

**Social Media as a Green Virtual Sphere: Examining the Alberta Oil
Sands and the Northern Gateway Pipeline on Twitter**

by

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Abstract

Environmental issues are increasingly discussed through social media applications. Consequently, researchers are beginning to question whether social media could represent a green virtual sphere: a virtual public space to discuss environmental issues not governed by a single authority in which anyone can access; however, limited empirical research has been conducted to date. In response, this study combines text analysis, social network analysis, and semi-structured interviews to determine whether discussions regarding the Alberta oil sands and the Northern Gateway Pipeline on Twitter – a micro-blogging site – reflect the characteristics of a green virtual sphere. It was found that Twitter is used to disseminate information, access news, and engage in debate, but there are limitations: not everyone has access to Twitter, the government may monitor online activity, and discussions appear to be dominated by environmentalists and environmental organizations. Twitter use on these issues only partially reflects the characteristics of a green virtual sphere.

List of Abbreviations Used

CBC	Canadian Broadcasting Corporation
CCME	Canadian Council of Ministers of the Environment
CEAA	Canadian Environmental Assessment Act
ENGOS	Environmental Non-governmental Organizations
RT	Re-tweet

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Chapter One: Introduction

1.1 Introduction

The majority of discussions on environmental issues take place within a state-centric space (Kuehls, 1996). This means that discussions tend to focus on the voices of states (Rosenau, 2002; Eckersley, 2005) while other individuals and organizations, such as environmental non-governmental organizations (ENGOS) and citizens, have trouble voicing their opinions (Pickerill, 2003; Yang & Calhoun, 2007; Liu, 2011). In Canada, for example, the government made changes to the *Canadian Environmental Assessment Act 2012* through omnibus legislation, Bill C-38 (Doelle, 2012; Gibson, 2012). CEAA plays a key role in Canadian environmental assessments as the legislation outlines the review process for environmental projects (Gibson, 2012); however, the new Act hinders the ability for the public to participate in environmental assessment processes: “the approach in *CEAA 2012* is a further step backward in the effort to actively engage members of the public in the planning stage of project development and to provide meaningful opportunities for mutual learning” (Doelle, 2012, p. 15). Under *CEAA 2012*, the public has tighter timelines to participate, a sharp reduction in the number of opportunities to participate, and specific restrictions about who can speak at public hearings because only “interested parties” are permitted to participate; interested parties are defined by the review panel (Gibson, 2012; Doelle, 2012).

This state-centric space presents a challenge for three reasons. First, power is not evenly dispersed amongst individuals and organizations (Eckersley, 2005), which means that the individual or organization that holds the most power – the state – is able to tune out the voices of others and dominate the discussion. This leads to the second challenge: there is a lack of diversity amongst the voices included in discussions on environmental issues. In Canada, some of the actors that are included are the provinces and media (McKenzie, 2002). Although provinces do not technically have jurisdiction on environmental issues based on the Canadian Constitution, they do have control over natural resources. In addition, they meet with the federal government through the Canadian Council of

Ministers of Environment (CCME) to harmonize legislation, develop national objectives and standards on environmental issues, develop strategies regarding emerging issues, and harmonize environmental assessment (McKenzie, 2002). Media also has an influence on environmental issues, but they must address challenges such as: deciding if they are merely observers of environmental issues or if they are advocates, and determining whose voice gets heard, whether its government, industry, ENGOS, or individuals (Fletcher, 1992). Within this space a number of actors are not included, specifically ENGOS and the public. As a result, diversity is limited; however, diversity is important because it hinders the ability for one individual or organization to dominate the discussion (Rosenau, 2002). Finally, the third challenge is a lack of reflexivity in discussions on environmental issues. Actors are unable to develop reflexivity – enhanced breadth of awareness of the consequences of their actions – because the discussions tend to be dominated by one voice: the state (Dryzek, 2006; Rosenau, 2002).

To address the challenges of the state-centric space, research suggests that a greater level of public involvement and communication is needed regarding environmental issues (Paehlke, 2008); however, this requires access to a space for discussion. Increasingly, people are going online to discuss environmental issues; thus there could be a green virtual sphere (Pickerill, 2003; Liu, 2011). A green virtual sphere is a virtual public space for discussion, in which access is granted to all citizens; the space is not governed by a single authority but rather, the public confers in an unrestricted fashion to debate about issues of the environment (Habermas, 1964; Papacharissi, 2002; Torgerson, 2000; Yang & Calhoun, 2007). One potential space is social media. Social media are internet-based applications¹ that allow for the creation and exchange of user-generated content, such as Facebook, YouTube, and Twitter (Kaplan & Haenlein, 2010). Initially, it was unclear whether social media was of any importance (Chadwick et al., 2009); however, it has become clear that use of social media is widespread: there are 1.15 billion monthly users on Facebook (Facebook, 2013), 1 billion monthly users on YouTube and (YouTube, 2013), and 218 million monthly users on Twitter (Twitter, 2013). It has also become clear that social media applications can be used for discussions on social, economic and

¹ Throughout my thesis, I use the terms social media and social media applications interchangeably.

political relations (Chadwick et al., 2009; Murthy, 2013) as demonstrated by the events in the Arab Spring Revolution², the Occupy Wall Street Movement³ and the Idle No More Movement⁴ (Hands, 2011; Murthy, 2013; Lindell, 2013).

Very few studies, however, have examined the use of social media applications to discuss environmental issues (exceptions include Greenberg & MacAulay, 2009; Cheong & Lee, 2010; Segerberg & Bennett, 2011) and even fewer studies have utilized a mixed methods approach. Consequently, it is unclear whether social media applications may demonstrate the characteristics of a green virtual sphere. In response, I examine discussions regarding the Alberta oil sands and the Northern Gateway Pipeline on Twitter, using quantitative and qualitative methods, to explore whether this social media application reflects the characteristics of a green virtual sphere. In the following section, I provide background information on the Alberta oil sands, the Northern Gateway Pipeline, and Twitter.

The oil sands are “a natural mixture of sand, water, clay and a type of heavy oil called bitumen” located in northeastern Alberta, Canada (Alberta Government, 2013). Current research demonstrates that the oil sands may cause significant environmental impacts, including “water quantity and quality, land use disturbance, and air pollution, including greenhouse gas emissions” (Hoberg et al., 2012, p. 1); yet, projects to increase the production and exportation of bitumen continue to emerge, such as the Northern Gateway Pipeline. In 2010, Enbridge proposed to build the Northern Gateway Pipeline to increase the amount of bitumen sent from the Alberta oil sands to growing energy markets in Asia (Enbridge, 2013a). If approved, it will include the construction of two bitumen pipelines and the construction and operation of a marine terminal, estimated to cost 6.5 billion dollars (Gateway Panel, 2013). The proposed bitumen pipelines are 1,170 kilometres in length and would run from Bruderheim, Alberta to Kitimat, British Columbia (Gateway Panel, 2013) (see Figure 1.1). The Northern Gateway project is being reviewed by an

² The Arab Spring Revolution is a loose grouping of anti-government movements that took place in the Middle East and North Africa in late 2010 and early 2011 (Murthy, 2013).

³ The Occupy Wall Street movement was a “series of activist movements started in New York City in 2011 to protest against perceived financial inequalities symbolized by Wall Street” (Murthy, 2013, p. 92).

⁴ The Idle No More movement aimed to bring attention to the state of the relationship between Indigenous women and First Nations, and the Canadian government (Lindell, 2013). The movement also included opposition to the Canadian government’s omnibus budget bill in December 2012 (Lindell, 2013).

independent Joint Review Panel – a panel of three independent experts (Gateway Panel, 2013). Specifically, under the CEEA “when a project may cause significant adverse environmental effects or there is a high degree of public concern, a project can be referred to a joint review panel process” which includes public hearings with affected communities, scientists, environmental groups, and First Nations (Gateway Panel, 2013). The Joint Review Panel will publicly issue a decision on the project by December 31, 2013 (Gateway Panel, 2013). In addition to the hearings, people are also discussing the Alberta oil sands and the Northern Gateway Pipeline project on Twitter.



Figure 1.1: Map of proposed Northern Gateway Pipeline project (Enbridge, 2013b).

Twitter is a micro-blogging site that was developed in 2006 (Twitter, 2013). Originally, it was developed to enable users to share updates about what they were doing by posting tweets, which are messages of no more than 140 characters and can include links to websites, images, or videos (Twitter, 2013). Millions of tweets are sent every day and as a result, Twitter users have developed methods to sort through the messages. Specifically, Twitter users may, and often do, include hashtags using the # symbol to “mark keywords or topics in a tweet” allowing others to easily find messages (Twitter, 2013). I selected Twitter for my study because it provides researchers a window into online discussions (Seegerberg & Bennett, 2011). Specifically, through the use of hashtags, researchers are able to identify discussions on particular topics and examine how Twitter is used to discuss the issue and who is using Twitter to discuss the issue (Seegerberg & Bennett,

2011). In addition, Twitter is one of the fastest growing social media applications on the internet, demonstrating its significance as a focus of study (Murthy, 2013). Finally, Twitter is primarily a public platform which means that the information that is shared is publicly accessible, unlike some social media applications, such as Facebook, which means that it more closely reflects the characteristics of a green virtual sphere. Moreover, the public nature of Twitter allows for the collection and analysis of online messages without the need for ethics approval.

This chapter provides an introduction to my thesis. In the first section, I describe the conceptual framework that I use to situate my research – the green virtual sphere. Next, I synthesize the existing relevant literature on social media in order to provide context for my study. I go on to provide a detailed description of the research goal and objectives as well as the research design and methodology. Then, I discuss the procedural ethics as well as my relationship to the research. Finally, I outline the format of my thesis.

1.2 Conceptual Framework: Green Virtual Sphere

Scholars have started to investigate the broader implications of the internet and social media by determining whether they can offer a new public sphere, a virtual sphere, for public discussion and deliberation (Pickerill, 2003; Dahlgren, 2005; Papacharissi, 2009; Hands, 2011; Shirky, 2011). The public sphere, a concept originally proposed by Jürgen Habermas, is:

A realm of our social life in which something approaching public opinion can be formed. Access is granted to all citizens. A portion of the public sphere comes into being in every conversation in which private individuals assemble to form a public body. They then behave neither like business or professional people transacting private affairs, nor like members of a constitutional order subject to the legal constraints of a state bureaucracy. Citizens behave as a public body when they confer in an unrestricted fashion – that is, with the guarantee of freedom of assembly and association and the freedom to express and publish their opinions – about matters of general interest (Habermas, 1964, p. 49).

The first public sphere emerged out of the bourgeois coffee houses during the Industrial Revolution where free men debated about the ruling authority (Habermas, 1964). Over

time, the media – through newspapers and magazines, radio and television – became the voice for this public sphere and thus, became “an institution of the public itself, effective in the manner of a mediator and intensifier of public discussion, no longer a mere organ for the spreading of news but not yet the medium of a consumer culture” (Habermas, 1964, p. 53). Although the media played a key role, it eventually became more interested in making a profit, rather than providing social and political commentary and as a result, it increasingly fell under the control of big business. Over time, the public sphere was transformed from a forum for democratic debate into a site for manipulation by corporate interests (Habermas, 1964).

Building on the original concept of the public sphere, researchers have questioned whether the internet and social media applications could potentially represent a new public sphere, a virtual sphere, by enhancing communicative action and participatory democracy (Papacharissi, 2002; Pickerill, 2003; Berdal, 2004; Dahlgren, 2005; Papacharissi, 2009; Carty, 2010; Shirky, 2011). In particular, the virtual sphere shares the same characteristics of the public sphere, but it also has great data storage and retrieval capabilities, which infuses political discussions with information that was not previously available and enables discussions between people from far sides of the globe from diverse backgrounds (Papacharissi, 2002). The virtual sphere, as a result, has the potential to increase the amount of information that is available to citizens, include more citizens in discussions, and provide a new space for deliberation (Papacharissi, 2002). The concept of the virtual sphere has been applied to some cases, including web forums and online social movements, as well as the internet more broadly (Berdal, 2004; Salter, 2003; Langman, 2005; Dahlgren, 2005; Papacharissi, 2002) and it has been found that the internet has the potential to serve as a virtual sphere (Salter, 2003; Berdal, 2004; Langman, 2005); but there are limitations (Papacharissi, 2009).

First, people may not be utilizing the internet as a virtual sphere: “online technologies render participation in the political sphere more convenient but do not guarantee it” (Papacharissi, 2002, p. 15). This means that the internet, like other technologies, is not deterministic, but rather people can choose how to use it (Pickerill, 2003). It is also

challenging to foster genuine dialogue online because communication tends to be one-way and it is difficult to gauge the impact of a message that is sent through Twitter or Facebook (Greenberg & MacAulay, 2009), which could lead to over-estimating the impact of online debate (Morozov, 2009; Gladwell, 2010). Second, there is a chance that the virtual sphere may become commercialized, since it is a medium constructed in a capitalist era (Papacharissi, 2002). As such, the virtual sphere could be transformed from a forum for democratic debate into a site for manipulative corporate interests, as the original public sphere was (Habermas, 2010). Finally, there is a lack of accessibility and resources which are required to effectively engage through the internet, as well as social media (Papacharissi, 2002). In particular, millions of people have access to the internet and social media applications, but access is not universal and equal for all (Papacharissi, 2002); thus, only well-resourced individuals and groups appear to be utilizing social media (Merry, 2011). Although there are limitations, the virtual sphere provides a valuable conceptual framework⁵ for this study because it can help to explain how the internet and social media are used, who uses the internet and social media, and why the internet and social media are used (Papacharissi, 2009).

Although scholars have investigated whether the internet and social media can serve as a virtual sphere, they have not applied this concept to environmental issues. Specifically, researchers have suggested that people are increasingly turning to the internet and social media to communicate about environmental issues because their voices are often excluded from environmental debates (Pickerill, 2003; Yang & Calhoun, 2007; Liu, 2011), which could demonstrate the characteristics of a green virtual sphere. The characteristics of a green virtual sphere include: (1) a virtual public space for discussion; (2) in which access is granted to all citizens; (3) the space is not governed by a single authority; but rather, (4) the public confers in an unrestricted fashion to debate about issues of the environment (Habermas, 1964; Papacharissi, 2002; Torgerson, 2000; Yang & Calhoun, 2007). Scholars have yet to conduct empirical research to determine whether the internet or social media applications reflect the characteristics of a green virtual

⁵ Conceptual framework “explains either graphically or in a narrative form, the main things to be studied – the key factors, constructs or variables – and the presumed relationships among them” (Miles & Huberman, 1994, p. 18).

sphere on environmental issues (Pickerill, 2003). Thus, I use the green virtual sphere as a conceptual framework to examine the use of a specific social media application on two inter-related Canadian environmental issues. Specifically, Twitter provides a useful example because it is: (1) a virtual space for discussion (an online micro-blog), (2) that allows anyone to create an account (with the limitation of requiring internet access), (3) that is not governed by a single authority, and (4) allows people to discuss environmental issues, such as the Alberta oil sands and the Northern Gateway Pipeline. Prior to discussing my research question and objectives, I synthesize existing literature on social media that is relevant to the green virtual sphere.

1.3 Literature Review

Over the past decade, there has been a huge growth in scholarship on the use of the internet as a space for discussion: “when the internet first emerged as a popular communication medium (in the developed world) few seemed to take it seriously...but over the course of a decade, this context has arguably changed, as appreciation has grown of deeply rooted changes in social, economic, cultural, and political life in the advanced democracies” associated with the growing use of the internet (Chadwick et al., 2009, p. 3). From this rapidly growing body of literature, it is apparent that the internet has: changed the nature of the economy to become more instantaneous, borderless, and dominated by information (Castells, 1997); enhanced existing forms of activism, such as petitions, and created entirely new forms of activism, including hacktivism, which involves hacking as a form of protest (Vegh, 2003; Hands, 2011); altered the nature of journalism and the media, resulting in citizen reporting through blogs, and online photo and video sharing sites, such as Flickr and YouTube (Lester & Hutchins, 2009; Chadwick et al., 2009); and changed the nature of politics by providing a virtual sphere, an online space in which people can meet to discuss collective problems (Papacharissi, 2002; Gane & Beer, 2008). Although internet scholarship has burgeoned within the past decade, social media scholarship is just starting to emerge (Chadwick et al., 2009; Larsson & Moe, forthcoming). In the following section, I examine areas of social media scholarship that are relevant to my research as they relate to the green virtual sphere, specifically the

use of social media to form online communities, to discuss political issues, to access news, and to communicate on environmental issues.

1.3.1 Social Media Communities

One area of social media scholarship that emerged explores online conversations (Honeycutt & Herring, 2009) and community formation on social media applications (Sullivan & Xie, 2009; Gruzd et al., 2011; Chen, 2011). Within this area, studies have found that there is a high level of reciprocity and communication amongst acquaintances through social media applications which can gratify a need to connect with others (Krishnamurthy, 2008; Chen, 2011). On Twitter for example, approximately 12.5 percent of tweets are part of online conversations and 30 percent of tweets contain @ signs⁶ which denote a Twitter username, suggesting that conversations take place between users (Java et al., 2007; Honeycutt & Herring, 2009); however, not all people who use social media applications engage in conversations (Chen, 2011). For example, broadcasters⁷ and spammers⁸ tend to send out information rather than engage in discussions with others (Chen, 2011).

Nonetheless, research suggests that social media conversations can potentially lead to the formation of online communities (Gruzd et al., 2011). Online communities are defined as: “a spatially compact set of people with a high frequency of interaction, interconnections and a sense of solidarity” that are “collective and personal; real and imagined” (Gruzd et al., 2011, p. 1314). These communities can emerge around different users or issues. For example, online communities can be comprised of academics focusing on research interests (Gruzd, Staves, & Wilk, 2013), health professionals on medical discussions (Gruzd & Haythornthwaite, 2013), or ENGOS on environmental issues (Sullivan & Xie, 2009). However, it has also been found that relationships on social media applications, such as Facebook and Twitter, can be overstated since users often only communicate with a small percentage of members in their seemingly large networks (Golder, Wilkinson, &

⁶ @ signs are used to denote Twitter user accounts, known as handles. If an @ sign is included in a tweet, it often demonstrates that a Twitter user is referring to another user in the message, signifying a conversation.

⁷ Broadcasters are people who engage in one-way communication, sending out information but not necessarily engaging in dialogue, or two-way communication.

⁸ Spammers are fake Twitter accounts that automatically tweet messages.

Huberman, 2007; Huberman, Romero & Wu, 2008). As a result, there is a need for qualitative research to investigate the quality of relationships on social media applications.

1.3.2 Social Media and News

Another relevant area of research to the green virtual sphere is the dissemination of news through social media applications. Specifically, social media scholarship has found that there is a high level of news shared through social media applications – for example, over 85 percent of trending topics on Twitter are news-like in nature (Kwak, Lee, Park & Moon, 2010). Researchers have also found that social media applications have the potential to impact the role of media, which includes the changing dynamic of the news cycle due to the emergence of citizen journalism (Leskovec, Backstrom & Kleinberg, 2009; Kwak et al., 2010; Bandari, Asur & Huberman, 2011; Poell & Borra, 2011; Papacharissi & de Fatima Oliveira, 2012; Murthy, 2013). This means that the increasing use of social media has resulted in a change in the production and consumption of news (Papacharissi & de Fatima Oliveira, 2012; Murthy, 2013). In particular, as the public increasingly uses social media applications to create and access news, they have produced a hybrid form of journalism that enables them to become more engaged in the news process (Papacharissi & de Fatima Oliveira, 2012). This new type of hybrid journalism means that the public is not merely passively consuming news, but rather, they are actively involved in (re)producing news (Papacharissi & de Fatima Oliveira, 2012) which is relevant to the green virtual sphere because it allows the public to mediate their own message (Pickerill, 2003). However, like traditional journalism, it appears that only a small number of individuals currently dominate news discussions on social media (Poell & Borra, 2011) and the spread of news is still affected by the source of news, category of news, subjectivity of language, and named entities in the article (Bandari, Asur, & Huberman, 2012; Lotan, Graeff, Ananny, Gaffney, Pearce & boyd, 2011).

1.3.3 Social Media and Politics

Researchers have also started to investigate the use of social media applications in political contexts, such as increasing the circulation of political news (Small, 2011;

Romero, Meeder & Kleinberg, 2011); discussions of political events, like elections (Smith, 2009; Larsson & Moe, forthcoming); the potential use of social media by government to promote engagement and public consultation (Eggers, 2007; Macmillan et al., 2008; Lang et al., 2008; Ewerdt, 2008; Brown et al., 2010; Clarke, 2012); the use of social media for activism (Gaffney, 2010; Rotman et al., 2011; Lotan, Graeff, Ananny, Gaffney, Pearce & boyd, 2011; Younus et al., 2011; Bajpai & Jaiswal, 2011; Poell & Borra, 2011; Gonzalez-Bailon, Borge-Holthoefer, Rivero, & Moreno, 2011); and the use social media by non-profit organizations, to communicate with members and ask for participation in activities (Greenberg & MacAulay, 2009; Obar, Zube & Lampe, 2012; Lovejoy & Saxton, 2012). Overwhelmingly, this area of research suggests that the use of social media applications in political contexts has drastically increased, particularly since the 2008 United States presidential election (Larsson & Moe, forthcoming). Despite the increasing use of social media for political reasons, governments have been slow to start using applications (Clarke, 2012) and it is still unclear whether social media use can actually broaden participation in public debates; thus, further research is needed (Larsson & Moe, forthcoming). Regarding activism, research suggests that social media applications are useful for disseminating information (Romero et al., 2010; Wu, Hofman, Mason & Watts, 2011; Gonzalez-Bailon, Borge-Holthoefer, Rivero & Beilin, 2009) and mobilizing action (Obar et al., 2012; Lovejoy & Saxton, 2012). Specifically, social media may represent a new space for activists to voice their concerns and provide new methods of activism, such as hacktivism (Pickerill, 2003; Vegh, 2003). However, the impact of social media for creating political change remains uncertain (Gaffney, 2010).

