimer & Vining, 2005). This appears to offer a good opportunity to advance a national policy position and achieve some consensus going forward.

7 Acknowledgements

References
Anderson A. 2009. Media, Politics and Climate Change: Towards a New Research Agenda. Sociology Compass 3(2): 166–182.
Anderson A, Marhadour A. 2007. Slick PR? The Media Politics of the Prestige Oil Spill. Science Communication 29: 96–115.
Arlt D, Hoppe I, Wolling J. 2011. Climate change and media usage: effects on problem awareness and behavioural intentions. International Communication Gazette, 73: 45–63
Barr S. 2011. Climate forums: virtual discourses on climate change and the sustainable lifestyle. Area 43(1): 14–22.
Bennett D, Fielding P. 1999 The net effect: how cyberadvocacy is changing the political landscape, Merrifield, VA: E-advocates Press.
Blood R. 2002. The weblog handbook: Practical advice on creating and maintaining your blog. Cambridge, MA: Perseus.
Boyd DM, Ellison NB. 2008. Social network sites: definition, history and scholarship. Journal of Computer Mediated Communication 13: 210–30.
Boykoff MT, Boykoff JM. 2007. Climate Change and Journalistic Norms: A Case Study of US Mass-Media Coverage. Geoforum 38: 1190–1204.
Boykoff, MT, Roberts JT. 2007. Media Coverage of Climate Change: Current Trends, Strengths, Weaknesses. Human Development Report 2007/8, United Nations Development Programme Occasional paper, Human Development Report Office.
Brunsting S, Postmes T. 2002. Social movement participation in the digital age—predicting offline and online collective action. Small Group Research, 33: 525–554.
Byun K, Frey C. 2012. The US Economy in 2020: Recovery in Uncertain Times. Labor Monthly Review January 2012: 21–42.

Caldeira K, Wickett ME. 2003. Anthropogenic carbon and ocean pH. Nature 425: 365

Carvalho A. 2007. Ideological Cultures and Media Discourses on Scientific Knowledge: Re-reading News on Climate Change. Public Understanding of Science 16: 223–43.

Carvalho A. 2010. Climate Change as a 'grand narrative'. Journal of Science Communication,9(4):1-4

Carvalho A, Burgess J. 2005. Cultural Circuits of Climate Change in the UK Broadsheet Newspapers, 1985–2003. Risk Analysis 25: 1457–1470.

Cook J, Nuccitelli D, Green S, Richardson M, Winkler B, Painting R, Way R, Jacobs P, Skuce A. 2013. Quantifying the Consensus on Anthropogenic Global Warming in the Scientific Literature, Environmental Research Letters 8(2): 1-7. http://dx.doi.org/10.1088/1748-9326/8/2/024024 [17 July 2013]

Dailey L, Demo L, Spillman M. 2008. Newspaper political blogs generate little interaction. Newspaper Research Journal 29(4): 53–65.

Davis R. 1999. The web of politics: the Internet's impact on the American political system, New York, NY: Oxford University Press.

Dietz T, Stern PC. 2008. Public Participation in Environmental Assessment and Decision-Making. Panel on Public Participation in Environmental Assessment and Decision Making, National Research Council: Washington, DC.

Dunlap R, McCright A. 2008. A Widening Gap: Republican and Democratic Views on Climate Change. Environment 50(5): 26–35.

Dunlap R, Xiao C, McCright A. 2001. Politics and Environment in America. Environmental Politics 10(4): 23–48.

Dunleavy P, Margetts H, Bastow S, Tinkler J. 2006. Digital-era Governance: IT Corporations, the State and e-Government, Oxford UK: Oxford University Press.

Dutton W, Helsper E, Gerber M. 2009. Oxford Internet Survey 2009 Report: The Internet in Britain. Oxford, UK: Oxford Internet Institute.

Dutton W, Shepherd A. 2006. Trust in the Internet as an experience technology, Information, Communication and Society 9(4): 433–451.

Freeman RE, Wicks AC, Parmar B. 2004. Stakeholder theory and "the corporate objective revisited". Organization Science 15: 364–369.

Gelbspan R. 2004. Boiling Point. New York, NY: Perseus.

Hine C. 2005. Virtual methods: issues in social research on the Internet. Oxford, UK: Berg.

Hoegh-Guldberg O, Bruno JF. 2010. The impact of climate change on the world's marine ecosystems, Science, 328: 1523–1528.

Hood C, Heald D. 2006. Transparency: the Key to Better Governance? Oxford UK: Oxford University Press.

Hood C, Margetts H. 2007. The Tools of Government in the Digital Age, London, UK: Palgrave Macmillan.

Hughes J. 2012. Internet Research Methods, Thousand Oaks CA; Sage.

IPCC (Intergovernmental Panel on Climate Change). 2013. Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the IPCC. Geneva: IPCC.

International Monetary Fund. 2013. World Economic Outlook. Policy Actions Improve Prospects for Global Economy http://www.imf.org/external/pubs/ft/survey/so/2013/res041613a.htm [16 April 2013].

Jackson K, Trochim W. 2002. Concept mapping as an alternative approach for the analysis of open-ended survey responses. Organizational Research Methods 5: 307–336.

Jeswani H, Whermeyer W, Mulugetta Y. 2008. How Warm is the Corporate Response to Climate Change? Evidence from Pakistan and the UK. Business Strategy and the Environment 18: 46–60.