1.3.4 Social Media and Environmental Issues

Another area of research that is relevant to the green virtual sphere is the use of social media to communicate on environmental issues. Specifically, research suggests that individuals and organizations are using the internet (Pickerill, 2003; Horton, 2004; Yang & Calhoun, 2007; Dreiling et al., 2008; Lester & Hutchins, 2009; Merry, 2011; Liu, 2011) and social media applications (Bortree & Seltzer, 2009; Greenberg & MacAulay, 2009; Sullivan & Xie, 2009; Cheong & Lee, 2010; Segerberg & Bennett, 2011) to communicate about environmental issues. To date, most of the research focuses

specifically on how ENGOs use the internet, which includes: to share information with members, to recruit new members, to request funding, and to influence mainstream media (Pickerill, 2003; Yang & Calhoun, 2007; Lester & Hutchins, 2009; Liu, 2011). Research also suggests that the majority of ENGOs that currently use the internet tend to have more resources and are membership based organizations (Dreiling et al., 2008; Merry, 2011; Liu, 2011). Finally, it appears that ENGOs have accepted the use of the internet because it reinforces ENGOs' existing green culture (Horton, 2004).

More recently, research has started to examine the use of social media applications on environmental issues (Bortree & Seltzer, 2009; Greenberg & MacAulay, 2009; Sullivan & Xie, 2009; Cheong & Lee, 2010; Segerberg & Bennett, 2011). Researchers have explored whether social media promotes dialogical communication – meaning two-way communication – between ENGOs and its members (Bortree & Seltzer, 2009; Greenberg & MacAulay, 2009) and found that although there is a potential for dialogical communication, ENGOs are primarily using social media to broadcast information to members (Bortree & Seltzer, 2009; Greenberg & MacAulay, 2009). Research has also examined social media as a window into protest spaces, finding that social media applications are used as networking mechanisms that involve gatekeeping processes and reflect changing protest dynamics (Segerberg & Bennett, 2011). Finally, researchers have compared online and offline relationships and actions regarding environmental issues, finding that there are connections between online and offline relationships between ENGOs (Sullivan & Xie, 2009) and that there is also a link between social media discussions and on the ground action (Cheong & Lee, 2010).

1.3.5 Gaps in the Literature

Social media scholars have investigated the use of applications to form online communities, access news, participate in politics, and discuss environmental issues. Although these budding areas of research illustrate that social media scholarship is starting to grow, there are a number of gaps. My research aims to address two of these gaps. The first gap is that few researchers examine the use of social media on environmental issues, even though more people are turning to the internet and social

media to voice their views (Pickerill, 2003; Yang & Calhoun, 2007; Liu, 2011). The second gap is a lack of mixed methods within social media scholarship that examine environmental issues. Mixed methods studies are those that “integrate qualitative and quantitative methods of data collection and/or analysis” (Crooks et al., 2011, p. 79). Researchers are calling for the use of mixed method approaches to understand social media use, and the internet more generally, (Bennett & Toft, 2009; Stein, 2009; Papacharissi, 2009) but few have answered this call.

Quantitative methods, for example, can be used to analyze large amounts of data to determine how social media is used and who is using it. Text analysis is useful to explore the nature of social processes online (Gruzd et al., 2008) and can be either automatic or manual – automated text analysis typically involves the use of applications for analysis (Gaffney, 2010). Social network analysis involves studying the relations and patterns within social networks (Marin & Wellman, 2011) and is useful to understand relationship patterns between and among people (Gane and Beer, 2008; Scott, 2000; Diani, 2002; Valente, 2008; Kadushin, 2012). Qualitative methods can then be used to add a narrative component by including the voices of social media users to understand their motivations and perceptions. Interviews and focus groups, for example, are useful to examine emotions, motives, and life histories (Klandermans & Staggenborg, 2002; Staggenborg, 2012), while participant observation can be helpful to gain insight into collective action events (Staggenborg, 2012).

1.4 Research Design and Methodology

1.4.1 Research Goal and Objectives

Given the lack of empirical research that examines whether social media applications reflect the characteristics of a green virtual sphere, the goal of my research is to determine whether Twitter discussions using the hashtag #tarsands regarding the Alberta oil sands and the Northern Gateway Pipeline demonstrate the characteristics of a green virtual sphere. To achieve this, I pursued four specific objectives, including:

Objective One: to determine how Twitter is used by examining the content (i.e., keywords, ideas, themes, etc.) and structure (i.e., tweets, re-tweets, links, etc.) of tweets on the Alberta oil sands and the Northern Gateway Pipeline;

Objective Two: to identify who uses Twitter to communicate on the issues of the Alberta oil sands and the Northern Gateway Pipeline;

Objective Three: to uncover why Twitter users utilized Twitter to communicate on the Alberta oil sands and the Northern Gateway Pipeline; and

Objective Four: to understand how Twitter users perceive their use of Twitter regarding the Alberta oil sands and the Northern Gateway Pipeline.

To address these objectives, first, I collected Twitter messages on the oil sands and pipeline and I analyzed the links and determined the function of the tweets (Objective 1). Next, I detected the usernames from the tweets to identify who was discussing these issues on Twitter (Objective 2) and I generated a communication network to understand connections between Twitter users. Finally, I completed semi-structured phone interviews with ten well-connected Twitter users who discussed the oil sands and the pipeline to investigate their motivations and perceptions for discussing these issues on Twitter (Objective 3 and 4).

1.5 Data Collection

1.5.1 Twitter Messages

To collect the tweets, I utilized a program called Netlytic – which is “a cloud-based text and social network analyzer that can automatically summarize large volumes of text and discover social networks from online conversations on social media sites such as Twitter, YouTube, blogs, online forums and chats” (Netlytic, 2013). First, I selected a hashtag. Hashtags are an important feature of Twitter because, by including them in tweets, Twitter users can facilitate a global discussion on a topic (Lotan et al., 2011). Thus, using hashtags to collect tweets is an efficient approach to gather data on a specific topic and it is also a well-established protocol in the literature (Segeberg & Bennett, 2011; Bajpai & Jaiswal, 2010; Papacharissi & de Fatima Oliveira, 2012; Larson & Moe, forthcoming; Gaffney, 2010). Initially, I collected data for six hashtags – #Enbridge, #ethicaloil,

#NorthernGateway, #oilsands, #pipeline, and #tarsands – that were identified as relevant; however, my study focused specifically on one key hashtag, #tarsands, because it was connected to both issues, it was the most widely used hashtag, and it provided significant overlap with the other related hashtags. Using the most prominent hashtag as a phenomenon for analysis is also common within the literature, but it can be limiting (Gaffney, 2010; Bajpai & Jaiswal, 2011; Papacharissi & de Fatima Oliveira, 2012; Larson & Moe, forthcoming). For example, tweets that did not include #tarsands were not included in my sample; therefore, I may have missed some relevant tweets.

Next, I determined a timeframe for data collection. Considering that Twitter research is still evolving, the timeframes from different studies tends to vary quite substantially. Some studies collect data for a few days (Segeberg & Bennett, 2011), while others collect data for a month (Papacharissi & de Fatima Oliveira, 2012; Larson & Moe, forthcoming), and others still collect data over several months (Gaffney, 2010; Bajpai & Jaiswal, 2011). Although I collected data from January 17, 2012 to March 19, 2012, a one month timeframe was selected (January 24, 2012 to February 24, 2012) because it reflected a peak period for the use of Twitter on the oil sands and the pipeline. It is important to note that there was a limitation: the program that I used to collect the tweets could only collect a maximum of 100 tweets per hour; therefore, some of the relevant tweets may be excluded from the data set if more than 100 tweets were posted within an hour but it is unlikely that there were often more than 100 tweets per hour given that most days had less than 300 tweets.

1.5.2 Twitter Users

After collecting the tweets, I conducted interviews – which are guided conversations – with people who used Twitter to communicate on the oil sands and pipeline in order to understand their motivations and perceptions for using Twitter (Objective 3 and 4) (Blee & Taylor, 2002, p. 92). Specifically, interviews are useful to generate in-depth data about the motives of people who are involved in social movements (Blee and Taylor, 2002; Obar et al., 2012) and a number of related studies have effectively used interviews (see for example Pickerill, 2003; Horton, 2004; Lester & Hutchins, 2009; Liu, 2011; Obar et

al., 2012). The first step for my interviews was thematizing, which involved formulating the purpose of the study (Kvale & Brinkmann, 2009). Next, I designed the interviews by selecting an appropriate type, designing an interview guide, and acquiring Research Ethics Board approval from Dalhousie University. Generally speaking, there are three types of interviews: informal (which offer flexibility but can be difficult to code); semi-structured (which offer a bit more structure); and standardized open ended (which are very structured, but answers are open ended) (Turner, 2010). I selected semi-structured interviews because they allowed me to gain an adequate understanding of the interactions between people, their use of computers, and the influences upon their use (Pickerill, 2003). Next, I developed my interview guide which included five general themes and 20 questions (see Appendix A).

In total, I conducted ten semi-structured interviews. This number of interviews was adequate for two reasons. First, Kvale and Brinkmann (2009) suggest that most qualitative studies conduct approximately 15 (+/- 10) interviews and second, after completing ten interviews, I reached data saturation, meaning that the same themes were discussed with no new topics emerging (Kvale & Brinkmann, 2009). To select my potential interview participants, I used purposeful sampling, which has been used in similar studies (Pickerill, 2003; Lester & Hutchins, 2009). Given the nature of my study, I used a network ethnography approach (Howard, 2002), which means that I identified Twitter users with the highest total degree centrality⁹ from the #tarsands data set and contacted them to participate in the study. Initially, I had the goal of conducting between 10 and 15 interviews. In the first round of recruitment, I invited the 15 Twitter users with the highest total degree centrality to take part in the study. Potential participants were sent an email (if I could find an email address through their Twitter profiles), and in cases where I could not find an email address, I sent them a direct message through Twitter (see Appendix B). From the 15 people that I contacted in round 1, 7 agreed to participate, 6 did not reply, and 2 did not want to participate in the study (one chose not to participate because of maternity leave while the other declined to participate due to a busy work

⁹ Degree centrality is a common measurement that is used in social network analysis to determine the number of ties that a node has to other nodes (Scott, 2000).

schedule). In the second round of recruitment, I used the same approach to contact the next 8 Twitter users to participate in my study. From the 8 people that I contacted, 3 people agreed to participate, and 5 did not respond to my invitation. The participant recruitment process is summarized below in Table 1.1.

Table 1.1: Summary of recruitment for interview participants.

Recruitment Round	Contacted	Accepted	Declined	No Reply
1 (June 2012)	15	7	2	6
2 (September 2012)	8	3	0	5
Total	23	10	2	11

I chose to collect interview data over the phone and record it using a digital recorder considering the limited amount of time and financial resources that I had available for my research. Although I was not able to make note of participants' body language, I had the opportunity to interview participants from a wider range of geographic locations and to accommodate participants' busy schedules. I completed the phone interviews between July 9, 2012 and February 11, 2013. The interviews ranged from approximately 30 minutes to 80 minutes in duration. After conducting the interviews, I transcribed the data using Sony Sound Organizer and Microsoft Word. Then, I exported the transcripts into NVivo 10, a qualitative data analysis program, for coding.

1.6 Data Analysis

1.6.1 Automated and Manual Text Analysis

I analyzed tweets in two ways: automated text analysis and manual text analysis. First, I used Netlytic to conduct the automatic text analysis. Specifically, I used a keyword extractor in the program to identify the most recurrent words from the imported #tarsands dataset and present the words in the form of an interactive concept cloud (Netlytic, 2013). To create the concept cloud, Netlytic removed common words, such as 'of', 'will', and 'to,' based on a list of over 500 stop-words (stop-words are common words that were removed to identify more relevant words) (Netlytic, 2013). After removing the common

words, the program then identified the most recurrent words from the #tarsands dataset and presented them in the interactive concept cloud (see Figure 1.2). The words in the cloud are sized according to the number of times that they appeared (i.e., the larger the word, the more times it appeared in messages) and the number of times each word appeared is also shown at the top right corner of each word (Netlytic, 2013). Using this interactive concept cloud, I was able to: identify words that were frequently used in conjunction with the hashtag #tarsands; and explore the context in which each of these words was used by clicking on a specific word to view all of the tweets that included that word, as well as who published the tweet, and when the tweet was published.



Figure 1.2: Interactive concept cloud of #tarsands automated text analysis (Netlytic, 2013).

I also conducted a manual text analysis to: (1) classify the function of tweets (i.e., information, community, or action); and (2) categorize the links within the tweets (i.e., video, image, article, petition, website, protest or document) in order to understand how Twitter was used to communicate on the oil sands and pipeline. Given the volume of tweets that I collected, a sample of every tenth tweet (n=1280) was manually analysed and coded, which is a similar approach used in related studies (see for example Segerberg

& Bennett, 2011; Clarke, 2012). Previous studies used coding schemes to categorize different types of tweets. Lovejoy and Saxton (2012), for example, categorized tweets as information, community, or action while Clarke (2012) grouped tweets into three categories: informational tweets; participatory tweets; and amicable ties. Lovejoy and Saxton (2012) used an inductive approach, while Clarke (2012) used a combination of inductive and deductive approaches to code tweets. I used a combination of inductive and deductive approaches to code my tweets. First, I broadly grouped the #tarsands tweets into three categories based on the main function of the message: (1) informational tweets, which included tweets with information and/or links to videos, images, news articles, websites, etc.; (2) community tweets, which included replies or mentions; and (3) action tweets, which requested participation, such as signing an online petition or attending a protest. Then, I manually examined the links (by clicking and following the links) and categorized them as a video, image, news article, petition, website, protest or document.

Table 1.2: Manual text analysis function of #tarsands tweets.

Function	Definition	Example	Percent of Tweets
Information	Tweet that spreads information through one-way interaction	@NoTarSands: Think We Have No Alternatives to Oil? Think Again. http://t.co/8XhR7S50 #tarsands #cdnpoli	57.5
Community	Tweet that involves interaction, sharing, or conversing	@deepgreendesign: @BourassaJohn Don't get bummed out, get up & voice your #Radical #Science & become an "Enemy of the State"! ;) #Cheers #cdnpoli #tarsands	18.0
Action	Tweet that asks people to do something (i.e., sign petition, or attend protest)	@PlatformLondon: EU votes Thurs on #tarsands and UK is blocking, act now to stop the flow of Canada's dirty oil into Europe #FQD @Avaaz http://t.co/JcZPxIN	24.5

1.6.2 Social Network Analysis

I also completed a network analysis, which involves building networks from members (nodes) that are connected based on some common form of interaction (ties) (Netlytic, 2013). This approach is useful to study online phenomenon because it offers “the tools to interpret the structure of the network” and identify patterns of ties between nodes (Diani, 2002, p. 175); it has also been used in a number of related studies (see for example Diani, 1995; Sullivan & Xie, 2009; Gaffney, 2010). I used a Name network approach which means that the network was built from mining names from the #tarsands tweets. As such, nodes were Twitter users who communicated with others using the hashtag #tarsands while ties, the linkages between the nodes, were defined as Twitter users re-tweeting, replying, or mentioning another user in a tweet. Using this approach, I identified 5,223 nodes. There were some limitations regarding the nodes, including: it was unclear whether nodes were individuals or organizations because Twitter users can be either; the network did not include Twitter users who tweeted using different hashtags or tweeted at different time periods; the network did not include lurkers (i.e., Twitter users who only read tweets and did not engage in discussions); and finally, bots or spammers – Twitter users that automatically tweeted using the hashtag #tarsands – may have been included; however, given that the communication network was generated from mining personal names or usernames in a tweet, the likelihood of bots and spammers was reduced.

To better understand the relations between the nodes, I also applied different measurements to the network. Specifically, I used degree centrality – which is a common measurement used in social network analysis – to determine the number of ties that a node has to other nodes (Scott, 2000). In this research, degree centrality was defined as the number of unique Twitter users with whom a person communicates on Twitter, which included re-tweeting, replying, or mentioning to a Twitter user. Three different degrees of centrality were applied: in-degree, out-degree, and total degree centrality. In-degree centrality is how many ties a node receives, out-degree is how many ties a node sends out, and finally, total degree centrality is the combination of both in-degree and out-degree (Scott, 2000). Figure 1.3 illustrates the network based on total degree centrality. In

particular, the size of the node represents the total degree centrality values (i.e., the larger the node the higher the total degree centrality value); the location of the node depicts how central a Twitter user is in the network (i.e., nodes located in the core are more central and nodes in the periphery are less central); and the colours denote clusters of Twitter users that communicate with each other more frequently.

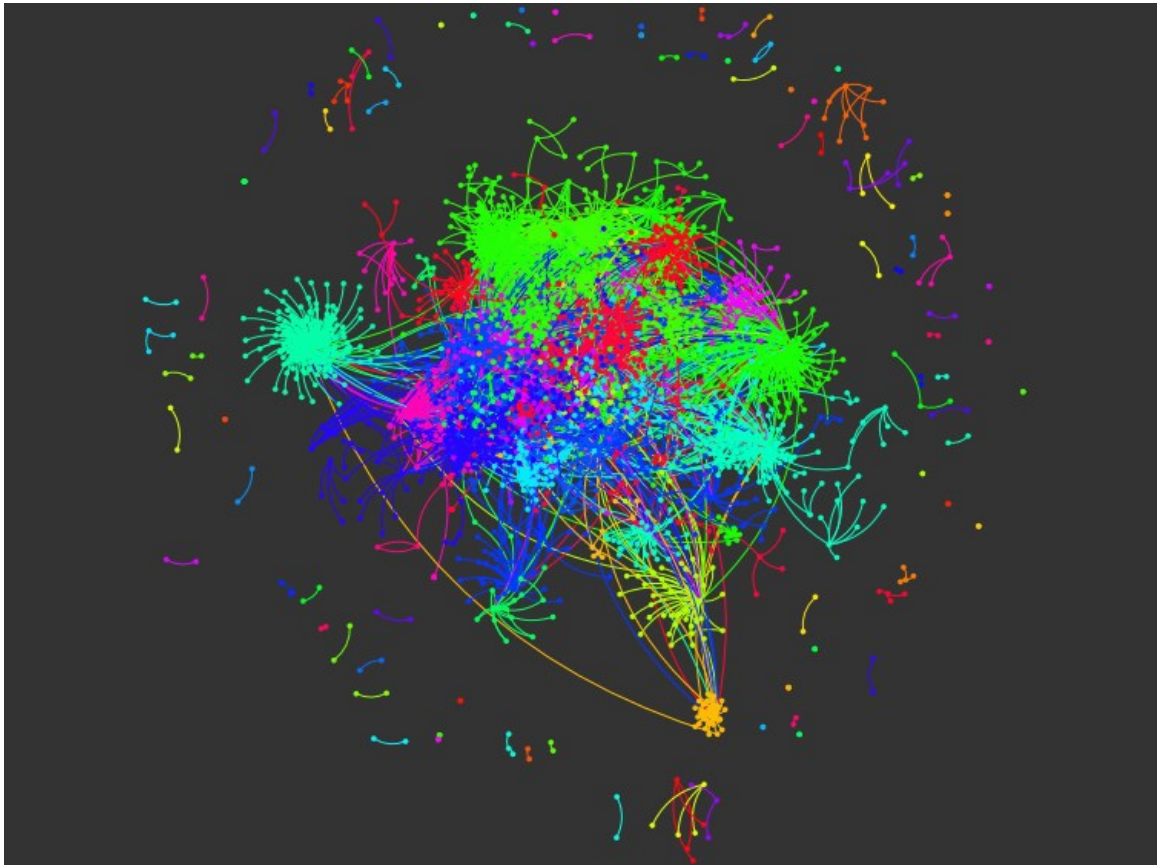


Figure 1.3: Social network analysis of #tarsands network.

1.6.3 Semi-structured Interviews

The final analysis was of the interview data. I analyzed my interview data through qualitative coding, which is the process of grouping material by topic in order to generate new ideas while retaining the data (Richards, 2005). The goal of qualitative coding is to identify and understand patterns and relations within the data (Richards, 2005). There are a number of different ways to code qualitative data (Miles & Huberman, 1994); I

combined two different approaches. The first approach, which is more deductive in nature, is known as a start list (Miles & Huberman, 1994). The start list is a list of codes that can be derived from the literature, the conceptual framework, or the research questions (Miles & Huberman, 1994). My start list was developed based on important ideas that I identified in the social media literature, my conceptual framework, as well as preliminary codes that I made note of during my interviews (which I recorded in a journal). Some of the nodes from my start list included: the benefits of using Twitter, online community, and debate. After formulating my start list, I exported the transcripts into NVivo 10 and coded the data into nodes.

Although my start list was useful, there were still a number of important themes that were not coded into nodes. As a result, I used a second approach, known as inductive coding, to create nodes for the remaining themes. Specifically, I reviewed the ten interview transcripts line by line and created new nodes for any emergent themes (Miles & Huberman, 1994). After I coded the remaining themes, I identified parent nodes, which are top level nodes focusing on broad categories, and moved the remaining “free” child nodes into corresponding parent nodes. This approach is known as a tree approach and I used it because it helps with the organization of nodes, it provides conceptual clarity, it prompts researchers to code richly, and it also assists in identifying patterns (Bazeley, 2007). Finally, after grouping all of the nodes into trees (with parent and child nodes), I went back to check over all of the nodes. This process included moving child nodes into the appropriate parent node as well as merging related nodes to prevent redundancy (Bazeley, 2007). My codebook is included in Appendix C.

1.7 Ethical Considerations

1.7.1 Research Ethics Board Process

My research study involved human participation, thus it underwent review and approval by the Dalhousie University Social Science and Humanities Research Ethics Board (see Appendix D). I also completed the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans Course on Research Ethics (TCPS 2: CORE) (see Appendix E). Throughout my study, a number of steps were followed to ensure that the research

was conducted in an ethical manner. First, informed consent was acquired from all interview participants through a written consent form (see Appendix F). In particular, participants were given an information letter outlining the purpose of my study (see Appendix G), they were informed that their participation was voluntary, and that they could withdraw at any time; no participants withdrew from the study.

Second, after the interviews were conducted, identifying characteristics were removed from the data to ensure anonymity; however, participants were informed that given the relatively small size of people using the hashtag #tarsands on Twitter, there was a possibility that they could be identified. Identities of participants were kept confidential by allocating codes to each person's data. When using quotations in publications and reports, names are not used, rather I refer to participants by number, such as Participant 1, instead. I also conducted all transcriptions myself.

Third, participants were also asked if they would like to receive a copy of their interview transcript and confirm what was said; this process is known as transcript verification (Miles & Huberman, 1994). Seven out of the ten interview participants requested to review their transcripts; however, only two participants provided feedback on their interview transcripts, which was incorporated.

Fourth, interview data were kept in a secure location. Both the transcripts and audio recordings were only accessible by my thesis supervisors and myself, and are now stored in a research office in the School for Resource and Environmental Studies at Dalhousie University in steel cabinets under lock and key. Likewise, all data that is stored on computers is password-protected. All of the research data will be kept on site in the secure location at Dalhousie University until 2017 at which time it will be destroyed.

Although attempts were made to ensure that the research was conducted in an ethical manner, there are some challenges associated with my study. First, there is an ethical challenge regarding the collection of Twitter data (Moe & Larsson, 2012; Tufekci, forthcoming). It is important to acknowledge that ethics approval was not required (nor

was it obtained) from Dalhousie University Research Ethics Board for the text analysis and social network analysis portion of my research study because I only collected public Twitter messages. The second challenge that was encountered is the anonymity of the interview participants. Specifically, since information on Twitter is public, there is a possibility that interview participants could be identified based on what they post on Twitter. Although there were challenges, attempts were made to minimize the risks. For example, interview participants were informed of the possibility that they could be identified in the informed consent form as well as prior to conducting the phone interviews.

1.7.2 Positionality

Given that research can be influenced by the researcher, it is important for researchers to share their positionality so that others may better understand who they are, where they stand in relation to others, and how this shapes their view of the world, and subsequently their research (Takacs, 2002). In this section, I outline my positionality statement focusing on my academic training and recent work experience.

After completing high school, I moved to Ottawa to complete my undergraduate degree in Political Science at the University of Ottawa focusing on environmental politics. Throughout my degree, I decided to specialize in environmental politics because I wanted to learn more about potential options to improve the environment. Prior to completing my final year, I worked with the federal government as a CO-OP student at Public Works and Government Services Canada in the Office of Green Government Operations. While working as a policy analyst, I completed a research project that investigated the current and potential use of social media applications by the federal government. I found that there was great potential for the government to use social media applications as a way to increase public engagement. When I returned for my final year, I completed a course on global ecological politics. During this course, I was introduced to a number of new concepts, including the virtual sphere and the green public sphere. Given my recent CO-OP experience with the government and my exposure to these new concepts, I became curious about the use of social media applications to create a new space to discuss

environmental issues. As a result, I enrolled in the Master of Environmental Studies program at Dalhousie University to undertake thesis research on using social media as a space to discuss environmental issues.

Now that I have discussed my academic background and training, it is also important to discuss any potential bias. There are three considerations that I would like to acknowledge, given the nature of my thesis research: (1) my academic background; (2) my Twitter use; and (3) my views on the oil sands and the pipeline. First, my undergraduate degree in Political Science informed my conceptual framework, the green virtual sphere. Specifically, the readings and concepts that I was exposed to throughout the duration of my undergraduate degree heavily influenced how I framed my thesis. Second, as of 2011, I have had an active Twitter account. In particular, I use Twitter to communicate on the Alberta oil sands as well as the Northern Gateway Pipeline and as a result, it is important for me to address the politics of integration (Fuller, 1999). The politics of integration occurs when the “researcher (sometimes unexpectedly, sometimes through choice) becomes actively involved within the community or group that (s)he was supposed to be studying” (Fuller, 1999, p. 221). As a result of my Twitter use, I am involved in the #tarsands community. My use of Twitter has also allowed me to contact interview participants that I would not have been able to reach through other means (such as email) because I was able to contact them directly through Twitter using direct messaging. Finally, it is important to note my stance on the oil sands and the pipeline. A number of interview participants inquired about my stance on these issues, particularly considering that I am enrolled in Environmental Studies. Although the oil sands and pipeline are important to the Canadian economy, in my opinion, the short term economic benefits are not worth the long-term environmental and health impacts. As a result, I believe that we should look into alternative energy sources that have less impact. I disclose my background in Political Science, my involvement on Twitter, and my views on the oil sands and pipeline to acknowledge, but also to limit, potential bias in my research.

1.8 Format of Thesis

My thesis is presented in a manuscript-based format. Specifically, Chapter Two and Chapter Three are stand-alone papers that I will submit for peer-review and possible publication. These chapters include their own introductions, literature reviews, findings, and discussions. In these two chapters, I refer to “we” – which represents the two additional authors that contributed to the manuscripts. Also, based on Dalhousie’s policy for manuscript style theses, these chapters include a student statement of contribution. Chapter Two focuses on the mixed methods approach used to address three of the research objectives: how is Twitter used to discuss the Alberta oil sands and the Northern Gateway Pipeline (Objective 1), who uses Twitter to communicate on these issues (Objective 2), and how do Twitter users view their use of Twitter on these issues (Objective 4)? While Chapter Three centres on the third research objective: what are Twitter users’ motivations to tweet on the Alberta oil sands and the Northern Gateway Pipeline (Objective 3)? Although each of the chapters has a different focus, they remain linked to the overall goal of the thesis. It is important to note that because Chapter Two and Chapter Three are stand-alone papers, presented after a comprehensive literature review and methodology included in Chapter One, there will be some repetition across Chapters. Finally, in Chapter Four, I bring the thesis together by providing an overview of the research activities as they relate to my objectives, key findings and contributions, study limitations, and potential directions for future research.

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Chapter Two: Integrating Quantitative and Qualitative Methods to Investigate Observed and Perceived Social Media Use

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2.1 Statement of Student Contribution

B. White coordinated the primary data collection, conducted analysis, and wrote all sections of this manuscript. H. Castleden and A. Gruzd provided supervisory oversight of the data collection and actively contributed to the writing process.

2.2 Abstract

Responding to recent calls for mixed methods research in social media scholarship, we integrate quantitative text analysis and social network analysis to *observe* Twitter use on the Alberta oil sands and the Northern Gateway Pipeline, then, we add qualitative interview data to understand *perceptions* about Twitter use on these issues. The quantitative data posited that Twitter is used to disseminate information; form online communities; and mobilize action, while the interview data revealed that participants utilized Twitter to access news outside of mainstream media and find like-minded individuals; participants also expressed concern that Twitter use could result in over-estimating online activities. We discuss the benefits and challenges of adopting a mixed methods approach to acquire a more comprehensive understanding of social media use.

2.3 Introduction

In 2011, thousands of people used social media¹⁰ applications to participate in the Arab Spring Revolution – a loose grouping of anti-government movements that took place across the Middle East and North Africa (Lotan et al., 2011; Murthy, 2013). In Egypt, for example, Facebook and Twitter were utilized to rally protestors and share news: the Facebook page, “We are all Khaled Said,” was created in July 2010 in response to Egyptian police officers beating Khaled Said, a young Egyptian man, to death and it served as a rallying point for the political uprisings (Khashman, 2012); while Twitter provided international media with eye witness accounts of what was happening on the ground (Murthy, 2013). Shortly after the political unrest started in the Middle East and North Africa, a wave of research emerged examining the implications of social media use on the movement. On one side, social media was viewed as changing the nature of social movements, claiming that the “revolutions were tweeted” (Shirky, 2011; Lotan et al., 2011). On the other side, however, critics claimed that social media has not dramatically altered social movements, and the use of social media has resulted in slacktivism meaning that people over-estimate the actual impact of their online activities (Morozov, 2009; Gladwell, 2010).

One of the biggest limitations of existing social media scholarship, including the research conducted on the Arab Spring Revolution, is that it primarily focuses on *observing* social media use through the use of text analysis and social network analysis from data derived through quantitative methods, and as a result, it overlooks users’ perspectives on the *perceived* utility of social media, which could be captured through qualitative methods. These quantitative approaches allow researchers to analyze large amounts of data very quickly (Gaffney, 2010), which is greatly beneficial because social media phenomenon produce huge amounts of data and tend to emerge rapidly. Text analysis, for example, helps to determine the structure and content of social media messages, while social network analysis can be used to identify influential people and connections, as well as online communities (Gruzd et al., 2011). Although these quantitative approaches have

¹⁰ Social media are internet-based applications that allow for the creation and exchange of user-generated content (Kaplan & Haenlein, 2010).

strengths, they also have limitations: text analysis does not help to determine the context of social media content and although social network analysis can identify interactions between online users, it does not investigate users' perspectives on the utility of social media applications. Thus, we need to turn to other methods, qualitative methods, to understand peoples' perceptions about social media use.

Consequently, we combine different methods to take advantage of the strengths of quantitative and qualitative methods to achieve a better scholarly understanding of observed social media use as well as perceived social media use. To illustrate the benefits of combining methods, we examine the use of Twitter on two environmental issues. We selected Twitter – a micro-blogging service – because it provides a window into online discussions by allowing researchers to view conversations on a particular topic (Segerberg & Bennett, 2011). Twitter users publish tweets, which are short messages composed of 140 characters or less. Originally, Twitter did not include a function to organize tweets (Lotan et al., 2011); however, since millions of tweets are sent every day, Twitter users started to include hashtags, which are keywords preceded by “#” which can be clicked to help people locate conversations on a particular topic. Hashtags also provide researchers an opportunity to locate and observe very specific conversations on a range of topics (Segerberg & Bennett, 2011). For our research, we chose to focus specifically on the use of Twitter for two (interconnected) Canadian environmental issues because there are very few studies in this area of social media scholarship (see, for example, Greenberg & MacAulay, 2009). Furthermore, research suggests that people are increasingly turning to the use of social media applications to discuss environmental issues (Liu, 2011), yet the implications of this are unclear. We focused on the Alberta oil sands and the Northern Gateway Pipeline because they reflected prominent environmental issues in Canada, both of which are briefly described below.

The Alberta oil sands, located in northeastern Alberta, Canada, are estimated to be the third largest oil reserve in the world; as such, they are considered an important component of Canada's future economy (Alberta Government, 2013). The oil sands, however, involve an “intensive extraction process [which] has significant environmental

impacts in terms of water quantity and quality, land use disturbance, and air pollution including greenhouse gas emissions” (Hoberg, et al., 2012, p. 1). Recently, a new Alberta oil sands pipeline project was proposed: the Northern Gateway Pipeline. The international energy company Enbridge proposed the 6.5 billion dollar project, that would involve the construction of two pipelines and the construction and operation of a marine terminal to increase the amount of oil distributed from Alberta to growing markets in Asia (Gateway Panel, 2013). The project is currently being reviewed by a joint review panel of three independent experts because it has the potential for significant adverse environmental effects. Specifically, under the Canadian Environmental Assessment Act and Canada’s National Energy Board Act: “when a [development] project may cause significant adverse environmental effects...a project can be referred to a joint review panel process” (Gateway Panel, 2013).

Using these case studies, we seek to address the following questions: how do people use Twitter to communicate on the Alberta oil sands and the Northern Gateway Pipeline (i.e., observed use) and how do they view their Twitter use to communicate on these issues (i.e., perceived use)? In answering these questions, we seek to determine if there is a discrepancy between observed and perceived social media use by utilizing both quantitative and qualitative methods. We also respond to calls to take on the challenge of engaging in mixed methods research by combining automatic and manual text analysis, social network analysis, and semi-structured interviews.

In the following section of the paper, we discuss mixed methods research within the context of social media scholarship. Then, we outline the methods of data collection and analysis that we used to complete our study. Next, we summarize the results and discuss the implications of these results for social media scholarship as well as broader policy and societal implications. We also suggest potential direction for future research and offer brief concluding comments.

2.4 Literature Review

Although a growing number of researchers are starting to examine the use of social media (Chadwick et al., 2009), such as the studies on the Arab Spring Revolution, very few have utilized mixed methods. Mixed methods studies are: “those that integrate qualitative *and* quantitative methods of data collection and/or analysis, as opposed to multimethod studies that employ multiple quantitative *or* multiple qualitative methods” (Crooks et al., 2011, p. 79). Currently, most social media studies use quantitative methods, including text analysis (Cheong & Lee, 2010; Segerberg & Bennett, 2011; Kavanaugh et al., 2011; Bajpai & Jaiswal, 2011; Lovejoy & Saxton, 2012), social network analysis (Sullivan & Xie, 2009; Gruzd et al. 2011) or a combination of the two (Java et al., 2007; Gaffney, 2010). Consequently, existing studies primarily focus on observed social media use and do not tend to engage with those who actually use social media. In this section, we provide an overview of social media research, focusing particularly on the methodological approaches that were used.

2.4.1 Text Analysis

One of the most prominent methods within social media scholarship is text analysis, which can be automatic, manual, or a hybrid of the two. On the one hand, automated text analysis involves automatically analyzing the text of communication, such as quantifying the most frequently used words and mining usernames (Gaffney, 2010). This approach is frequently used within social media studies because it allows researchers to analyze large amounts of data in a short period of time (Gaffney, 2010). On the other hand, manual text analysis involves the detection, selection and analysis of data which can include offline materials, such as books, newspapers, and journals, as well as online materials, such as websites (Merry, 2011), social media messages (Lovejoy & Saxton, 2012), or online profiles (Bortree & Seltzer, 2009). Finally, a hybrid approach combines automated text analysis with manual text analysis (Gaffney 2010; Bajpai & Jaiswal, 2011).

Previous social media studies have demonstrated that text analysis is particularly useful to identify the function of online messages. For example, researchers used text analysis to

examine tweets that were sent during the 2009 election in Iran, the 2010 protests in Thailand, and the 2011 protests in the Arab Spring Revolution, and found that the messages were used to disseminate information (Gaffney, 2010; Bajpai & Jaiswal, 2011; Kavanaugh, Yang, Li, Sheetz & Fox, 2011; Younus et al., 2011). Scholars have also used text analysis to determine the type of information that is disseminated; they found that most of the information shared through Twitter is chatter, meaning personal updates; however, it is also used to share news (Java et al., 2007; Kwak et al., 2010). Other researchers have used text analysis to understand the online conversations of organizations and have found that organizations tend to broadcast information, meaning that there is limited dialogue (Greenberg & MacAulay, 2009; Lovejoy & Saxton, 2012).

A number of researchers have also used text analysis to study online actions via social media applications. For example, text analysis was used to examine protestors' tweets during the 2009 United Nations Climate Summit in Copenhagen. The analysis not only provided a window into the larger protest space, but it also demonstrated how the protest ecology changed over time (Seegerberg & Bennett, 2011). Similarly, text analysis was used to determine whether Twitter was effective at promoting Earth Hour – an annual campaign encouraging people to turn out their lights for one hour – by comparing tweets about Earth Hour and power consumption across Australia (Cheong & Lee, 2010). To date, studies have shown that social media sites are not often used for action (an exception includes Cheong & Lee, 2010). For example, only 16.5 percent of non-profit organizations' tweets are used to mobilize action, such as promoting events, asking for donations, and calling for volunteers (Lovejoy & Saxton, 2012).

2.4.2 Social Network Analysis

In addition to text analysis, scholars are also using social network analysis to examine the use of social media (Kadushin, 2012). Social network analysis involves examining relations between a set of actors – which are known as nodes – that are connected by a specific relation (Diani, 2002). This approach, which originated in sociology, is used by social media scholars because it offers the tools to interpret the structure of the network

and the patterns of ties between the nodes, such as who is influential and who is connected (Diani, 2002).

Prior social media research has demonstrated that social network analysis is useful to examine the existence and evolution of online communities. Online communities are: “a spatially compact set of people with a high frequency of interaction, interconnections and a sense of solidarity” (Gruzd et al., 2011, p. 1314). Gruzd and colleagues (2011), for example, employed social network analysis to determine whether Twitter can be used as a platform to organize and sustain an online community; they found that Twitter can be used to form online communities that are “collective and personal; real and imagined” (p. 1314). Java and colleagues (2007) also used social network analysis to examine online communities on Twitter and they found that communities tend to emerge around similar interests.

Social network analysis is also useful to compare online and offline communities. In their research, Sullivan and Xie (2009) completed a social network analysis of environmental groups in China to understand the relationship between online and offline networks and they found that the online networks help to reinforce existing offline networks of environmentalists. Social network analysis is also a suitable approach to identify influential individuals within a network, including prominent users on social media applications. For example, in his study on the 2009 Iranian election on Twitter, Gaffney (2010) used social network analysis to identify “hub” accounts that were frequently re-tweeted¹¹. He found that there were a relatively small number of influential people, or hub accounts (Gaffney, 2010).

2.4.3 Mixed Methods

Social media scholars have also started to combine different methods, including text analysis paired with social network analysis. For example, Java and colleagues (2007) – using both text and network analysis – found that Twitter is primarily used for daily

¹¹ Re-tweeting involves a user re-sending a tweet by including “RT” or using the re-tweet function in Twitter (Twitter, 2013).

chatter¹², conversations¹³, sharing information, and reporting news (Java et al., 2007). They also identified three types of Twitter users: “information sources”, “information seekers”, and “friends” (Java et al., 2007). Gaffney (2010) used a similar approach to examine Twitter use on the 2009 Iranian election. He collected tweets that contained the hashtag #iranElection and then generated a network based on re-tweets in the sample. He found that most of the prominent users were non-Iranian and they used Twitter to raise awareness about the political situation in Iran (Gaffney, 2010).

But interestingly and relevant to the goal of our study, boyd and colleagues (2010) paired text analysis of a sample of Twitter messages with qualitative comments that were gathered by asking Twitter users to respond to three questions on re-tweeting (RT): “what do you think are the different reasons for why people RT something? If, when RTing, you alter a tweet to fit under 140 chars, how do you decide what to alter from the original tweet? What kinds of content are you most likely to RT? Why?” (boyd et al., 2010, n.p.). Then, they used these responses to inform their quantitative findings and found that people re-tweet to participate in conversations, but they do not necessarily follow the same re-tweeting protocol, and they also tweet for different reasons (boyd et al., 2010). Additionally, Younus and colleagues (2011) also employed brief surveys with Twitter users, but they used the findings from the surveys to confirm the validity of a new method to determine public opinions during political uprisings, using the Tunisian uprising as a case study.

These two studies (boyd et al., 2010 and Younus et al., 2011) demonstrate some of the benefits of applying mixed methods for social media research; that is by combining text analysis with surveys, social media researchers are able to benefit from the analysis of large data volumes through quantitative methods and the qualitative data garnered from surveys. Although these examples demonstrate the potential for integrating text analysis and survey data, there is clearly room for more in-depth qualitative approaches (e.g.,

¹² Daily chatter includes people posting about what they are doing such as daily routines (Java et al., 2007).

¹³ Conversations include interaction between Twitter users, such as mentioning a username or replying to another Twitter user (Java et al., 2007).

semi-structured interviews) to further investigate users' perceptions about social media use.

There are, indeed, examples from other areas of research that use interviews to understand the use of the internet and social media – without any integration with text analysis or social network analysis. Social movement researchers, for example, have combined interviews with key personnel, observation of technology use, and/or quantitative analysis of websites to examine online social movements (Blee & Taylor, 2002; Papacharissi, 2002; Stein, 2009). For example, in her research, Pickerill (2003) used semi-structured interviews along with observation of technology use to confirm how environmental non-governmental organizations (ENGOS) used different technologies to engage in online environmental activism in the United Kingdom (Pickerill, 2003). Liu (2011) also combined in-depth interviews with observation of technology use to study internet use by ENGOS in China. These approaches used a combination of qualitative data collection methods (interviews and participant observation) to provide an in-depth investigation of perceptions.

2.5 Data Collection

To address our questions – how do people use Twitter to communicate on the Alberta oil sands and the Northern Gateway Pipeline and how do they perceive their use of Twitter to discuss these issues – we collected two data sets: Twitter messages and interviews with Twitter users. The first data set, which targeted the former question, was comprised of #tarsands Twitter messages on the oil sands and the pipeline. To gather these data, we imported Twitter messages from January 24, 2012 to February 24, 2012 that contained the hashtag #tarsands. We used the hashtag #tarsands for a number of reasons: it was considered connected to both of the issues (i.e., the oil sands and the pipeline), it was the most widely used hashtag on both of these issues, and it also provided significant overlap with other relevant hashtags such as #oilsands, #NorthernGateway, and #enbridge. In total, we gathered 12,815 tweets; however, there were some limitations: tweets that did not contain #tarsands were not included and the program that was used to collect the tweets could only gather a maximum of 100 messages per hour, although it is unlikely

that there were often more than 100 tweets per hour considering that most days had less than 300 tweets. Consequently, there is a possibility that not all of the relevant tweets were included in our data set.

The second data set, which aimed at the latter question, consisted of interviews with ten well-connected Twitter users who used the hashtag #tarsands. In order to identify interview participants, we relied on purposeful sampling. In particular, we identified Twitter usernames from the #tarsands tweets to generate a list of people who had high total degree centrality¹⁴. This approach – which is known as network ethnography – helps researchers to identify relevant interview participants from a communication network and is particularly useful for studies involving new media, like Twitter (Howard, 2002). Although we found this approach useful to identify interview participants, there were some limitations: we focused on people who were well-connected and used the hashtag, thus, they are not representative of the entire sample because they are well-connected users. It was also challenging to contact potential interview participants because not all users provide their contact information on Twitter. As a result, we sent an email to contact interview participants when an email address was available, otherwise we sent a direct message or tweeted to potential participants¹⁵.

Given the geographic distance of our potential participants and the limited amount of financial resources for this study, we selected phone interviews as a viable alternative to face-to-face interviews (Sturges & Hanrahan, 2004). Initially, we contacted 15 Twitter users that demonstrated the highest total degree centrality to participate in an interview; 7 of them agreed to participate. After conducting the 7 interviews, we had not achieved data saturation, which meant that new themes were still emerging because interview participants were discussing new topics (Kvale & Brinkmann, 2009). Consequently, we chose to contact 8 additional Twitter users to participate in our research; 3 agreed to

¹⁴ Degree centrality is a common measurement that is used in social network analysis to determine the number of ties that a node has to other nodes (Scott, 2000). In-degree centrality is how many ties a node receives, while out-degree is how many ties a node sends out, finally total-degree is a combination of in-degree and out-degree centrality (Scott, 2000).

¹⁵ This study was reviewed and approved by the Dalhousie University Social Sciences and Humanities Research Ethics Board.

participate and by the time their interviews were complete, data saturation had been achieved. The interviews lasted between 30 to 80 minutes in which participants were asked 20 open-ended questions about their Twitter use on the oil sands and the pipeline. The interviews were recorded using a digital recorder then they were transcribed verbatim into Microsoft Word, and finally, entered into NVivo10™ for data management. In total, ten one-on-one phone interviews were conducted between July 9, 2012 and February 11, 2013.