Jones S. 1999. Doing Internet research: critical issues and methods for researching the Net, Thousand Oaks CA; Sage.

Jun J. 2011. How climate change organizations utilize websites for public relations. Public Relations Review 37: 245–249.

Karlsson R. 2005. Why the far-future matters to democracy today. Futures 37: 1095–1103.

Krippendorff K. 2004. Content Analysis: An Introduction to Its Methodology, 2nd Edition. Thousand Oaks, CA: Sage Publications.

Layman G, Carsey T, Horowitz J. 2006. Party Polarization in American Politics. Annual Review of Political Science 9: 83–110.

Lester L, Hutchins B. 2009. Power games: environmental protest, news media and the internet. Media Culture & Society 31: 579–595.

Leximancer. 2005. User Manual Version 2.25. Brisbane, Australia: Leximancer.

Lorenzoni I, Nicholson-Cole S, Whitmarsh L. 2007. Barriers perceived to engaging with climate change among the UK and their policy implications Global Environmental Change 17: 445–459.

Margetts HZ. 2009. The Internet and Public Policy, Policy & Internet 1(1): 1–21.

Margetts H, John P, Escher T, Reissfelder S. 2009. Experiments for Web Science: Examining the Effect of the Internet on Collective Action, Proceedings of the WebSci'09: Society On-Line Conference, 18-20 March 2009, Athens, Greece.

McCright A, Dunlap R. 2011. The Politicization of Climate Change and Polarization in the American Public's Views of Global Warming, 2001–2010. The Sociological Quarterly 52: 155–194.

McKenna L. 2007. "Getting the word out": Policy bloggers use their soap box to make change. Review of Policy Research 24(3): 209–229.

Melville NP. 2010. Information systems innovation for environmental sustainability. MIS Quarterly 43(1): 1–21.

Merica, D. 2013. Environmentalists want Obama to steer clear of Congress on Climate Change. http://edition.cnn.com/2013/01/23/politics/obama-climate-change/index.html [24 January 2013].

Merry MK. 2010. Blogging and Environmental Advocacy: A New Way to Engage the Public? Review of Policy Research 27(5): 641–656.

Newig J. 2007. Does Public Participation in Environmental Decisions Lead to Improved Environmental Quality? Towards an Analytical Framework, Communication, Cooperation, Participation. Research and Practice for a Sustainable Future 1(1): 51-71.

Newig J, Fritsch O. 2009. Environmental Governance: Participatory, Multi-Level – and Effective? Environmental Policy and Governance 19: 197–214.

Pearce D. 2006. The political economy of an energy tax: The United Kingdom's Climate Change Levy. Energy Economics 28: 149–158.

Schenk A, Hunziker M, Kienast F. 2007. Factors influencing the acceptance of nature conservation measures – a qualitative study in Switzerland. Journal of Environmental Management 83: 66–79

Schäfer MS. 2012. Online communication on climate change and climate politics: a literature review. WIREs Climate Change 3: 527–543.

Smith A, Humphreys M. 2006. Evaluation of unsupervised semantic mapping of natural language with Leximancer concept mapping. Behaviour Research Methods 38: 262–279.

Soma K. 2010. Framing Participation with Multicriterion Evaluations to Support the Management of Complex Environmental Issues. Environmental Policy and Governance 20: 89–106.

Soma K, Vatn A. 2010. Is There Anything Like a Citizen? A Descriptive Analysis of Instituting a Citizen's Role to Represent Social Values at the Municipal Level. Environmental Policy and Governance 20: 30–43.

Song I, Bucy EP. 2007. Interactivity and political attitude formation: A mediation model of online information processing. Journal of Information Technology and Politics 4(2): 29–61.

The Pew Research Center. 2013. More Say there is Solid Evidence of Global Warming. http://www.people-press.org/files/legacy-pdf/10-15-12%20Global%20Warming%20Release.pdf [24 November 2012].

Tremayne M. 2007. Blogging citizenship and the future of the media. Cleveland OH: CRC Press.

Trochim, W. 1989. An introduction to concept mapping for planning and evaluation. Evaluation and Program Planning 12: 1-16.

Tsang S, Burnett M, Hills P, Welford R. 2009. Trust, Public Participation and Environmental Governance in Hong Kong. Environmental Policy and Governance 19: 99–114.

United States Department of Labor. 2013. US Economy at a Glance http://www.bls.gov/eag/eag.us.htm. [16 April 2013].

Varma A. 2003. UK's climate change levy: cost effectiveness, competitiveness and environmental impacts. Energy Policy 31: 51–61.

Vespermann J, Wittmer A. 2011. Financial, Ecological and Managerial Impacts of Emissions Trading Schemes: the Case of Lufthansa. Business Strategy and the Environment 20: 174–191.

Weimer D, Vining A. 2005. Policy Analysis: Concepts and Practice, 4th Edition. Upper Saddle River, NJ: Prentice Hall.

Whitmarsh L, O'Neill S, Lorenzoni I. 2011. Engaging the Public with Climate Change: Behaviour Change and Communication. London, UK: Earthscan.

Zelizer, J. 2013. How to fight climate change. http://edition.cnn.com/2013/02/18/opinion/zelizer-climate-change/index.html?hpt=hp_c4 [18 February 2013].