2.6 Analysis

2.6.1 Automatic and Manual Text Analysis

After we collected the #tarsands tweets, we completed two types of text analysis. For the automated text analysis, we used Netlytic, which is a cloud-based text analyzer that can automatically summarize large volumes of text from online conversations on social media sites (Netlytic, 2013). Using the #tarsands data set, we built a concise summary of the communal textual discourse on Twitter (Gruzd & Haythornthwaite, 2008); first, we identified the most recurrent words from the dataset and presented them in the form of an interactive concept cloud, which allows researchers to click on terms and view the details about that term (Gruzd & Haythornthwaite, 2008). The concept cloud was achieved by removing common words, such as “of”, “will”, and “to,” based on a list of over 500 so-called “stop-words” (i.e., common words that are removed in order to identify more relevant words) (Netlytic, 2013). The visualization then counts the number of tweets in which each word appears and shows this number at the top right corner of each word. Then, we used Netlytic to identify the names of Twitter users from the #tarsands tweets. We identified the top ten most frequent Twitter posters (i.e., people who posted the highest number of tweets with the hashtag #tarsands) and we also identified the top ten most mentioned users (i.e., Twitter users who are included in a tweet).

Next, we completed a manual text analysis which included determining the function of the tweets and classifying the links within the tweets. Given the size of our data set and the limited amount of resources that we had available, we chose to manually code every tenth tweet (n=1, 280). First, using a Twitter typology developed by Lovejoy and Saxton

(2012), we coded the tweets based on their function as: information, community, or action (Vegh, 2003; Cavanaugh & Freund, 2013; Gaffney, 2010; Bajpai & Jaiswal, 2011). An information tweet contains information regarding an activity, highlights from an event, or any other news, facts, or reports and it involves a one-way interaction (Lovejoy & Saxton, 2012; Vegh, 2003). A community tweet involves interaction, sharing, or conversing and demonstrates two characteristics: direct interactive conversations (i.e., such as @ mention) and tweets that serve to strengthen ties to the online community without involving an expectation of interactive conversation (Lovejoy & Saxton, 2012). Finally, an action tweet aims to get followers to do something, such as attend events or make donations (Lovejoy & Saxton, 2012; Vegh, 2003). After determining the function of the tweets, we examined and classified the links as: news articles, websites, videos, images, petitions, or protests, which enabled us to further understand the function of the tweet.

Table 2.1: Manual text analysis function of #tarsands tweets.

Function	Definition	Example	Percent of Tweets
Information	Tweet that spreads information through one-way interaction	@NoTarSands: Think We Have No Alternatives to Oil? Think Again. http://t.co/8XhR7S50 #tarsands #cdnpoli	57.5
Community	Tweet that involves interaction, sharing, or conversing	@deepgreendesign: @BourassaJohn Don't get bummed out, get up & voice your #Radical #Science & become an "Enemy of the State"! ;) #Cheers #cdnpoli #tarsands	18.0
Action	Tweet that asks people to do something (i.e., sign petition, or attend protest)	@PlatformLondon: EU votes Thurs on #tarsands and UK is blocking, act now to stop the flow of Canada's dirty oil into Europe #FQD @Avaaz http://t.co/JcZPxIN	24.5

2.6.2 Social Network Analysis

Next, we completed a social network analysis. To conduct our analysis, we used the #tarsands data set to identify the Twitter usernames and generate a communication network. The nodes represented Twitter users who communicated with another Twitter user(s) using the hashtag #tarsands between January 24, 2012 and February 24, 2012. There were 5,223 nodes. A few limitations are worth noting here: a Twitter user does not necessarily represent an individual; it could also represent an organization; it could also be a fake account, such as a ‘bot’ that automatically sends tweets; however, because we used a name network approach, which means that Twitter users demonstrated connections, the likeliness of fake Twitter accounts in our network was reduced.

A number of measurements were then applied to understand the relations between the nodes, including: in-degree, out-degree, and total degree centrality. Degree centrality is the number of ties that a node has to other nodes, in-degree centrality is how many ties a node receives, out-degree is how many ties a node sends out, and finally, total degree centrality is the combination of both in-degree and out-degree (Scott, 2000). In our case, degree centrality is the number of unique Twitter users with whom a person communicates on Twitter. We defined communication as re-tweeting, replying, or mentioning a Twitter user. For example, if a Twitter user re-tweets, replies and mentions to a lot of different users, they demonstrate high out-degree centrality. Conversely, if a Twitter user gets re-tweeted, replies to, or is mentioned often by different Twitter users, then they demonstrate high in-degree centrality.

2.6.3 Semi-structured Interviews

Finally, we completed a thematic analysis to identify emergent themes from the Twitter user interviews which involved coding the interview data and comparing it with themes from our study purpose as well as themes from the literature (Aronson, 1994). We combined two different approaches: the first was a start list (Miles & Huberman, 1994) which was developed based on important ideas that we identified in the social media literature, and preliminary codes that we made note of during our interviews. After

formulating our start list, we coded the data into nodes. Although the start list was a useful first step, there were still a number of important themes that were emerging but not yet coded. As a result, we used a second approach, inductive coding, to create nodes for the remaining themes. Specifically, we reviewed the interview transcripts line by line and created new nodes for any emergent themes (Miles & Huberman, 1994). After we coded the remaining themes, we identified parent nodes, which are top level nodes focusing on broad categories, and moved the remaining “free” child nodes into corresponding parent nodes. Through this process, we identified a number of meta-themes from the data.

2.7 Results

2.7.1 Observed Use of Twitter

The first section of our results reveals the observed use of Twitter on the oil sands and the pipeline. As such, we start by summarizing the findings from the text analysis, which focused on the content and structure of the tweets (i.e., re-tweets, Twitter usernames, function, and links) which is followed by findings from the social network analysis. First, we found that there was a very high level of re-tweets in the #tarsands data set. Re-tweeting is a common Twitter convention which can be “understood both as a form of information diffusion and as a means of participating in a diffuse conversation” (boyd, Golder & Lotan, 2010, n.p.). We found that close to 50 percent of the #tarsands tweets were re-tweets, which could demonstrate a high level of information dissemination.

Next, we examined Twitter usernames that were included in the #tarsands data set. We found that the ten most frequent posters were either environmentalists or associated with an ENGO (see Figure 2.1), based on their Twitter profiles¹⁶. Likewise, the top ten most *mentioned* Twitter users were also environmentalists or associated with an ENGO (see Figure 2.2). There were, however, two exceptions for the most mentioned Twitter usernames, including: @ethical_oil, which is a non-profit organization that supports the development of the Alberta oil sands and related projects; and @dpcarrington, who is the senior environmental journalist with *The Guardian* in the United Kingdom. Although a

¹⁶ A Twitter user profile can include your name, location, a link to your website, a 140 character biography, and a picture (Twitter, 2013).

majority of the top posters and most mentioned Twitter users were environmentalists or associated with an ENGO, this finding is not entirely surprising because of the hashtag that we selected. Specifically, “tar sands” is considered a pejorative term, which means that most of the Twitter users who chose to use the hashtag #tarsands tended to be opposed to the oil sands and pipeline. Since our sample likely over-represented opponents, it is necessary to be cautious about using this sample to generalize about Twitter use more broadly.

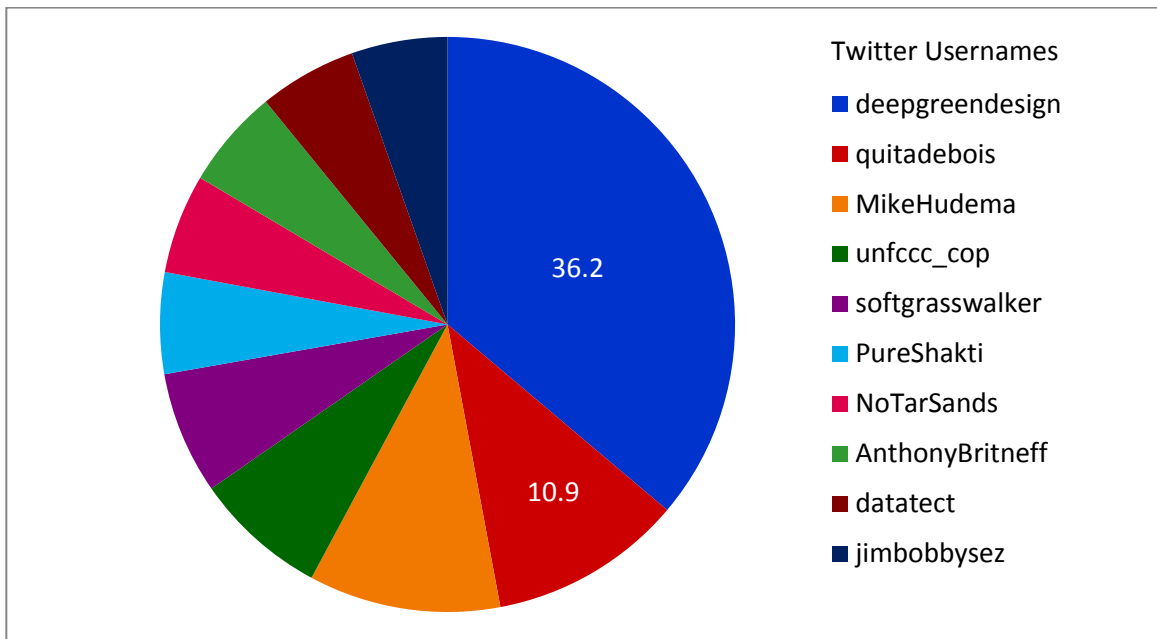


Figure 2.1: Chart showing the top ten *posters* that used the hashtag #tarsands between January 24, 2012 and February 24, 2012.

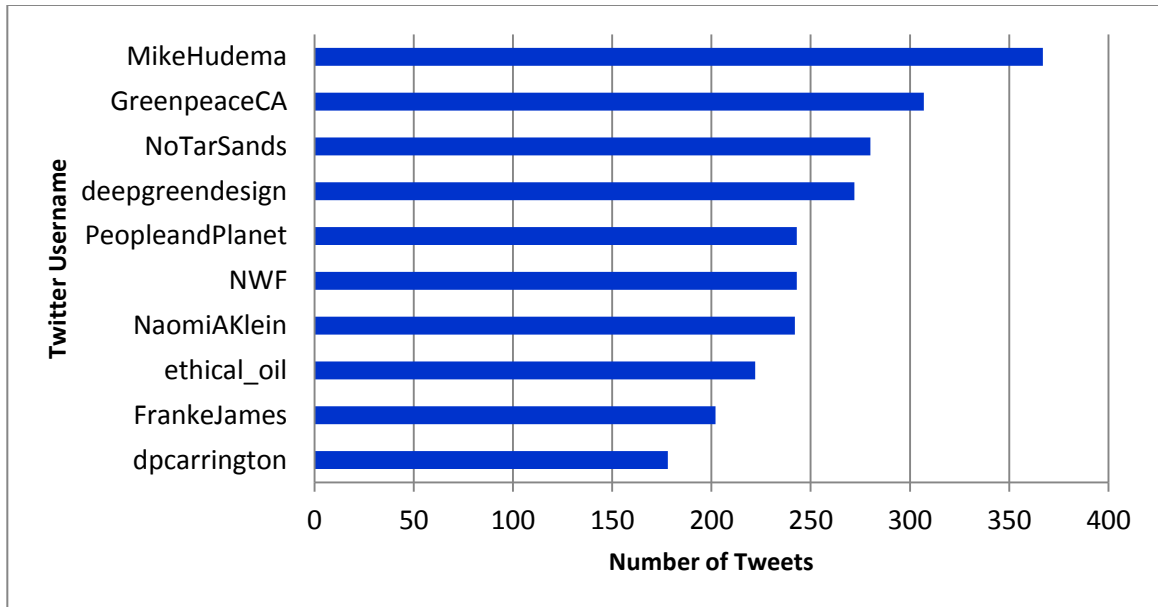


Figure 2.2: Chart showing the top ten most *mentioned* posters that used the hashtag #tarsands between January 24, 2012 and February 24, 2012.

Next, using the manual text analysis, we determined the function of the tweets. We found that the main function of tweets on the oil sands and pipeline was to disseminate information. In particular, 57.5 percent of the sample of the #tarsands tweets demonstrated an informational function. This included tweets with links to news articles or websites, as well as messages that had links to videos or images. An example of an informational tweet is a message from the No Tar Sands Network (i.e., @NoTarSands) which includes a link to their website with information about alternative forms of energy and includes two hashtags (i.e., #cdnpoli and #tarsands): “@NoTarSands: Think We Have No Alternatives to Oil? Think Again. <http://t.co/8XhR7S50> #tarsands #cdnpoli” (Twitter, 2012).

The second most common function of the #tarsands tweets was to mobilize action on the oil sands and the pipeline, which made up 24.5 percent of the sample. Most of the tweets that were classified as action tweets included online petitions, while only a small minority provided details regarding protests. An example of an action tweet is a message that was sent by an activist organization in the United Kingdom (@PlatformLondon) which asked people to sign a petition to prevent the importation of oil from Alberta into the European

Union and included a link to the petition as well as two hashtags (#tarsands and #FQD): “@PlatformLondon: EU votes Thurs on #tarsands and UK is blocking, act now to stop the flow of Canada’s dirty oil into Europe #FQD @Avaaz <http://t.co/JcZPx1N>” (Twitter, 2012).

The third function of the #tarsands tweets was to foster online communities through conversations, and this function represented 18.0 percent of the sample. Tweets included conversations between Twitter users as well as tweets that fostered a sense of community. An example of a conversational tweet is a message that was sent from a green designer, Graham Chivers (@deepgreendesign), to John Bourassa (@BourassaJohn) an Albertan who tweets on the oil sands, about voicing opposition to the oil sands: “@deepgreendesign: @BourassaJohn Don't get bummed out, get up & voice your #Radical #Science & become an "Enemy of the State"! ;) #Cheers #cdnpoli #tarsands” (Twitter, 2012).

In addition to determining the function of the Twitter messages, we also analyzed the links to other online material being circulated within the #tarsands tweets. We found that a majority of the #tarsands tweets – approximately 80 percent – contained links. These included information sources, such as: news articles (29.2 percent), websites (22.6 percent), videos (7.3 percent), and images (3.4 percent) as well as links asking people to participate in action such as: online petitions (15.9 percent) and protest information (2.1 percent).

The news article links included mainstream media sources, such as to one of Canada’s national newspapers, the *Globe and Mail* and Canada’s national broadcasting agency, the *Canadian Broadcasting Corporation* as well as micro media sources including *The Tyee*, which is a daily online independent news magazine out of British Columbia. Most of the tweets with links to news articles also included brief commentary about the articles. The website links found in the #tarsands tweets included a wide range as well – from personal websites like Andrew Frank’s site (a communication specialist that speaks about the oil

sands and the pipeline) to larger ENGO websites, such as Sierra Club Canada's site. Tweets were often used to bring people's attention to new content on a website.

Video links in the #tarsands tweets were primarily to YouTube or Vimeo (which are both video-sharing sites). Examples include a TEDx video by Garth Lenz, who is a Canadian photographer, discussing the environmental costs of oil, as well as a video posted by Naomi Klein, who is an author and activist, discussing whether the Alberta oil sands should be considered an ethical resource. There were a few videos of protest events, such as one Northern Gateway Pipeline protest in Prince Rupert, British Columbia. We also found links to images of protests, such as a student protest against the oil sands that took place in Sheffield, United Kingdom and a pipeline protest in Edmonton, Canada; however, the majority of the images that were shared using the hashtag #tarsands were satirical. For example, Twitter users shared pictures that depicted Canadian Natural Resource Minister Joe Oliver marrying "big oil" in a mock wedding ceremony.

Online petitions were also circulated on Twitter through #tarsands tweets. The petitions included a range of topics related to the oil sands and the pipeline such as: stopping the development of the Alberta oil sands; preventing the approval of the Northern Gateway Pipeline by the Joint Review Panel; preventing the approval of the Keystone XL Pipeline (another pipeline transporting oil from Alberta, Canada to the United States); and discussing the European Fuel Quality Directive vote (a vote to prevent the importation of oil from the Albertan oil sands to the European Union). Tweets also included links to protest information. There were several protests organized on Twitter between January 24, 2012 and February 24, 2012 including: two in Canada (one in Toronto and another in Vancouver at the Chinese Consulate); as well as two in the United Kingdom (one at the Canadian High Commission in London, and another at the Liberal Democrats headquarters in London).

In addition to observing the structure and function of the #tarsands tweets, we also observed interactions between Twitter users. Figure 2.3 illustrates the network based on total degree centrality. Specifically, the size of the node represents the total degree

centrality values (i.e., the larger the node the higher the total degree centrality value); the location of the node depicts how central a Twitter user is in the network (i.e., nodes located in the core are more central and nodes in the periphery are less central); and the colours denote clusters of Twitter users that communicate with each other more frequently. From the network, we found that a number of clusters emerged on Twitter. Clusters are groups of nodes that are more densely connected to each other than to nodes outside the group (Java et al., 2007).

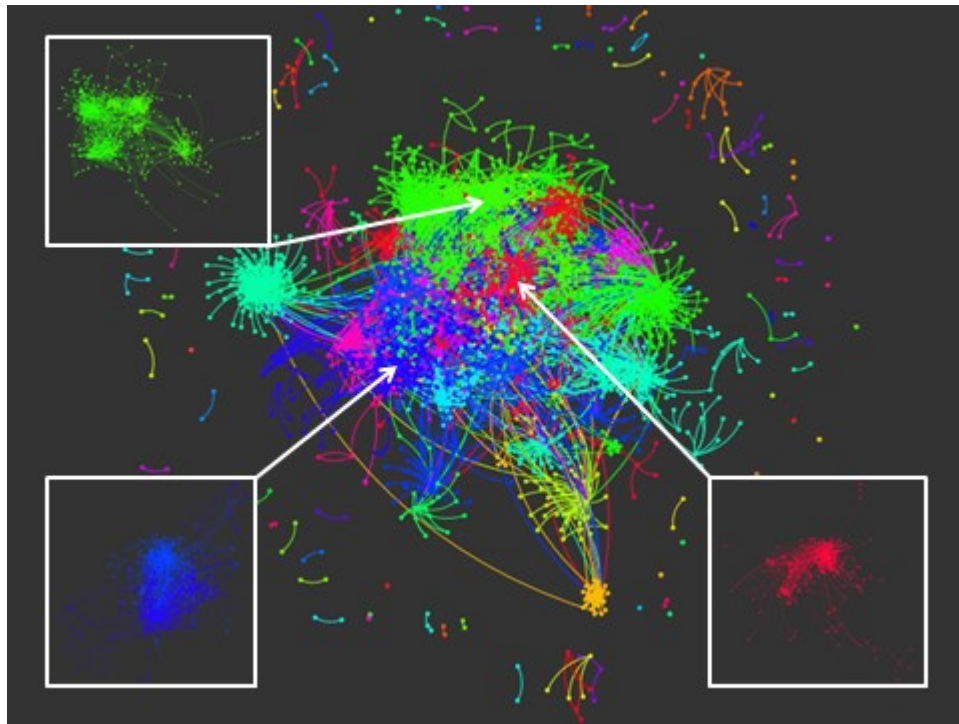


Figure 2.3: Social network analysis of #tarsands network depicting clusters.

For example, the first cluster that we identified (shown in Figure 2.4) was predominantly individual environmental activists that were located in Canada. This included individuals such as @climatekeith and @mikehudema, who identified themselves on Twitter as working with Greenpeace Canada, as well as @deepgreendesign, an environmental designer based out of Toronto. The second cluster that we identified (shown in Figure 2.5) was primarily comprised of organizations and journalists that were based in the United Kingdom. Specifically, this cluster included large international ENGOs, such as Greenpeace UK, smaller ENGOs like No Tar Sands Network, as well as an

environmental student network, People and Planet. This cluster also included environmental journalist Damian Carrington from *The Guardian*. The third cluster (shown in Figure 2.6) was predominantly comprised of ENGOs that are based in Canada, including Greenpeace Canada, Sierra Club Canada, and Environmental Defence. From the social network analysis, we found that there were a number of specific clusters of individual activists as well as ENGOs that tended to reflect location; however, there were nodes included in these clusters that did not demonstrate the same characteristics. In addition, we only relied on the Twitter profiles to identify the geographic location, so there is a possibility that these groups or individuals are based in another location.

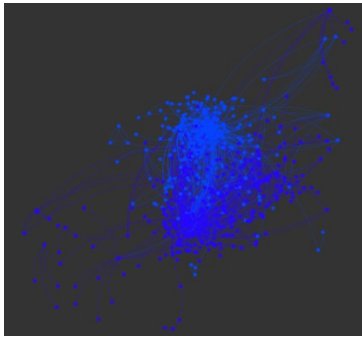


Figure 2.4: Canadian environmental activists.

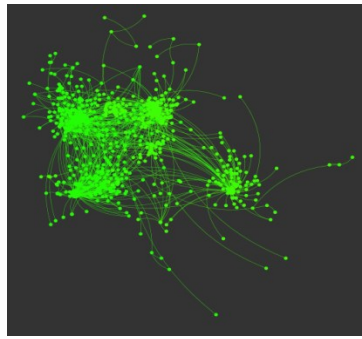


Figure 2.5: UK environmental activists.



Figure 2.6: Canadian ENGOs.

2.7.2 Perceived Use of Twitter

In this section of our results, we discuss participants' perceived use of Twitter – how they felt that they used Twitter – to communicate on the oil sands and pipeline. To understand their perceptions, we focused on themes that emerged from the interviews. To provide context, we included a summary of participant information (see Table 2.2). The key themes that arose were: that participants used Twitter to access news; that there was an inclusion of voices, including youth and rural populations; that participants connected with like-minded individuals; that participants felt a sense of community; and that participants believed that using Twitter on the oil sands and pipeline may lead to slacktivism. Each of these themes is elaborated on in detail below.

Table 2.2: Interview participant characteristics.

<i>Participant</i>	<i>Country of Residence</i>	<i>Gender</i>	<i>Individual/Organization</i>
1	Canada	Female	Individual
2	Canada	Male	Individual
3	United Kingdom	Female	Organization
4	Canada	Male	Organization
5	United Kingdom	Female	Organization
6	Canada	Male	Individual
7	Canada	Male	Organization
8	Canada	Male	Individual
9	Canada	Female	Individual
10	Canada	Female	Individual

First, we found that the majority of interview participants (nine out of ten) stated that they use the re-tweet function on Twitter and they primarily used it to disseminate news articles. We also found that interview participants were using Twitter to access news: “I think that people more and more...are turning to social media sources...like Facebook and Twitter for their news” (Participant 7). More specifically, interview participants stated that they used Twitter to get news that they could not find in mainstream media sources: Twitter is “a really good way to get past the mainstream press and messaging that’s out there” (Participant 3) because it includes “different information than what you are getting through news sites” (Participant 1).

We also found that there was a theme of inclusion, meaning that new voices were brought into the discussion on the oil sands and the pipeline. A number of participants noted that they were able to connect with more people than in the past: “I definitely think the reach of Twitter is far more extensive than what I would be able to do in my day to day life” (Participant 7). Interview participants also said that Twitter was a good way to engage youth: “It’s also a way of bonding with youth” (Participant 6). While others commented that Twitter is helpful because it includes rural populations: “I think that [Twitter] gives...an outlet for people who are physically remote from where the action actually is. So I feel very attuned to the people in Kitimat, and in Victoria, and in Vancouver who are working against the pipeline. I feel very close with those people...it does...empower the rural people and the individual which is supposed to be the big equalizer factor of the

internet. The average person has the same ability to publish something on the internet as the *New York Times* does...you have the platform, the soapbox” (Participant 2). Hence, we found that interview participants perceived a greater inclusion of voices in the discussion on the oil sands and the pipeline as a result of Twitter.

Another theme that arose was connecting with like-minded individuals. This concept – known as homophily – suggests that individuals with similar interests tend to interact with each other: “[p]eople in one community have certain common interests” (Java et al., 2007) (Kwak et al., 2010; McPherson, Smith-Lovin & Cook, 2001). The majority of interview participants suggested that they used Twitter to connect with others with similar interests: “[Twitter] connects you to...like-minded individuals” (Participant 2). More specifically, they stated that people: “sort of build a network of like-minded individuals. There’s quite a few people that I would say are my Twitter pals or Twitter comrades in arms...against the pipeline” (Participant 2). Another participant said that: “As far as relationships I guess I am more accustomed to similar minds” (Participant 8). Several participants also referred to the importance of using hashtags to find people with shared interests: “hashtags...are so important in terms of attracting people who are interested in the same topics” (Participant 1). Interview participants demonstrated homophily by expressing feelings of connectedness with people having shared interests.

We also found that interview participants generally felt connected to others who tweeted on the oil sands and the pipeline: “when you are following people and you find their tweets amusing or informative you kind of feel like you know them even if you’ve never met them” (Participant 4). Furthermore, the majority of interview participants felt a sense of community: there is “comradery and some sense of community” on Twitter (Participant 9). It was also suggested that “it definitely feels more involved and shows more like a community because we are kind of organizations and individuals who are tweeting about the same, similar issues...[w]e re-tweet each other sometimes and then you have the whole issue of the hashtag which gives you kind of a specific set of tweets to follow and to makes you feel like part of a community” (Participant 5). “I think that there is certainly a community built on Twitter...I do feel some affinity, of course,

towards those people and then they have been useful in gaining information from and then also giving information to” (Participant 7). It was clear that many individual interview participants perceived a feeling of community. However, this feeling was not as strong for those representing organizations as it was for individuals: “I don’t feel like I’ve made any personal connections, it’s been hard because I am not tweeting as a person, as an individual. I tweet as an organization in this case...it’s nice to see people who re-tweet us or tweet often, oh yeah that person in that kind of field. Some sense of connection but not on a very individual level, no” (Participant 5).

The final theme that emerged from the interviews is the concern that the use of Twitter may result in slacktivism. The majority of participants stressed that: “on the one hand [Twitter] is the greatest tool in the world, but on the other hand, if you are dealing with apathetic users, nothing has changed. There’s no action, they may learn something, but if there’s no action involved with knowledge it may as well be nothing...it’s seeing other people going out and picketing that I think is motivating more and more people to become physically active in their environmental pursuits” (Participant 8). As a result, some participants were skeptical of the impact of Twitter: “I think that Twitter is effective for environmental groups to get their message out and to try to mobilize people and perhaps sway the media, but I don’t think it’s been a very good organizing tool for them” (Participant 9). In addition, participants said that Twitter “makes you feel like you are maybe doing more about an issue than you actually are...I mean it’s online, it’s messaging, it’s information. But that in itself isn’t going to change anything unless people are motivated by that information to do something with it, so, it’s only kind of the first step in that way” (Participant 3).

2.8 Discussion

2.8.1 Similarities Between Observed and Perceived Twitter Use

The perceived data supported the following results from the observed data: using Twitter as a news source and clustering amongst sub-groups. Specifically, from the observed Twitter use, we found that the main function was to disseminate information, and we also found that almost one third of the links within the tweets were to news articles. This

finding was supported by the perceived use of Twitter. Participants noted that they used Twitter in order to access news, specifically news that cannot be found within mainstream media. This finding is not particularly surprising, given that previous studies have found that Twitter is used to access information (Java et al., 2007); however, our findings suggest that Twitter users also perceive this use of Twitter to access news. The second observed result supported by perceived data was that groups formed around clusters. From the social network analysis, we identified three clusters, including an individual environmental activist cluster, a United Kingdom ENGO cluster, and a Canadian ENGO cluster. Interview participants also acknowledged the formation of groups. They also suggested that they communicated with like-minded individuals. Again, this finding was not surprising because previous researchers have suggested that individuals with similar interests are more likely to interact with each other (McPherson et al., 2001).

The perceived data was also able to expand the results from the observed data. For example, from the observed data, it appeared that a community had formed on Twitter regarding the Alberta oil sands and the Northern Gateway Pipeline. Specifically, Twitter users interacted through the use of re-tweets and @mentions and there also appeared to be dialogue based on the manual text analysis. However, simply observing the tweets and the communication network it is difficult to confirm whether members of the community actually feel a sense of community to other members of the community. Based on participants' responses, however, we found that a majority of participants felt a sense of community to others who used Twitter to communicate on the oil sands and pipeline.

2.8.2 Differences Between Observed and Perceived Twitter Use

Although the perceived Twitter use supported and even expanded some of the observed results, we also found some differences. First, two of the participants who were observed as being members of the online community did not feel a sense of community. For example, one participant did not feel a sense of community because they were tweeting on behalf of an organization while another participant, that was a proponent of the oil sands and pipeline, noted that they did not feel a sense of community on Twitter because

the majority of people tweeting using the hashtag #tarsands were opponents and therefore they felt outnumbered. Another difference between observed and perceived Twitter use was the predominance of mobilizing action. From the observed use, we found that 24.5 percent of the tweets served an action function; however, after examining the links within the tweets, we found that only 2.1 percent of included information to protest events while most of the action tweets included links to online petitions. This is related to participants concerns about slacktivism suggesting that by participating in online activities, like circulating petitions, Twitter users would overestimate their actions. Finally, although it appeared that ENGOs and environmentalists were the most frequent and mentioned Twitter users from the observed data, participants noted that Twitter provided for greater inclusion, particularly for rural populations and youth, demonstrating that it was more than ENGOs and environmentalists discussing these issues on Twitter.

2.8.3 Benefits and Challenges of Engaging in Mixed Methods Research

The findings that we shared above demonstrate that mixed methods can introduce a greater level of detail regarding observed and perceived Twitter use. We do not see the differentiation between the quantitative and qualitative findings as a shortcoming. Instead, it demonstrates that there is a need to combine text analysis and social network analysis with “on-the-ground” observations from Twitter users themselves to gain a more complete understanding of social media use. More specifically, the quantitative data revealed that tweets were used for information, community, and action, while interview participants noted that they were not just accessing information, but news that is beyond mainstream media; that communities were comprised of like-minded individuals and that there are concerns that Twitter use could result in slacktivism. Thus, our findings not only offer a more robust examination of Twitter use on the oil sands and the pipeline, but they also demonstrate a potential gap between observed Twitter use and perceived Twitter use. Given the exponential increase in social media use paired with the growing use of these applications to discuss environmental issues, it will be useful to understand the role of social media applications regarding environmental issues. The method that we described is useful in that it incorporates both observed and perceived attributes in an area of research that is just starting to emerge. Whereas most of the existing literature relies on

quantitative methods, our approach also incorporates data gleaned from personal interviews with Twitter users. As such, our approach introduces a new level of complexity and nuance that has yet to be seen in social media research. In this paper, we have demonstrated the power of combining both qualitative and quantitative methods to analyze social media data.

Although there were benefits of engaging in mixed methods research, there were also challenges. The first challenge – regarding research ethics – arose with our participant selection. In our study, we collected tweets, then, we mined names from the tweets which we used to identify potential interview participants. This posed a challenge regarding research ethics because on the one hand the first data set, the #tarsands tweets, did not require ethics approval because it was publicly accessible data. On the other hand, the qualitative interviews required ethics approval because it involved research involving human participants. We addressed this challenge by acquiring ethics approval for the interviews and also ensuring that our interview participants were aware of the possibility that they may be identified (we noted this in the consent form and in the interviews).

Then, we needed to decide how we would collect and analyze data and which order we would collect and analyze data. Mixed methods researchers may use qualitative methods first for exploration (Sale et al., 2002), while others may add qualitative methods after for additional detail (Crooks et al. 2011) and others may integrate the methods. We used a sequential design, starting with quantitative and ending with qualitative. We collected and analyzed the tweets first because it enabled us to mine names from the tweets to identify potential interview participants. In our study this became useful because it allowed us to combine inductive and deductive thematic analysis for the interview data. The deductive analysis allowed us to see differences between observed and perceived social media use while the inductive analysis helped us to identify other themes regarding Twitter use.

2.8.4 Limitations

Although our study furthers the understanding of social media use and mixed methods, it does have a number of limitations. First, our study focused on one hashtag (i.e.,

#tarsands). Consequently, we did not include Twitter users or tweets that did not engage with the hashtag #tarsands. As a result, it would be beneficial for future studies to include multiple hashtags in order to provide a broader volume of tweets and to even conduct comparisons between different hashtags. It is also important to note that the term “tar sands” is pejorative, and as a result, our sample of tweets and Twitter users included a higher number of users that opposed the oil sands and pipeline.

In addition, our study did not examine Twitter users who did not engage with others; these users are known as lurkers¹⁷. This means that Twitter users who only read tweets are not included in our study. The implications are that the sense of community that was felt by interview participants could change based on people’s level of engagement. Thus, it would be valuable for future research to include Twitter users who are less involved in discussions to determine if they too feel a sense of community.

Finally, by coding tweets using Lovejoy and Saxton’s (2012) Twitter typology – which included information, community, or action – we confined the text analysis portion of our study to these specific functions. However, through the qualitative interviews, we were also able to address this limitation by including open answers regarding the use of Twitter on the oil sands and the pipeline. Consequently, we found that participants described more detailed uses, including accessing news beyond the mainstream media and connecting with like-minded individuals.

2.8.5 Future Research Directions

Further research is still required to answer a number of pressing questions about the role of social media applications on environmental issues, such as: is social media *effective* for the environmental movement and under what conditions is it effective for the environmental movement? It is also important for social media researchers from different disciplines, such as computer science, political science, sociology, and communication

¹⁷ Lurkers are Twitter users who may read tweets but do not engage with other Twitter users by tweeting, re-tweeting, replying or mentioning.

studies, to apply mixed methods to gain a more comprehensive understanding of social media use by including users' perception of use.

2.9 Conclusion

This study was developed to enhance scholarly understanding of how people utilize Twitter to communicate on the oil sands and the pipeline and how they perceive their use of Twitter on these issues. As such, the goal was to incorporate both quantitative and qualitative data following the call for mixed methods approaches in social media research. To achieve this, we incorporated automatic text analysis, manual text analysis, social network analysis, and semi-structured interviews. The result is a more comprehensive understanding regarding Twitter use on environmental issues. Thus, we recommend using mixed methods to provide complementarity (i.e., using one method to complement another) for future social media studies (Sale, Lohfeld, & Brazil, 2002; Crooks et al., 2011).

Taken together, we found that social media applications, specifically Twitter, play an important role in disseminating information, forming communities and mobilizing action; we also found that sharing information and creating communities may not directly translate into action and could result in slacktivism. As such, whether these discussions translate into better informed publics, stronger offline communities, or on the ground action, such as protests, remains to be seen. This is a preliminary attempt to incorporate mixed methods into social media research; there is clearly room for future research and methodological innovation.

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Chapter Three: Talking With Twitter Users: Investigating the Motivations Behind Twitter Use on the Alberta Oil Sands and the Northern Gateway Pipeline

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3.1 Statement of Student Contribution

B. White coordinated the primary data collection, conducted analysis, and wrote all sections of this manuscript. H. Castleden and A. Gruzd provided supervisory oversight of the data collection, and actively contributed to the writing process.

3.2 Abstract

Environmental issues are being discussed through social media applications with increased frequency. Researchers are beginning to question whether social media can be used as a green virtual sphere: a virtual public space to discuss environmental issues that is not governed by a single authority in which anyone can access. Consequently, we investigate why people use Twitter – a micro-blogging site – to communicate about two interrelated Canadian environmental issues and how they feel about using Twitter to discuss them. We conducted semi-structured interviews with ten Twitter users who were well-connected on these issues and found that they used Twitter to access news and engage in debate; however, they raised some concerns, including: the potential of overestimating online activities; the presence of harassment from other Twitter users; and the possibility of being labeled an extremist. The study concludes that Twitter partially demonstrates the characteristics for a green virtual sphere on these issues because it has increased access to information and provided a space for debate.

3.3 Introduction

Throughout 2012, thousands of people from across Canada participated in protests against the controversial development of the Alberta oil sands¹⁸ and the Northern Gateway Pipeline¹⁹; the movement was called Defend Our Coast (Defend Our Coast, 2013). During this period, people used signs, banners, and petitions to spread their message against the oil sands and the pipeline; but they also used Twitter²⁰ – a micro-blogging site – to discuss the issues associated with these projects. The Defend Our Coast movement became quite prominent on Twitter; in fact, on the first day of live protest in Victoria, Canada, the hashtag²¹ #defendourcoast became the top Canadian trend on Twitter (Defend Our Coast, 2013).

This #defendourcoast example, along with a number of others, helps to illustrate a developing trend: people are increasingly using social media²² applications, such as Twitter, to communicate about environmental issues. This trend is not entirely surprising considering that emerging technologies are often used to communicate on environmental issues, as a number of researchers have already found (see for example Castells, 2001; Pickerill, 2003; Horton, 2004; Dreiling, Lougee, Jonna & Nakamura, 2008; Mol, 2008; Greenberg & MacAulay, 2009; Lester & Hutchins, 2009; Sullivan & Xie, 2009; Segerberg & Bennett, 2011; Liu, 2011; Merry, 2011; Cox, 2013).

¹⁸ The oil sands are a mixture of sand, water, clay and a type of petroleum called bitumen. In Canada, the majority of the oil sands are located in Alberta (Alberta Government, 2013).

¹⁹ The Northern Gateway Pipeline is an oil sands project that was proposed by Enbridge in 2010. The project would involve the construction of two oil sands pipelines and a marine terminal that would be used to ship oil from Canada to China (Gateway Panel, 2013).

²⁰ Twitter is a micro-blogging site developed in 2006 (Twitter, 2013). Originally, it was developed to allow users to share updates on what they were doing by posting Twitter messages, known as tweets. Tweets are messages of no more than 140 characters and often include links to websites, images, or videos (Twitter, 2013). Users choose who to subscribe to, and then, receive updates from these people; this is known as ‘following’. Users can follow celebrities, politicians, journalists, friends or people with shared interests.

²¹ In addition to following, Twitter users have created new functions for the site, such as hashtags. A hashtag occurs when a Twitter user includes a # symbol in front of a word “to mark keywords or topics in a tweet” allowing Twitter users to easily categorize messages (Twitter, 2013). Clicking on a hashtagged word shows all other tweets marked with that keyword (Twitter, 2013). For example, the #cdnpoli hashtag is often included in tweets on Canadian politics, thus users can search #cdnpoli to find tweets concerning Canadian politics.

²² Social media are Internet-based applications that allow for the creation and exchange of user-generated content (Kaplan & Haenlein, 2010). It includes: blogs, collaborative projects, social networking sites, content communities, virtual social worlds, and virtual game worlds (Kaplan & Haenlein, 2010).

In particular, prior studies indicate that citizens are increasingly turning to the internet and social media to communicate about environmental issues because their voices are often excluded from mainstream environmental debates (Yang & Calhoun, 2007; Liu, 2011). This could suggest that the internet and social media represent a *green virtual sphere* which is: (1) a virtual public space for discussion, (2) in which access is granted to all citizens; (3) the space is not governed by a single authority; (4) but rather, the public is able to confer in an unrestricted fashion to debate about issues of the environment (Habermas, 1964; Papacharissi, 2002; Torgerson, 2000; Yang & Calhoun, 2007). To date, few scholars have examined the presence of a green virtual sphere (exceptions include Yang & Calhoun, 2007; Liu, 2011; Cox, 2013); thus, the goal of our study is to determine whether one social media application, Twitter, demonstrates the characteristics of a green virtual sphere in the context of two prevalent environmental issues in Canada.

3.4 Conceptual Framework

Although the conceptualization of a green virtual sphere is relatively new in the academy, a number of scholars have posited that the internet and social media can potentially offer a new public sphere – a virtual sphere – by enhancing communicative action and participatory democracy (Pickerill, 2003; Dahlgren, 2005; Papacharissi, 2009; Hands, 2011; Shirky, 2011). According to Jürgen Habermas (1964):

A public sphere is a realm of our social life in which something approaching public opinion can be formed. Access is granted to all citizens. A portion of the public sphere comes into being in every conversation in which private individuals assemble to form a public body. They then behave neither like business or professional people transacting private affairs, nor like members of a constitutional order subject to the legal constraints of a state bureaucracy. Citizens behave as a public body when they confer in an unrestricted fashion – that is, with the guarantee of freedom of assembly and association and the freedom to express and publish their opinions – about matters of general interest (p. 49).

The notion of a virtual sphere shares many of the same characteristics of the public sphere, but it also has great data storage and retrieval capabilities, which infuses political discussions with information that was not previously available; it also enables discussions between people from far sides of the globe from diverse backgrounds reducing

geographic and temporal barriers (Papacharissi, 2002; Frangonikolopoulos, 2012). The virtual sphere, as a result, has the potential to increase the amount of information that is available to citizens, include more citizens in discussions, and provide a new space for deliberation (Papacharissi, 2002).

The concept of the virtual sphere has been applied to a number of cases, including web forums (Berdal, 2004), online social movements (Salter, 2003; Langman, 2005), as well as the internet more broadly (Dahlgren, 2005; Papacharissi, 2002). Across these studies, a common theme emerged that suggests the internet and social media applications have the potential to serve as a virtual sphere (Salter, 2003; Berdal, 2004; Langman, 2005; Papacharissi, 2009); however, there are some limitations to the virtual sphere in terms of whether the internet is currently used as a space for discussion (Papacharissi, 2002; Papacharissi, 2009); the potential commercialization of the virtual sphere (Papacharissi, 2002; Papacharissi, 2009); and the lack of access to the internet and social media by some groups (Papacharissi, 2002; Papacharissi, 2009; Frangonikolopoulos, 2012) as discussed below.

First, people may not be utilizing social media as a virtual sphere: “online technologies render participation in the political sphere more convenient but do not guarantee it” (Papacharissi, 2002, p. 15). It is also challenging to foster genuine dialogue through social media applications because communication tends to be one-way and it is difficult to gauge the impact of a message sent through Twitter or Facebook (Bortree & Seltzer, 2009; Greenberg & MacAulay, 2009), which could lead to the over-estimation of the impact of online debate; this has been referred to as ‘slacktivism’ (Morozov, 2009; Gladwell, 2010). Second, there is a chance that the virtual sphere may become commercialized, since it is a medium constructed in a capitalist era (Papacharissi, 2002). As such, the virtual sphere could be transformed from a forum for democratic debate into a site for manipulative corporate interests (Habermas, 2010). Facebook and YouTube, for example, include advertisements and although Twitter does not have advertisements, this may change considering that it has just become a publicly traded company (Luckerson, 2013). Finally, there could be a lack of accessibility to the internet and resources such as

computers, laptops, tablets, and smartphones, which are required to engage through the internet and social media (Papacharissi, 2002; Greenberg & MacAulay, 2009). Millions of people have access to the internet and social media, but access is not universal or equitable for all (Papacharissi, 2002); thus, only well-resourced individuals and groups appear to be utilizing these technologies so far (Merry, 2011).

To understand whether social media applications may represent the characteristics of a green virtual sphere, we examine online discussions on two pressing environmental issues in Canada – the Alberta oil sands and the Northern Gateway Pipeline. The oil sands are located in northeastern Alberta, Canada and are estimated to be the third largest oil reserves in the world (Alberta Government, 2013). The development of the oil sands is currently expanding to provide more oil for growing markets in China and the United States and as development continues to grow, new pipelines are needed to transport the oil. Consequently, in 2010, the energy company Enbridge proposed a 6.5 billion dollar project: the Northern Gateway Pipeline (Gateway Panel, 2013). If approved, the project would include the construction of two oil pipelines that would be 1,170 km in length and would run from Bruderheim, Alberta to Kitimat, British Columbia as well as the construction and operation of a marine terminal (Gateway Panel, 2013) (see Figure 3.1).



Figure 3.1: Proposed Northern Gateway Pipeline route (Enbridge, 2013).

We selected these specific issues because they had an emerging discourse in the public sphere concerning the challenges associated with public consultation. For example, Canadian Natural Resource Minister Joe Oliver released an open letter stating that environmentalists and other radical groups are trying to commandeer the public consultation process on the Northern Gateway Pipeline (Payton, 2012): “These groups threaten to hijack our regulatory system to achieve their radical ideological agenda. They seek to exploit any loophole they can find, stacking public hearings with bodies to ensure that delays kill good projects” (Natural Resources Canada, 2012). The public hearings on the Northern Gateway Pipeline did fill up quickly with people wanting to voice their opinions on the oil sands and the pipeline and subsequently, the government released a new 15-month limit for oral public hearings (O’Neil, 2013).

Given the growing number of people using social media applications to communicate about environmental issues paired with limited mainstream in-person access to environmental debates through public consultation, it is important to examine the potential of social media applications to serve as a space for discussion and debate. We investigate whether Twitter reflects the characteristics of a green virtual sphere in the context of the Alberta oil sands and the Northern Gateway Pipeline. To achieve this, we examine *why* people use Twitter to communicate on the oil sands and the pipeline. By understanding their motivations, we aim to determine if Twitter demonstrates the characteristics of a green virtual sphere.

We selected Twitter for two reasons. First, it provides a unique window into online spaces of contention (Segeberg & Bennett, 2011). Twitter users publish tweets – which are brief messages of 140 characters or less. Millions of tweets are sent every day, so in response, Twitter users often include hashtags – a Twitter convention in which users place a “#” before a word which enables others to click on the word and be brought to other tweets that include that word (Lotan et al., 2011). The use of hashtags, which is like a keyword used to find relevant conversations, can facilitate a global discussion on a topic (Lotan et al., 2011); it can also enable researchers to locate and study specific topics in the virtual public sphere (Segeberg & Bennett, 2011). Second, Twitter was selected

because it is a widely used social media application, (i.e., it currently has over 500 million users), and it is primarily a public platform, meaning that the information posted on Twitter is available to the public; although it should be noted that some Twitter users have private accounts and as a result, their tweets are not publicly available and were not part of this study.

What follows is a synthesis of existing literature regarding the use of the internet and social media to discuss environmental issues. From there, we outline the method of data collection and analysis that we used to complete our study. We then present the results and discuss the broader implications of our results. In the final section of the paper, we provide suggestions for potential future research and offer concluding comments.

3.5 Literature Review

Over the past decade, researchers from a range of different fields, such as political science, geography, communication studies, and social movement studies, have found that individuals and groups – particularly environmental non-governmental organizations (ENGOS) – are increasingly turning to the internet to discuss environmental issues (Castells, 2001; Pickerill, 2003; Liu 2011; Cox, 2013). For example, existing research suggests that most of the ENGOS in the United Kingdom are online, including larger well-resourced organizations such as Greenpeace, and even smaller grassroots groups such as the Green Student Network (Pickerill, 2003). Likewise, the majority of Canadian ENGOS use the internet and social media applications (Greenberg & MacAulay, 2009), as well as ENGOS in the United States (Merry, 2011) and China (Liu, 2011). Broader research also suggests that environmentalists from all around the world are using the internet to communicate about environmental issues (Castells, 2001).

The internet is used in a number of different ways, such as to share news and information regarding environmental issues (Pickerill, 2003; Merry, 2011; Cox, 2013). ENGOS, for example, use email and websites in order to communicate with their membership, recruit new participants, and develop alliances with other organizations (Dreiling et al., 2008). ENGOS also create online communities using the internet, which help to reinforce offline

relationships (Sullivan & Xie, 2009; Cox, 2013). Finally, ENGOs use the internet to mobilize for collective action events (Mol, 2008; Cox, 2013), such as the Defend Our Coast live protest, (Defend Our Coast, 2012) that we mentioned in the Introduction. Thus, as Castells (2001) argues: “the Internet has become a major organizing and mobilizing tool for environmentalists around the world, raising people’s consciousness about alternative ways of living, and building the political force to make it happen” (p. 280).

More recently, social media applications, such as Facebook and Twitter, are used to communicate on environmental issues. In response, researchers have started to investigate the use and impact of these applications with respect to environmental issues. Existing research indicates that Facebook can be used by ENGOs to create an interactive space for dialogue (Bortree & Seltzer, 2009). Twitter can be used to promote awareness about environmental issues, such as climate change, as it was illustrated by the use of Twitter during the Earth Hour campaign in Australia (Cheong & Lee, 2010). Twitter has also been used to organize collective action events, such as the protests that took place during the United Nations Climate Summit in Copenhagen in 2009 (Segeberg & Bennett, 2011). Within this area of research, scholars have also found that studying social media applications can help to understand the role of these technologies as organizing mechanisms and as windows to reveal larger organizational schema (Segeberg and Bennett, 2011). In addition, examining ENGOs’ social media use can help to identify effective and ineffective strategies to engage with an organization’s membership (Greenberg & MacAulay, 2009).

Although there is a growing body of work on the internet in general and social media applications specifically to communicate on environmental issues (see for example Greenberg & MacAulay, 2009; Cheong & Lee, 2010; Segeberg & Bennett, 2011), there has been scant research that examines the motivations for using these technologies to communicate about environmental issues (a notable example is Liu, 2011). Moreover, the majority of the research that does exist tends to examine ENGOs (Pickerill, 2003; Greenberg & MacAulay, 2009; Bortree & Seltzer, 2009; Sullivan & Xie, 2009), and as a result, the focus is on the organizational level, rather than specific individual engagement

with social media regarding environmental issues. Thus, there is a need for further research to examine why people use social media to determine whether social media applications reflect the characteristics of a green virtual sphere in much the same way Habermas envisioned and articulated his ideas for the public sphere.

3.6 Methods²³

Our study employed semi-structured qualitative interviews with well-connected Twitter users using the hashtag #tarsands²⁴. In order to recruit participants using this hashtag, we collected tweets using a program called Netlytic from January 24, 2012 to February 24, 2012, which automatically collected tweets with this hashtag. In total, we collected 12,815 tweets. Using these tweets, we identified Twitter usernames. Although this approach was effective, there were two key limitations. The program that we used could only collect 100 tweets per hour; as a result, some of the relevant tweets may have been excluded. In addition, the usernames did not necessarily represent individuals; they also represented an organization's Twitter account. When this was the case amongst our interview participants, the interview was conducted with the individual who used the account.

Using purposeful sampling, we identified potential interview participants from the #tarsands data set; this approach is known as network ethnography (Howard, 2002). We focused on well-connected Twitter users with the highest total degree centrality²⁵. Initially, we aimed to conduct between 10 and 15 interviews, to achieve a sufficient data set (as suggested in Kvale & Brinkmann, 2009). We contacted 15 well-connected Twitter users to participate in our study, of which 7 agreed to participate. Since we did not reach our initial target of interviews and since we had not achieved data saturation after

²³ This study was reviewed and approved by the Dalhousie University Social Sciences and Humanities Research Ethics Board.

²⁴ We selected this hashtag because: it was connected to both of the issues; it was the most frequently used hashtag in tweets on both of the issues; and it also provided significant overlap with other relevant hashtags (e.g., #oilsands, #pipeline, #NorthernGateway, and #enbridge).

²⁵ Degree centrality is a common measurement that is used in social network analysis to determine the number of ties that a node has to other nodes (Scott, 2000). In-degree centrality is how many ties a node receives, while out-degree is how many ties a node sends out, and finally, total-degree is a combination of in-degree and out-degree centrality (Scott, 2000).

conducting the first 7 interviews – meaning that new themes were still emerging (Kvale & Brinkman, 2009) – we contacted an additional 8 well-connected Twitter users; 3 agreed to be interviewed. In total, we interviewed 10 Twitter users.

Table 3.1: Interview participant characteristics.

<i>Participant</i>	<i>Country of Residence</i>	<i>Gender</i>	<i>Individual/Organization</i>
1	Canada	Female	Individual
2	Canada	Male	Individual
3	United Kingdom	Female	Organization
4	Canada	Male	Organization
5	United Kingdom	Female	Organization
6	Canada	Male	Individual
7	Canada	Male	Organization
8	Canada	Male	Individual
9	Canada	Female	Individual
10	Canada	Female	Individual

When it was possible, we contacted potential interview participants via email. However, not all users include their contact information on Twitter; thus, in some cases, we used direct messaging, which is a function available through Twitter, or we tweeted to Twitter users in order to invite them to participate in our study. To collect our interview data, we relied on phone interviews because of the geographic distance of our interview participants and the limited amount of resources that were available (Sturges & Hanrahan, 2004). The interviews lasted between 30 to 80 minutes. During the interviews, participants were asked 20 questions that explored why they used Twitter as well as how they felt about using it on the oil sands and the pipeline. After we finished collecting our interview data, we transcribed the data verbatim into Microsoft Word, and then we exported the transcripts into NVivo10TM for data management.

We conducted a thematic analysis. This means that we analyzed the interview data line by line to identify emergent themes regarding participants' motivations towards Twitter use on the oil sands and pipeline. Our analysis involved coding the interview data based on patterns that were evident within the data set and then comparing these patterns with

the study purpose and literature (see for example Aronson, 1994; Crooks et al., 2011). Specifically, we coded the transcripts based on a list of codes that were derived from the literature and identified during the interview process; this approach is known as a start list and relies on deductive analysis (Miles & Huberman, 1994). Next, we analyzed the transcripts to identify any themes that did not fall into any of the initial codes, known as inductive coding (Miles & Huberman, 1994). Once all of the interview data were coded, we reviewed our nodes and condensed them to eliminate any redundancy.

3.7 Results

From the interviews, we found that interview participants used Twitter to access news and engage in debate. However, participants also identified a number of concerns regarding the use of Twitter on the oil sands and the pipeline, including: the emergence of slacktivism (i.e., people over-estimating their online action), the presence of harassment from other Twitter users, and the possibility of being labeled as an extremist by the federal government. We examine each of these findings in more detail in the following section, starting with participants' motivations for using Twitter on the oil sands and pipeline.

3.7.1 Motivations For Using Twitter

There were two main themes associated with participants' motivations for using Twitter. These include accessing news and engaging in debate. Within accessing news, there were three sub-themes: accessing news beyond the mainstream media; receiving news about events, such as protests; and changing the power relationship between the consumers and producers of news. Each of these themes, and sub-themes, is discussed in turn below.

3.7.1.1 Accessing News

The most prominent motivation that we came across for using Twitter was to access news. Specifically, nine out of ten interview participants stated that they used Twitter to get news about the Alberta oil sands and the Northern Gateway Pipeline. In addition, a number of interview participants noted that they acted as information sources by providing and synthesizing news on these issues. For example, one participant stated that

their tweets on the Northern Gateway Pipeline provide a good overview of what has been written in the news about the issue: “my tweets on the Northern Gateway Pipeline are pretty comprehensive about what has been said about it in Canadian and some American news. So you have got this huge depository of chronicles, much of what has been written since the issue really started to get front and centre” (Participant 6). From the interviews, it was clear that participants used Twitter as a useful tool to access specific news on the oil sands and the pipeline.

Interestingly, amongst these well-connected Twitter users tweeting about the Alberta oil sands and the Northern Gateway Pipeline, access to news beyond mainstream media was cited as a common motivation for using Twitter. Seven out of ten of participants indicated that they used Twitter to find news that could not be found in mainstream media sources: “I get served different information than what you are getting through news sites” (Participant 1) and Twitter is: “a really good way to get past the mainstream press and messaging that’s out there” (Participant 3). Participants commented that it was important to get news from a variety of sources to acquire a better understanding of the oil sands and the pipeline and Twitter enabled them to do this:

Twitter is a place where I can get information about the Northern Gateway Pipeline from the pro-pipeline, the anti-pipeline and then individuals. I can also get it from engineering companies, I can get it from people, I can get it from many different sources. It’s a parallel, flat plane where I can pick and choose what I want to consume and as far as the Northern Gateway Pipeline and Twitter I think that you are going to get both sides of the story... you are going to get different perspectives, you’re going to see the far left, you are going to see the far right and then you can sort of decide for yourself if the Northern Gateway Pipeline is safe or not (Participant 8).

Participants also mentioned using Twitter to access and share news about events: “the main thing [sic] is that I will talk about the protest movements out there, what people are doing...any sort of news on any public gathering” (Participant 3). Twitter also provided people with accounts of protest events from people who were on the ground: “just hearing their eye witness statements from people that are directly out there on the ground

and it's something you never would have had the opportunity, not in an immediate way" (Participant 5).

Another sub-theme related to media that arose from the interviews was the changing power relationship between consumers (the public) and producers (mainstream media) of news. While not all, two participants did suggest that journalists used Twitter to identify emerging stories: "journalists pick up different stories that start to get circulated [on Twitter], and I think you can see a good correlation between some of the tweets and then when we see bigger media pick up of the issues" (Participant 7). While another participant commented that: "producers tend to look at what's tweeting heavily in the morning and if there is something going nuts on [Twitter]...or something everybody is tweeting about some particular thing or there is a lot of tweets in #cdnpoli Twitter feed, it often makes it into an item on Power and Politics²⁶" (Participant 2). Thus, it was suggested that journalists and producers are "ferreting out the news by what are people tweeting about today" (Participant 2). This sub-theme demonstrated that not only were participants going to Twitter for their news, but journalists were going to Twitter for news as well.

3.7.1.2 Engaging in Debate

The second motivation that emerged from the data was the use of Twitter for debating. We found that six out of ten participants said that they used Twitter to engage in debate: Twitter is "a world stage debate. It's an open floor...an honest discourse. An honest social discourse" (Participant 8). Participants also suggested that Twitter plays a role in fostering public dialogue: "It's not just about moving oil, it involves a whole lot of different issues, environmental, economic, it affects our future resource development...I think it's important to have a debate on it, it's important to have dialogue, it's important to keep getting people talking and thinking about things and Twitter is a way of doing that" (Participant 9). In fact, participants indicated that the debate on Twitter is addressing an important democratic deficit: "Democracy is about debate. You can't have

²⁶ Power and Politics is a nightly Canadian political talk show that airs on the Canadian Broadcasting Corporation (CBC).

democracy without debate and our Parliament is failing terribly, and I think that Twitter and social media are fulfilling a very important void here” (Participant 6).

3.7.2 Concerns Regarding the Use of Twitter

Participants also noted three concerns regarding the use of Twitter on the oil sands and the pipeline: the emergence of slacktivism; the presence of harassment from other Twitter users; and finally, publicly tweeting on a contentious issue and being labeled as an extremist. Each of these concerns is discussed in turn below.

3.7.2.1 Emergence of Slacktivism

Participants identified a number of concerns regarding the use of Twitter on the Alberta oil sands and the Northern Gateway Pipeline. Specifically, they indicated concern about the emergence of slacktivism: Twitter “makes you feel like you are maybe doing more about an issue than you actually are... I mean it’s online, it’s messaging, it’s information. But that in itself isn’t going to change anything unless people are motivated by that information to do something with it, so, it’s only kind of the first step in that way” (Participant 3). Another participant emphasized the value of Twitter for information, rather than action: “on the one hand [Twitter is] the greatest tool in the world, but on the other hand, if you are dealing with apathetic users, nothing has changed. There’s no action, they may learn something, but if there’s no action involved with knowledge it may as well be nothing” (Participant 8).

3.7.2.2 Harassment From Trolls

Harassment concerns associated with the use of Twitter also arose from the interviews. Half of the interview participants stated that harassment, particularly from trolls²⁷, was an issue that they came across when tweeting on the oil sands and pipeline using the #tarsands hashtag. Participants noted that trolls are common amongst Twitter discussions on the oil sands and the pipeline: there are “a few prominent trolls, I would say, who are out there looking...to pick a fight” (Participant 2). Another participant commented that they frequently dealt with trolls: “my personal experience about tweeting about oil sands,

²⁷ Trolls are (typically anonymous) individuals who verbally attack other people online.

the Northern Gateway Pipeline and Northern Gateway Pipeline issues on Twitter was interesting, most of the responses would be very negative, harassing, just a bunch of trolls... I know a lot of people who got off Twitter because of that” (Participant 9).

3.7.2.3 Being Labeled as an Extremist

The final theme that emerged from the interviews was in regards to publicly tweeting on controversial issues and subsequently being labeled as an extremist by the federal government. While not all, three participants were slightly worried about their tweeting on the oil sand and pipeline:

I think it’s a risk to express your opinion on anything contentious, publicly. Because you never know how people are going to react. I think that the Northern Gateway Pipeline unfortunately has become a very, very contentious issue with a lot of people and if you put yourself out there with an opinion either pro, negative or even in the middle, you are going to be on the radar of some people who are very passionate about that issue one way or another, and might try to engage you in a way that you don’t want to be engaged (Participant 9).

Specifically, these participants demonstrated concern about publicly tweeting their opposition to the oil sands and pipeline using the #tarsands hashtag because they did not want to be labeled as extremists by the Canadian government:

The Harper government, of course, is a strong proponent of the pipeline and that they have already labeled people that oppose the pipeline as extremists, even gone so far as terrorists, and put environmental groups in the same category on some government watch documents and so I think that coupled with the fact they have just started terrorism task force here in Alberta focusing on the oil sands and energy issues is fairly concerning about that the [sic] perhaps that activity will be used to try to target people who are doing work that is, I believe, in the public interest, a hundred percent legitimate and legal but use that to potentially identify networks and try and unjustly attack people who are innocent (Participant 7).

Another participant echoed this concern, and mentioned that there was a risk of being labeled an enemy of Canada as a result of tweeting against the oil sands and pipeline using the #tarsands hashtag on Twitter:

Confrontation with intransigent people who will call you unpatriotic foreign funded radical extremist enemy of Canada...it does hurt to be called [an] enemy of Canada to me. I find it to be quite hurtful and when cabinet ministers say that if you are against the pipeline you are an enemy of Canada, that, I find [it] hits me in the gut I am not kidding...I find it personally hurtful. But that's the risk (Participant 2).

Given participants' perceptions, it appeared that using social media applications that are publically accessible, can put users at risk not just of trolling but also with respect to governmental surveillance.

3.8 Discussion

Our research examined the motivations for using Twitter to communicate on the Alberta oil sands and the Northern Gateway Pipeline. We discuss these findings in the context of considering whether this case of Twitter reflects the characteristics of the green virtual sphere. Specifically, the characteristics of a green virtual sphere include: (1) a virtual public space for discussion; (2) in which access is granted to all citizens; (3) the space is not governed by a single authority; (4) but rather, the public is able to confer in an unrestricted fashion to debate about issues of the environment. We found that Twitter use on the Alberta oil sands and the Northern Gateway Pipeline, using the #tarsands hashtags, only partially reflected the characteristics of a green virtual sphere.

First, we found that Twitter is a virtual public space that the interview participants used in order to access news. This finding was not particularly surprising since a number of previous studies have noted that Twitter is used to access news (Java et al., 2007; Kwak et al., 2010). This finding reflects a characteristic of the green virtual sphere because interview participants were able to access and mediate their own messages, rather than having to go through the mainstream media (Pickerill, 2003). We also found that participants used Twitter to engage in debate, demonstrating a space for discussion. We found the presence of debate surprising, given that previous studies have shown that it is difficult to foster two-way dialogue on social media regarding environmental issues (Bortree & Seltzer, 2009; Greenberg & MacAulay, 2009). This finding also reflects a

characteristic of the green virtual sphere because it suggests that interview participants used Twitter for discussions.

We also found that Twitter use on the oil sands and pipeline had limitations regarding its use as a green virtual sphere. For example, although anyone can create a Twitter account (as long as they have access to the internet) we found that interview participants indicated that most of the people tweeting on the oil sands and pipeline were opponents; one participant even suggested that, based on their anecdotal experience, as much as 90 percent of people tweeting on these issues were opponents. Participants also had some concerns regarding the use of Twitter to communicate on the oil sands and the pipeline, including: the emergence of slacktivism; the presence of harassment, primarily from trolls; and the possibility of being labeled an extremist by the federal government. It was not surprising that there was a concern regarding slacktivism, given that previous studies have indicated the possibility of people over-estimating their online activities (Morozov, 2009; Gladwell, 2010). In addition, the presence of trolls is common on the internet. While previous studies have found that ENGOs and environmentalists had some concern about the government monitoring their online discussions and activities (Pickerill, 2003; Liu, 2011), participants in this case were not just concerned about monitoring but about being labeled as 'extremists'. Given the concerns, there are limitations of Twitter reflecting the characteristics of a green virtual sphere because the interview participants were worried about publicly tweeting on the oil sands and pipeline.

In short, it appears that in this case, Twitter use on these issues partially demonstrates the characteristics of a green virtual sphere. Specifically, Twitter provided a new virtual space for debate about the Alberta oil sands and the Northern Gateway Pipeline that is open to the public (meaning that it is a public platform). Within this space, participants noted that they participated in debates on the Alberta oil sands and the Northern Gateway Pipeline. Participants also recognized that Twitter allowed for an increase in access to news, including news that cannot be found within mainstream media sources such as eye witness accounts of protests through live-tweeting. However, participants also had concerns including slacktivism, harassment, and being labeled an extremist, limiting the

use of Twitter on these issues to reflect the characteristics of a green virtual sphere. Thus, in our case, Twitter use only partially reflected the characteristics of a green virtual sphere. Our findings have two implications.

Participants demonstrated concerns regarding the Canadian government's stance on the oil sands and the pipeline, noting that the review process for the Northern Gateway Pipeline was inadequate. Specifically, the public hearings on the Northern Gateway Pipeline quickly filled up with people wanting to voice their opinions on the oil sands and the pipeline with over 1,000 people speaking in-person and over 3,000 sending in written comments (O'Neil, 2013). The original hearing period was even capped by the government (O'Neil, 2013). This overwhelming response indicates that there may be inadequate spaces for the public to participate in discussions on the oil sands and the pipeline. In response, participants commented that more people were turning to Twitter to voice their opinions and engage in debate. As such, there is a possibility of using discussion available through social media applications, such as those on Twitter, as a source of public consultation. Although there are a number of challenges with this – such as anonymity and access to the Internet – this process, of using the Internet to engage in public consultation, is starting to emerge. For example, the New Zealand Government used a wiki to work with the public to revise the Police Act, allowing citizens to provide input on the legislation (McCardle & Webb, 2010). Thus, we might see new options emerging that include online discussions as a potential source for public consultation.

Second, it was apparent that Twitter was changing the power relationship between the public and the media; people are now using Twitter to publish information immediately and they are reaching a broader audience than before (Papacharissi & de Fatima Oliveira, 2012), while mainstream media are using social media, such as Twitter, to identify breaking stories. As a result we may see an increasingly higher level of integration between social media and mainstream media. For example, a growing number of prominent news programs, like CNN in the United States and Power and Politics in Canada, are including Twitter feeds (a stream of tweets on the bottom of the screen) into their programs.

3.8.1 Limitations

Our study contributes to a growing body of research to understand why people use Twitter to communicate about environmental issues and how they feel about using it. Specifically, our qualitative study focused on two related Canadian issues, the Alberta oil sands and the Northern Gateway Pipeline, and given this, it was not our intention to generalize our results to broader issues, as well as different regions. There were, however, limitations based on the selection of Twitter users and the hashtag #tarsands.

First, our study focused particularly on people who were well-connected on the oil sands and the pipeline. In other words, we interviewed Twitter users who demonstrated a high total degree centrality and as a result, we did not include participants who were not as connected or only read tweets. This means that less connected Twitter users may have different motivations regarding the use of Twitter to communicate on the oil sands and pipeline.

Second, we focused on only one hashtag in our study, #tarsands, and as a result, tweets that did not include this hashtag but did discuss the Alberta oil sands and the Northern Gateway Pipeline were not included. It is also important to note that tar sands is considered a pejorative term, and as such, our sample primarily included Twitter users who are opposed to the oil sands and the pipeline; however, by focusing on #tarsands, we were able to uncover different concerns from Twitter users, such as the federal government labeling environmentalists as eco-extremists.

Finally, another limitation of our study was that the interview data were coded by one researcher and, as a result, it did not incorporate inter-coder reliability (Richards, 2005). Inter-coder reliability involves multiple coders analyzing the same data to help to ensure rigour (Richards, 2005). Although our study relied on a single coder, the researcher that completed the coding was the most familiar with the data because she collected it and therefore, had an intimate knowledge of the data.

3.8.2 Potential Future Research Directions

Our study contributes to an emerging body of literature to understand the motivations and feelings behind people's use of Twitter, as a result, there is room for further investigation. Two suggestions are provided here, using our study results as a point of departure. First, given that this study pointed to a need for more public consultation on environmental issues, future studies can examine the potential integration of discussions on social media with traditional methods of public consultation by investigating questions such as: can social media applications be incorporated as a form of public consultation on environmental issues? If so, how could this be achieved? Second, future research could also investigate the changing role of the mainstream media as a result of the growing use of Twitter to access news about environmental issues. For example, studies could examine the potential integration of social media and mainstream media reporting by addressing questions such as: can social media applications be incorporated into mainstream media to enhance coverage on environmental issues, and if so, how could this be achieved?

3.9 Conclusion

There are a growing number of people using social media applications, such as Twitter, to communicate on environmental issues; yet, to date, there is a lack of literature that has examined why people use social media applications regarding environmental issues. In response, we inquired about peoples' motivations for using Twitter to communicate on the oil sands and the pipeline.

We found that participants, that used the #tarsands hashtag, utilized Twitter to access news beyond mainstream media. They also noted that the mainstream media is using Twitter to identify emerging topics. We found that interview participants used Twitter to engage in debates regarding the oil sands and the pipeline. Finally, participants identified concerns associated with Twitter use on the oil sands and pipeline: they felt concerned about the emergence of slacktivism, suggesting that there could be an over-exaggeration of involvement; they also showed concern about harassment on Twitter, primarily from

trolls; and they said that they were uncomfortable tweeting about contentious issues, because they feared being labeled as extremists by the Canadian government.

In this case, the social media application, Twitter, only partially demonstrated the characteristics of a green virtual sphere in the spirit of Habermas' public sphere to communicate about the Alberta oil sands and the Northern Gateway Pipeline by increasing access to information and providing a space for debate. The implications of our results suggest that the growing use of social media applications to discuss environmental issues could demonstrate a need for better public consultation. It also illustrates the possibility of further integration between social media and mainstream media reporting. As the use of social media applications such as Twitter continues to increase for the foreseeable future, people are changing how they communicate, including how they communicate on environmental issues.

3.10 References

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Chapter Four: Conclusion

4.1 Introduction

The majority of discussions on environmental issues take place within a state-centric space (Kuehls, 1996), which means that discussions tend to focus on the voices of states (Rosenau, 2002; Eckersley, 2005), limiting individuals and organizations' ability to voice their opinions (Pickerill, 2003; Yang & Calhoun, 2007; Liu, 2011). In Canada, for example, after the government made changes to the *Canadian Environmental Assessment Act 2012* through omnibus legislation, the public now has tighter timelines to participate in environmental assessments, a sharp reduction in the number of opportunities to participate in these assessments, and specific restrictions about who can speak at public hearings because only "interested parties" are permitted to participate (Gibson, 2012; Doelle, 2012). This state-centric space is problematic because it: (1) causes an uneven distribution of power (Eckersley, 2005); (2) limits the diversity of voices included in the discussions (McKenzie, 2002); (3) and hinders reflexivity because discussions tend to be dominated by one voice: the state (Dryzek, 2006; Rosenau, 2002).

In response, people are going online to discuss environmental issues; thus, there could be a new space for discussion: a green virtual sphere (Pickerill, 2003; Liu, 2011). A green virtual sphere is a virtual public space for discussion, in which access is granted to all citizens; the space is not governed by a single authority but rather, the public confers in an unrestricted fashion to debate about issues of the environment (Habermas, 1964; Papacharissi, 2002; Torgerson, 2000; Yang & Calhoun, 2007). Social media in particular may represent the characteristics of a green virtual sphere. When social media first came on the scene, it was uncertain whether such applications would be of any importance (Chadwick et al., 2009); however, as stated in the introduction to this Thesis, it has become clear that the use of social media is widespread: there are 1.15 billion monthly users on Facebook (Facebook, 2013), 1 billion monthly users on YouTube and (YouTube, 2013), and 218 million monthly users on Twitter (Twitter, 2013). It has also become clear that social media applications can be used for discussions on social, economic and political relations (Chadwick et al., 2009) as demonstrated by the events in

the Arab Spring Revolution, the Occupy Wall Street Movement and the Idle No More Movement (Hands, 2011; Murthy, 2013; Lindell, 2013). Very few studies, however, have examined the use of social media applications to discuss environmental issues (exceptions include Greenberg & MacAulay, 2009; Cheong & Lee, 2010; Segerberg & Bennett, 2011); as a result, it is unclear whether social media applications reflect the characteristics of a green virtual sphere. To begin to address this gap, I examined discussions regarding the Alberta oil sands and the Northern Gateway Pipeline on Twitter, using a mix of quantitative and qualitative methods, to determine whether social media demonstrates the characteristics of a green virtual sphere on these issues.

This chapter provides an overview of my thesis research. First, I outline how my research goal was addressed using a mixed methods approach then I present the main findings from my study and relate them to relevant literature. In the next section, I highlight my research's contributions to concepts and methods. Then I discuss the limitations of my study as well as suggestions for future research. Next, I offer recommendations regarding the use of social media to communicate on environmental issues. Finally, I offer some concluding comments about the use of Twitter to communicate on environmental issues, specifically the oil sands and the pipeline using the hashtag #tarsands.

4.2 Addressing the Research Objectives

4.2.1 Overview of the Research Objectives and Methodology

I utilized a mixed methods approach to examine whether Twitter discussions using the hashtag #tarsands regarding the Alberta oil sands and the Northern Gateway Pipeline reflected the characteristics of a green virtual sphere. To achieve this, I pursued four specific objectives, including:

Objective One: to determine how Twitter is used by examining the content (i.e., keywords, ideas, themes, etc.) and structure (i.e., tweets, re-tweets, links, etc.) of tweets on the Alberta oil sands and the Northern Gateway Pipeline;

Objective Two: to identify who uses Twitter to communicate on the issues of the Alberta oil sands and the Northern Gateway Pipeline;

Objective Three: to uncover why Twitter users utilized Twitter to communicate on the Alberta oil sands and the Northern Gateway Pipeline; and

Objective Four: to understand Twitter users' perceptions regarding their use of Twitter to communicate on the Alberta oil sands and the Northern Gateway Pipeline.

First, I collected Twitter messages on the oil sands and pipeline and I determined the function of the tweets using text analysis (Objective 1). Next, I detected the usernames from the tweets to identify who was discussing these issues on Twitter (Objective 2) and using these names, I generated a communication network to understand connections between Twitter users. Finally, I completed semi-structured phone interviews with ten well-connected Twitter users of the hashtag #tarsands to investigate their motivations and perceptions for using Twitter to communicate on these issues (Objective 3 and 4).

4.2.2 Key Findings and Links to the Literature

As a whole, my study offers five key findings:

- i. The main function of tweeting on the oil sands and the pipeline using the hashtag #tarsands was to disseminate information;
- ii. Environmentalists and ENGOs were the most frequent posters on Twitter using the hashtag #tarsands – a recognized pejorative term regarding the oil sands and the pipeline – and they tended to communicate with each other;
- iii. The main motivations to communicate about the oil sands and the pipeline amongst well-connected Twitter users using the hashtag #tarsands was to access news and to engage in debate.
- iv. Some of the Twitter users were concerned about their safety and security because they were publicly discussing the oil sands and the pipeline on Twitter; and
- v. In this case, participants' use of Twitter to discuss the oil sands and the pipeline partially represented the characteristics of a green virtual sphere, as it increased access to information and provided a space for debate on environmental issues.

I discuss each of these findings below and link them to relevant scholarly literature.

i. The main function of tweeting on the oil sands and the pipeline using the hashtag #tarsands was to disseminate information.

From the manual content analysis, I found that 57.5 percent of the tweets were used to disseminate information, which is similar to previous studies that found 58.6 percent of non-profit organizations' tweets were used to spread information (Lovejoy & Saxton, 2012). This finding was significant because one of the key functions of the green virtual sphere is to infuse discussions with more and varied (from the mainstream) information. After analysing the structure and content of the tweets on the oil sands and the pipeline, I further found that the number of messages with "RT" was relatively high (approximately 50 percent). Previous research on Twitter has suggested that between 3 and 6 percent of tweets were re-tweets (boyd, Golder & Lotan, 2010; Sysmos, 2010). This is also a significant finding because re-tweeting provides users a way to quickly disseminate information by re-sending a tweet to their followers, thus, reaching a wider audience; it also indicates a conversational aspect of Twitter (boyd et al., 2010). Although this finding contrasts with that of previous social media research, it was not entirely surprising given that the above finding reflects current understanding that the main use of the internet and social media applications is to disseminate information; re-tweeting is a way to achieve wide(r) dissemination (Pickerill, 2003).

I also found that 80.1 percent of the tweets included links to news articles, websites, online petitions, videos, images, and protest information, which was substantially higher than previous studies that found 13 to 50 percent of tweets include links (Java et al., 2007; boyd, Golder & Lotan, 2010; Segerberg & Bennett, 2011). Again, this demonstrated that people were using Twitter to disseminate information on the oil sands and pipeline by including links in their tweets to provide their followers with further information, such as a news article or a YouTube video. After examining the links in my case, I found that they were to: news articles (29.2 percent), websites (22.6 percent), online petitions (15.9 percent), videos (7.3 percent), images (3.4 percent), and protest information (2.1 percent). The news articles included mainstream media sources, such as one of Canada's national newspapers, the *Globe and Mail* and the national broadcasting

corporation, the *CBC* as well as micro-level news sources such as *The Tyee*, a daily environmental magazine based out of British Columbia. This finding was similar to related research, which found that tweets included mass-level, mid-level and micro-level media (Segeberg & Bennett, 2011). The website links included larger ENGO websites and personal websites. Most of the video links were to YouTube videos, including, for example, a TEDx video featuring Garth Lenz, who is an environmental photographer, speaking on the environmental impacts of the oil sands; there were also some videos of protest events. The images were predominantly satirical, such as images that were circulated of Canadian Minister of Natural Resources Joe Oliver marrying big oil in a mock wedding ceremony; however, there were some images of protest events such as one in London, United Kingdom and another in Edmonton, Canada. Finally, the tweets included links to online petitions, and less frequently, to protest information.

Although the most prominent function was to disseminate information, I also found that people used Twitter on the oil sands and pipeline to help form online communities. In particular, 18.0 percent of the tweets demonstrated a community function, which is similar to previous research suggesting that 26 percent of non-profit organizations' tweets are used to promote interactivity and dialogue which helps to create and reinforce communities (Lovejoy & Saxton, 2012). Furthermore, through the interviewing phase, participants indicated that there was a Twitter community on the issue of the oil sands and the pipeline. The majority of participants stated that not only was a community present on Twitter, but that they also felt a sense of community with other people who used Twitter to communicate on the oil sands and pipeline; one participant even referred to them as their comrades in arms. This theme is similar to findings from previous studies, which suggested that there are online communities on Twitter (e.g., Gruzd et al., 2011), and it also supports previous research that ENGOs use the internet and social media to connect online and form online communities (e.g., Pickerill, 2003; Sullivan & Xie, 2009); however, not all participants in our study experienced a sense of community. For example, two interview participants, one who was tweeting on behalf of an ENGO and one who was a proponent of the oil sands and pipeline, both did not feel a strong sense of community to others on Twitter. Given the varied responses in this study, further

research would provide the scholarly community with a better understanding of the factors that affect whether people feel a sense of community while tweeting on environmental issues.

The final function of tweeting on the oil sands and the pipeline was to mobilize action. From the manual text analysis, I found that 24.5 percent of the tweets asked people to participate in online or offline actions, such as signing an online petition, attending protest events, sending letters to politicians, and even attending a documentary film premiere entitled *Tarmageddon*; however, the majority of the action tweets focused on circulating online petitions. The presence of action tweets is higher than in previous research that found 16.5 percent of non-profit organizations' tweets asked people to participate in online or offline actions (Lovejoy & Saxton, 2012). Specifically, previous studies found that environmentalists and ENGOs have used the internet and social media applications to mobilize action, ranging from protest events to asking people to turn out their lights for the annual Earth Hour campaign (Pickerill, 2003; Cheong & Lee, 2010; Segerberg & Bennett, 2011). Triangulating data from the manual text analysis, interview participants confirmed that they used Twitter to mobilize action by encouraging people to attend protests and circulate online petitions; at the same time, they noted that it was unclear whether tweeting about these activities actually resulted in any action. This presents an opportunity for further research to investigate whether received tweets cause action.

ii. Environmentalists and ENGOs were the most frequent posters on Twitter using the hashtag #tarsands – a recognized pejorative term regarding the oil sands and the pipeline – and they tended to communicate with each other.

The second finding that emerged from my research was that the most frequent people discussing the oil sands and pipeline were environmentalists and ENGOs. From the tweets that I collected, I mined a total of 5,223 Twitter usernames. Then, I analyzed the names to identify the top ten most frequent posters and I found that they were either environmentalists or associated with an ENGO. Similarly, I discovered that eight of the

top ten most mentioned Twitter users were also environmentalists or associated with an ENGO. Interview participants also suggested that the most prominent people tweeting on these issues were opponents, primarily environmentalists and ENGOS; however, one interview participant identified as a proponent of the oil sands and pipeline.

The predominance of these groups tweeting on the oil sands and pipeline is not surprising given that previous research suggests that environmentalists and ENGOS are amongst the most active individuals and groups on the internet and social media (Castells, 2001; Pickerill, 2003; Greenberg & MacAulay, 2009; Bortree & Seltzer, 2009; Cheong & Lee, 2010; Merry, 2011; Segerberg & Bennett, 2011). There was another potential explanation of why environmentalists and ENGOS were so prominent regarding these particular issues. Specifically, I used the hashtag #tarsands to collect the tweets, to identify who was tweeting on these issues, and then to identify my potential interview participants; however, the term ‘tar sands’ is pejorative, meaning that it has a negative connotation and is primarily used by individuals and groups who are opposed to the development of the oil sands and pipeline (Gibson, 2012). As a result, there was a possibility that my sample had a higher number of opponents and was therefore a limitation of my study.

It was also apparent that environmentalists and ENGOS were communicating with each other on the oil sands and pipeline. Figure 4.1 illustrates the network based on total degree centrality. Specifically, the size of the node represents the total degree centrality values (i.e., the larger the node the higher the total degree centrality value); the location of the node depicts how central a Twitter user is in the network (i.e., nodes located in the core are more central and nodes in the periphery are less central); and the colours denote clusters of Twitter users that communicate with each other more frequently. From the social network analysis, I found that specific clusters had formed on Twitter regarding these issues (see Figure 4.1). For example, one cluster was primarily comprised of individual environmentalists (see Figure 4.2) while another cluster consisted of individuals and organizations that were based out of the United Kingdom (see Figure 4.3), and finally, a third cluster contained Canadian ENGOS that tended to communicate with each other (see Figure 4.4).

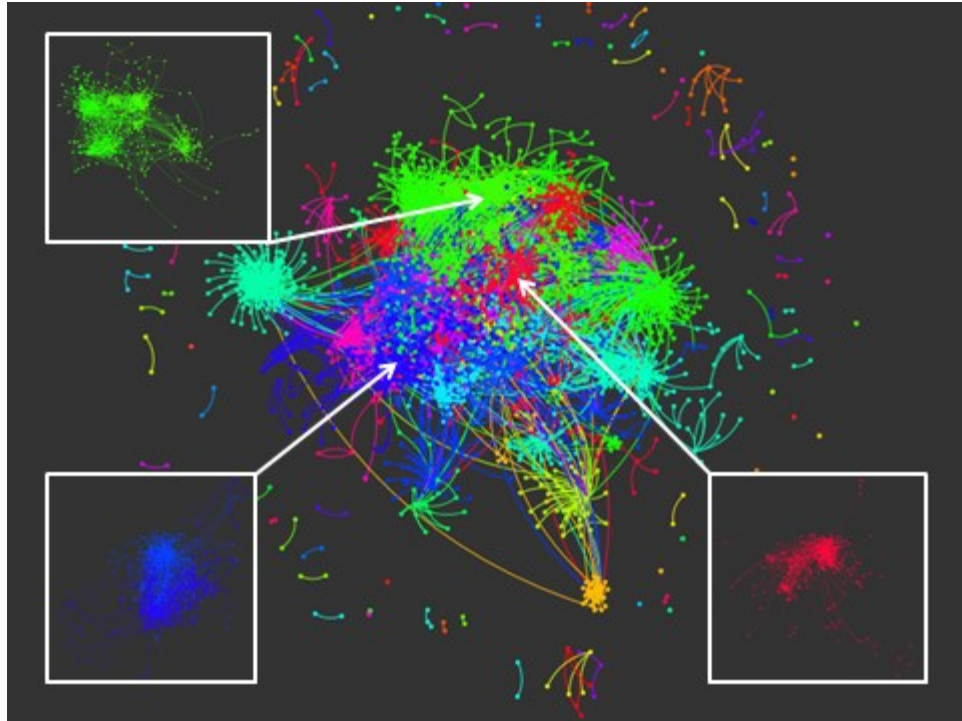


Figure 4.1: Social network analysis of #tarsands network depicting clusters.

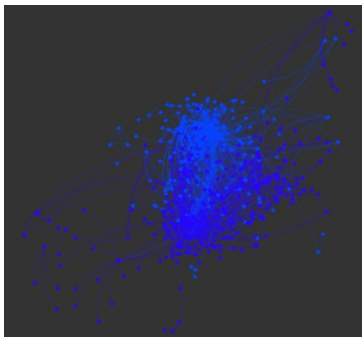


Figure 4.2: Canadian environmental activists.

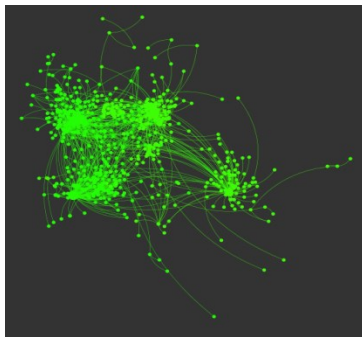


Figure 4.3: UK environmental activists.



Figure 4.4: Canadian NGOs.

This finding has two main implications. First, it is apparent that environmentalists and NGOs are using Twitter to communicate about the oil sands and the pipeline, which means that they are included in this space. Second, they tended to communicate amongst each other and even formed clusters, and as a result, there are limitations of Twitter reflecting the characteristics of a green virtual sphere on the oil sands and pipeline because there was a lack of interaction between users with opposing viewpoints. Specifically, the green virtual sphere is intended to increase the diversity of voices

communicating on environmental issues and promote debate; however, as it currently stands, the conversation using the hashtag #tarsands appears to be dominated by opponents. This presents a limitation because if social media applications, such as Twitter, are to reflect the characteristics of a green virtual sphere, users need to interact with each other even if they have opposing views. For Twitter to be used as a green virtual sphere for discussion on environmental issues, individual users must take it upon themselves to interact with others who have different views. Finally, the use of the hashtag #tarsands could have exacerbated this lack of interaction because people could be using entirely different hashtags to communicate, with opponents using #tarsands and proponents using another hashtag (e.g. #oilsands).

iii. The main motivations to communicate about the oil sands and the pipeline amongst well-connected Twitter users using the hashtag #tarsands was to access news and to engage in debate.

Based on the interviews, I found that participants used Twitter to communicate on the oil sands and pipeline in order to access news that they could not get through mainstream media. This finding is similar to previous research, which suggests that the majority of news links shared on Twitter are not mainstream media, but rather, they are mid-level and micro-level news sources (Seegerberg & Bennett, 2011). In addition, social media researchers have found that Twitter is often used to exchange news (Kwak et al., 2010). Participants also suggested that they provided news, including eye witness accounts of protests, which is related to other studies that have suggested that social media applications are changing the power relationship between the public and the media by allowing the public to create as well as consume news (Poell & Borra, 2011; Papacharissi & de Fatima Oliveira, 2012).

In addition to accessing news, the majority of interview participants who used the hashtag #tarsands stated that they used Twitter to engage in debates on the oil sands and pipeline, which is similar to previous research that suggests Twitter is used to discuss political issues and engage in debates (Aragon et al., 2013). One interview participant even noted

that Twitter was addressing a democratic deficit by providing a space for public dialogue, particularly on the oil sands and the Northern Gateway Pipeline. As it was previously mentioned, however, the majority of people tweeting on these issues were opponents, which brings into question whether the oil sands and pipeline debate on Twitter is meaningful because there could be a potential polarization of conversations based on the hashtags that are used (Conover et al., 2012), leading to two separate echo chambers – meaning spaces in which people are listening to louder versions of their own voice (Aragon et al., 2013) – and as a result, hindering Twitter’s demonstration of the characteristics of a green virtual sphere. Furthermore, researchers have suggested that the internet and social media have not provided dialogic communication, meaning that communication by ENGOs is still primarily one-way (Bortree & Seltzer, 2009; Greenberg & MacAulay, 2009; Aragon et al., 2013) suggesting that there might not actually be debate on Twitter regarding these issues.

iv. Some Twitter users were concerned about their safety and security because they were publicly discussing the oil sands and the pipeline on Twitter.

One of the concerns that emerged from the interviews was harassment as a result of publicly tweeting on a contentious issue using the hashtag #tarsands. Specifically, interview participants noted that by tweeting on the oil sands and the pipeline, whether for or against the issues, there was the possibility of being virtually attacked by trolls – which are usually anonymous individuals who post inflammatory comments and start arguments with others online. In particular, half of the interview participants stated that they were concerned about confrontation with trolls and one interview participant even noted that trolls can cause people to leave Twitter. The issue of online harassment, however, is not limited to Twitter and reflects larger challenges of communicating online.

Beyond the troll attacks, some participants expressed concern about publicly tweeting *opposition* to the oil sands and pipeline. Specifically, they indicated that they were concerned about being labelled as an extremist by the Canadian federal government based on what they were tweeting on the oil sands and the pipeline and their use of the

hashtag #tarsands. In fact, two interview participants suspected that their online activity, including their tweets on the oil sands and pipeline, were being monitored by the federal government. Concerns with government monitoring were also found in others' research. For example, ENGOs in the United Kingdom were concerned about using the internet to discuss controversial environmental issues because they believed that there was a possibility of the government monitoring their discussions and activities (Pickerill, 2003). Likewise, ENGOs in China are particularly concerned about using the internet to discuss environmental issues because the government monitors online discussions and may use this information against groups (Yang et al., 2007; Liu, 2011). Given my studies' findings and the findings of others, it appears that Twitter use on these issues may only partially represent the characteristics of a green virtual sphere because this space is not free from government monitoring and participants felt that they could not communicate on environmental issues without concerns about what they were tweeting.

- v. In this case, participants' use of Twitter to discuss the oil sands and the pipeline partially represented the characteristics of a green virtual sphere, as it increased access to information and provided a space for debate on environmental issues.**

Revisiting the overarching research goal, I found that Twitter helped to increase access to information, particularly news that could not be found in the mainstream media, such as information about protest events. In addition, interview participants suggested that it provided a new space for debate on the oil sands and pipeline. Despite this increased access and space for debate, I argue that there are some limitations of Twitter reflecting the characteristics of a green virtual sphere on the oil sands and the pipeline. The majority of Twitter users discussing the Alberta oil sands and the Northern Gateway Pipeline using the #tarsands hashtag were opponents and they tended to communicate primarily with each other. As such, the level of debate on Twitter about these issues was questionable. In addition, this space is, at least perceived as being, not free from government interference and discussions and activities can be monitored on these issues.

4.2.3 Limitations of the Green Virtual Sphere

There are limitations that have been noted in previous research that also apply to the use of Twitter on the oil sands and the pipeline. First, Twitter and other social media applications may not be currently utilized by people as a virtual sphere on these issues, meaning that they may use it for entertainment or other purposes rather than as a space for dialogue and debate; in short as Papacharissi (2002) has noted that “online technologies render participation in the political sphere more convenient but do not guarantee it” (p. 15). For example, previous studies have found that the most common use of Twitter was for daily chatter, meaning that users talked about what they were doing or discussed their daily routine (Java et al., 2007). In addition, researchers suggest that it is challenging to foster genuine dialogue through social media and as a result, it tends to be one-way communication (Bortree & Seltzer, 2009; Greenberg & MacAulay, 2009). Second, there are also limits to access – meaning that not all people have equal or equitable access to the internet or social media applications – and not all have the required literacy to use social media which poses a challenge to the use of Twitter as an open space for all to discuss these issues (Papacharissi, 2002; Papacharissi, 2009). Finally, the internet and social media could be commercialized as other public spaces have been in the past (Papacharissi, 2002; Papacharissi, 2009); signs of commercialization are already apparent for Twitter. For example, companies interact with their customers through Twitter as a form of marketing (Toubia & Stephen, 2013). Unlike Facebook and YouTube, Twitter does not include advertisements; however, it has become a publicly traded company, which could change the presence of advertisements on Twitter and as a result, transform Twitter from a potential forum for democratic debate into a site for manipulative corporate interests, like Habermas’ (2010) original conceptualization of the public sphere.

4.3 Research Contributions

Aside from the substantive findings noted above, this research made two other key contributions: conceptually and methodologically. Each of these is discussed below.

4.3.1 Conceptual Contributions

Very few studies have examined the use of social media as a space to discuss environmental issues and most of the previous studies have focused on the use of the internet and social media applications by ENGOs (see for example Pickerill, 2003; Greenberg & MacAulay, 2009; Merry, 2011; Liu, 2011); although these studies provided a better understanding regarding the use of social media applications at the organizational level, they did not examine social media more broadly as a space to discuss environmental issues, nor did they examine individual perspectives or motivations for using these applications. Given this gap in the literature, I set out to examine Twitter-based discussions on the Alberta oil sands and the Northern Gateway Pipeline using the hashtag #tarsands and in doing so, my research contributes to the scholarly discourse on the concept of the green virtual sphere on two issues. Specifically, a number of researchers have examined the use of the internet and social media as a virtual sphere (Salter, 2003; Berdal, 2004; Langman, 2005; Dahlgren, 2005; Papacharissi, 2009; Carty, 2010; Hands, 2011; Shirky, 2011), while others have examined the existence of a green public sphere (Torgerson, 2000; Yang & Calhoun, 2007); I brought these concepts together to create a new conceptual framework to examine environmental issues on social media. This framework helped to guide my research and interpret: (1) how Twitter was used on the oil sands and the pipeline; (2) who used Twitter to communicate on these issues; (3) why they used Twitter on these issues; and (4) how they perceived their use of Twitter on these issues. This new conceptual framework can be applied to other social media technologies, as well as to other environmental issues.

4.3.2 Methodological Contributions

The research design undertaken in my study also contributes to a growing body of literature on mixed methods research. Specifically, I combined two different methods of data collection – an automated collection of #tarsands tweets and semi-structured interviews with Twitter users – and three different methods of analysis – text analysis, social network analysis, and thematic analysis of interviews – to examine discussions on the oil sands and pipeline on Twitter using the hashtag #tarsands. Through the automated

collection of tweets I was able to gather a large data set, which reflects one of the benefits of social media as an area of study. In addition to collecting a large data set, I was also able to interact with people who used Twitter to communicate about the oil sands and the pipeline, and by using qualitative interviews, I investigated their motivations and perceptions about using Twitter as well as concerns that they had about using Twitter to communicate on these issues. This approach not only allowed me to develop a more comprehensive understanding of social media use on the oil sands and pipeline, but it also allowed me to contribute to a growing body of mixed methods research and to fulfill a gap in social media research.

The mixed methodological approach described in this research was useful in that it incorporated both qualitative and quantitative attributes in an area of research that is just starting to emerge. Whereas most of the existing social media literature relies on quantitative methods, namely text analysis and social network analysis, my approach incorporated data that was gleaned from personal interviews with frequent Twitter users. As such, it introduced a new level of complexity and nuance that has yet to be seen in social media research. By adding Twitter users' perceptions, I used an innovative methodological approach combining qualitative and quantitative methods that is a significant contribution to the emerging peer-reviewed published social media literature that has, so far, primarily focused on quantitative data sets.

4.4 Recommendations

4.4.1 Include Different Hashtags

In addition to the conceptual and methodological contributions, I also propose recommendations regarding the use of social media, particularly Twitter, to communicate on environmental issues. First, individuals and organizations who communicate about the oil sands and pipeline should use different hashtags, beyond the #tarsands hashtag. By including other hashtags in their tweets, Twitter users can extend the frame of their message, and in doing so, they may be able to reach a broader audience. Potential hashtags they could include, that are relevant to the oil sands and pipeline, are: #oilsands, #NorthernGateway, and #pipeline. In addition, they could also include political hashtags

to further extend the reach of their tweets. Prominent Canadian political hashtags for these issues, include: #cdnpoli, #abpoli, #ableg, #bcpoli, and #bcleg. The first hashtag, #cdnpoli, is frequently included in tweets that discuss Canadian politics, while #ableg and #abpoli are specific to Alberta and #bcleg and #bcpoli are specific to British Columbia. The Alberta and British Columbia hashtags are useful because the oil sands and pipeline are relevant to the region (i.e., the oil sands are primarily located in Alberta and the proposed Northern Gateway Pipeline route runs through Alberta and British Columbia). Although these proposed hashtags are currently relevant for these issues, it is important to note that hashtags are considered a folksonomy (Gruzd et al., 2011), which means that they are created by Twitter users and as a result, hashtags emerge organically and can change rather quickly. Consequently, Twitter users should diligently track the use of different hashtags and use the most relevant hashtags to remain engaged in environmental discussions.

4.4.2 Communicate with Different People

Second, Twitter users who used the hashtag #tarsands could reach out and communicate with a wider range of individuals and organizations on Twitter, rather than primarily communicating with Twitter users who have the same position on the oil sands and pipeline. Research suggests that Twitter may be leading to an echo chamber effect which means that people and groups that share the same opinions tend to communicate with each other, echoing the same views (Conover et al., 2012; Aragon, 2013). This means that individuals and organizations tend to communicate with Twitter users who already share the same views on environmental issues, hindering the presence of debate. To limit the echo chamber effect on the oil sands and pipeline, individuals and organizations could engage with a wider range of Twitter users by utilizing specific Twitter functions like @ mention, reply, and re-tweet to connect with environmentalists, ENGOs, politicians, journalists, the oil industry, and citizens. In doing so, Twitter users who communicate on the oil sands and pipeline can foster a more inclusive discussion on these issues.

4.4.3 Pair Twitter with Other Methods of Communication

It is also useful to pair the use of Twitter with other methods of communication. Specifically, discussions on the Alberta oil sands and the Northern Gateway Pipeline are not confined to Twitter and as a result, individuals and organizations have the opportunity to use different methods to communicate about these issues including: other social media applications (i.e., Facebook and YouTube), websites, email, print, telephone, and face-to-face engagement (Pickerill, 2003). Individuals and organizations should select the most appropriate tool for the goal that they are trying to achieve. For example, while Twitter is particularly useful to disseminate information (Lovejoy & Saxton, 2012) including news articles, videos, and images, other tools may be more effective to mobilize action. Twitter could be used to share information about an upcoming event, while YouTube could be used to share video footage of the event, and a summary of the event could be posted to websites or circulated through print media. Although Twitter provides a valuable communication avenue to discuss environmental issues, such as the oil sands and pipeline, it does not replace other methods of communication; rather, integrating different methods of communication provides the greatest impact (Pickerill, 2003).

4.5 Limitations

As with most research, I encountered some limitations during the course of my study. Since I used a case study approach that focused on two Canadian environmental issues, the Alberta oil sands and Northern Gateway Pipeline, it is inappropriate to generalize that all environmental issues are discussed in the same way on Twitter, nor was this my intention. As such there might be different motivations and perceptions regarding the use of Twitter given the topic and region that is examined. In addition, my study focused specifically on the use of Twitter because it is a public platform and, therefore, more accessible for data collection; however my study did not include other social media applications. As a result, there is a possibility that discussions about the oil sands and pipeline may be different on other social media applications, such as Facebook.

My study also focused on one specific hashtag (i.e., #tarsands), as a result I did not include Twitter users or tweets that did not engage with the hashtag #tarsands. Initially, I collected data for six hashtags: #enbridge, #ethicaloil, #NorthernGateway, #oilsands, #pipeline, and #tarsands; however, I focused on the hashtag #tarsands because it had the highest number of tweets and, therefore, it provided the largest data set. The selection of the #tarsands hashtag may have biased my data set to focus more predominantly on opponents because tar sands is a pejorative term that is primarily used by opponents. While I was conducting the interviews, for example, a number of participants mentioned that using this hashtag could bias my sample because tar sands is a pejorative term; however, by focusing on #tarsands, I was able to identify different concerns regarding the use of Twitter, such as the federal government labeling of environmentalists as extremists.

There were also limitations regarding the type of Twitter users I recruited in my research. My study did not examine lurkers, which are Twitter users that do not engage with other users. This means that Twitter users who only read tweets on the oil sands and pipeline were not included in the text analysis or interview portion of my study. Thus, it would be interesting if future research could include Twitter users who are less involved in discussions to determine why they use Twitter to communicate about environmental issues and whether they too feel a sense of community.

Another key limitation regarding the Twitter users in my study is that my data may have included bots or spammers – which are fake Twitter accounts that automatically tweet – who used the hashtag #tarsands. Specifically, the tweets that I collected were not necessarily sent by people; there is a possibility that some of the Twitter messages could have been automatically sent by bots, therefore affecting my dataset. At the same time, since the communication network was generated from mining personal names or usernames in a tweet, the likelihood of bots and spammers was reduced.

Finally, another limitation of my study was that the interview data were coded by one researcher and, as a result, it did not incorporate inter-coder reliability (Richards, 2005).

Inter-coder reliability involves multiple coders analyzing the same data to help to ensure rigour (Richards, 2005). Although my research relied on a single coder (myself) to complete the coding, I was the most familiar with the data because I collected it and therefore, I had an intimate knowledge of the data.

4.6 Directions for Future Research

A number of future research directions have already been articulated throughout this chapter. Still others are worth mentioning here. For example, it would be useful to conduct a comparison between the use of different hashtags on the Alberta oil sands and the Northern Gateway Pipeline, similar to Conover and colleagues' (2012) comparison of different hashtags in elections in the United States. In particular, it would be valuable to determine if there is polarization based on the use of different hashtags and to assess whether there are any linkages between users with opposing viewpoints. It would also be useful to identify who is tweeting using the different hashtags, to confirm whether ENGOs and environmentalists are the most well-connected Twitter users using the #tarsands hashtag. Examining different hashtags and the connections between groups that use different hashtags would help to further explore (i.e., support/refute this study) whether Twitter has the potential to enable debate and discussions on environmental issues.

Future research could also examine the sense of community on Twitter by engaging with different types of users. For example, researchers could investigate whether people tweeting on behalf of an organization feel connected to an online community, especially considering that ENGOs tweet so frequently. It would also be helpful to include users who are not prominent, specifically lurkers, to understand if they feel a sense of community as well. The use of surveys or interviews would be valuable to gather insight into why people feel connected and could also contribute to a growing body of methodological approaches for social media research.

Future studies could also expand the different types of methods that are used to examine the use of social media applications. To date, the majority of social media research has

utilized text analysis and social network analysis, but researchers could also benefit from including qualitative methods, such as interviews or focus groups, to better understand motivations and perceptions regarding the use of social media and the presence of environmental issues on social media. In particular, by applying mixed methods, we can gain a more comprehensive understanding of social media application use by including observation of use through quantitative methods as well as perception of use through qualitative methods.

4.7 Concluding Comments

My study was developed to understand discussions surrounding environmental issues on social media. As a result, I examined the Alberta oil sands and the Northern Gateway Pipeline on Twitter using the hashtag #tarsands to determine whether this space could represent the characteristics of a green virtual sphere. I found that Twitter helps to increase access to information and provides a space for debate on environmental issues, and as a result, it partially represents the characteristics of a green virtual sphere. However, the space appears to be dominated by opponents which means that there is a possibility that the use of social media applications, including Twitter, to engage in discussion (not necessarily action) on environmental issues represents an alternative space for environmentalists and ENGOs to voice their opinions on environmental issues with each other rather than engage in debate with individuals and groups with opposing views; perhaps a worst-case scenario is that Twitter has quite possibly further divided opponents and proponents on contested environmental issues like the Alberta oil sands and the Northern Gateway Pipeline.

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Appendix A: Interview Guide

Research Project: Who gives a tweet about #tarsands?:
Examining Twitter activity about the Northern Gateway Pipeline

Preamble:

Thank you for agreeing to participate in this study on the use of Twitter and the Northern Gateway Pipeline. You were selected to participate in this study based on your use of the hashtag #tarsands on Twitter. Before we begin, I want to tell you a little bit about how our conversation will go. The interview should take about an hour and our conversation will be about your use of Twitter concerning the Northern Gateway Pipeline.

I just wanted to remind you that during this interview I will record our conversation. There are no right or wrong answers; I am just interested in what you think. If there are things you don't want to talk about that's okay. We'll just move on. If you say something that you don't want recorded, just say so, and it can be removed, even after you have completed the interview. The only people who will hear and see the interview material will be me and my thesis committee. All original notes, digital recordings, and back-up files will be stored at Dalhousie University in a secure location and will be kept until 2017.

At the end of this project, a final thesis will be prepared and presented at Dalhousie University. It will also be distributed to those who participated in the study and possibly to some non-governmental organizations. This thesis is intended to help other researchers examining Twitter activity. Specifically, the goal is to gain a more comprehensive understanding of Twitter activity regarding the Northern Gateway Pipeline. In this and any other dissemination of the research, I will keep the information that you have provided confidential and any comments that you make will be anonymized, which means that I will come up with a fake name for you and all the other participants. Do you have any questions before we get started? I have six general sets of questions...

I. GENERAL QUESTIONS

1. Tell me about when you first started using Twitter...
2. What do you like about it?
3. What don't you like about it?
4. Before we talk about the Northern Gateway Pipeline, do you tweet about any other issues?
 - a. If so, and you are comfortable saying, what are the other issues that you tweet about?

- b. How often do you tweet about these issues?

II. NORTHERN GATEWAY PIPELINE

1. So, now on to the Pipeline...describe what you talk about in your tweets on the Northern Gateway Pipeline.
2. Tell me about how you use Twitter regarding the Northern Gateway Pipeline.
 - a. Do you post tweets, send re-tweets (RT), share links, send private messages, etc.?
 - b. How often do you use Twitter for each of these activities?
3. Why do you tweet about the Northern Gateway Pipeline?
4. Do you think that it is working?
 - a. How do you know (i.e., are there any particular indicators that help you know)?

III. ONLINE COMMUNITY

1. Now on to the third set of questions...when you think of Twitter, what words come to mind to describe the interaction? (If relationship doesn't come up ask: does 'relationship' come to mind? How about 'community'?)
 - a. How would you describe your interaction with others who tweet on the Northern Gateway Pipeline?
 - b. Do you feel any sense of connection to others who tweet on the Northern Gateway Pipeline?
2. Tell me about the people who tweet on the Northern Gateway Pipeline.
 - a. Have you got a sense of who the actual people are behind the tweets?
 - b. Do you believe that they tend to support or oppose the Northern Gateway Pipeline?
3. Who do you communicate with on the Northern Gateway Pipeline?
 - a. Do you communicate with these individuals outside of Twitter as well?
 - b. If yes, describe how you communicate with these individuals (i.e., in-person, over the phone, through e-mail, etc.).
 - c. How often do you communicate with these individuals outside of Twitter?
4. I previously sent you an image of a social network analysis that I did this spring on the Northern Gateway Pipeline Twitter network. (*Image will be provided in advance through email. Participant will be asked to scan and return the image through email*).
 - a. Place a dot where you believe you are located within the network.
 - b. Describe why you selected this location.

IV. TWITTER AND THE ENVIRONMENTAL MOVEMENT

1. Moving to the fourth set of questions...how would you describe the use of Twitter and

- the environmental movement?
2. A university researcher noted that “the Internet has become a major organizing and mobilizing tool for environmentalists around the world, raising people’s consciousness about alternative ways of living and building the political force to make it happen” (Castells, 2001, p. 280). What are your thoughts on this statement?
 - a. How is/isn’t Twitter an effective component of the environmental movement?
 - b. What are some of its limitations and/or strengths?

V. PRIVACY AND SECURITY

1. This last set of questions is about the public nature of Twitter...how do you feel about sending your tweets out into the public domain?
 - a. Could you describe any privacy concerns you have regarding your Twitter activity on the Northern Gateway Pipeline?
2. Are you familiar with Twitter’s privacy policy? Have you read their policy?
 - a. If yes, can you tell me what, if any, concerns you had about the policy.
 - b. If no [briefly state what the policy is and then ask], having just heard the policy, what, if any concerns do you have about the policy?
3. Is your Twitter activity with respect to the Northern Gateway Pipeline independent or is it associated with an organization or group?
 - a. If it is associated with an organization/group, does your Twitter activity about the Northern Gateway Pipeline go through a review process before it is sent out?
4. What are the benefits associated with tweeting about the Northern Gateway Pipeline?
5. Describe any risks that you associate with tweeting about the Northern Gateway Pipeline?
 - a. How, if at all, do you alter your Twitter activity based on these risks?
 - b. Can you tell me about any times where the risks outweigh the benefits (or vice versa)?

VI. FINAL THOUGHTS

Thank you very much for talking with me. I don’t think there is anything left for me to ask you about, but I wonder if there might be something that you wanted to say that I haven’t asked you?

Okay, thank you. I just wanted to re-emphasize that everything you’ve shared today will remain confidential and a fake name will be used for any of the quotes I take from this interview in any publications or presentations that I produce. If you have any questions or concerns regarding today’s interview, please do not hesitate to contact me, or my academic supervisor, or the Dalhousie research ethics office.

If participant has checked off that he/she would like to see either transcript of preliminary analysis then say: That's all for now, I'll be in touch with a copy of your transcript for you to review and/or a copy of our preliminary analysis for your comment. Thanks so much, it was great to talk to you, I learned a lot! [END].

Appendix B: Email Recruitment Script

Subject Line in Email: Invitation to participate in study on “Who gives a tweet about #tarsands?: Examining Twitter activity about the Northern Gateway Pipeline”

Dear _____:

I am a Graduate Student at Dalhousie University and I am conducting a study about the use of Twitter regarding the Northern Gateway Pipeline. I completed a social network analysis of Twitter to see who was using the hashtag #tarsands, and your name came up as a frequent user. I am contacting you to see if you would be interested in participating in a research interview.

My study, entitled “Who gives a tweet about #tarsands?: Examining Twitter activity about the Northern Gateway Pipeline” has been reviewed by the Dalhousie University Research Ethics Board.

Your voluntary participation would involve a 60 minute phone interview with myself once you have read the detailed information sheet and signed a consent form (see attachment).

I appreciate that you are probably very busy with your own work, but I hope that you see the value in participating as the goal of this study is to better understand how Twitter can be used amongst environmental activists in the spirit of environmental justice.

I am looking forward to hearing from you at your earliest convenience.

Sincere Regards,

Brittany White, MES Candidate

Dalhousie University

.....

If potential participant declines to participate, say the following by email:

Thank you very much for responding and I appreciate your decision.

Sincere Regards,

Brittany White, MES Candidate

Dalhousie University

.....

If potential participant agrees to participate, say the following by email:

That's great!

I have attached a copy of the information sheet and consent form. Once you have read the information sheet and I have answered any remaining questions, please sign the consent form, and send it back to me through email (by pdf) or fax at [REDACTED].

After I receive the consent form, we will schedule an interview at your earliest convenience. I have set aside the following four-week period for interviews [insert dates].

Thanks again, I am delighted to hear that you have agreed to participate. If you have any questions about the study, the information sheet, or consent form, you can contact me at [REDACTED].

Sincere Regards,

Brittany

If potential participant does not respond within one week of first email, I will re-send the original email with the following:

Subject Line: Final invitation to participate in study on “Who gives a tweet about #tarsands?: Examining Twitter activity about the Northern Gateway Pipeline”

Hello,

Last (date), I wrote to see if you would be interested in participating in a Dalhousie University graduate studies research project on how individuals and groups use Twitter to engage with each other on the Northern Gateway Pipeline. I am just following up on that email to see if you would be interested in participating.

I am a Graduate Student in the School for Resource and Environmental Studies. This spring, I completed a social network analysis of Twitter to see who was using the hashtag #tarsands, and your name came up as a frequent user. I am contacting you to see if you would be interested in participating in a research interview.

My study, entitled “Who gives a tweet about #tarsands?: Examining Twitter activity about the Northern Gateway Pipeline” has been reviewed by the Dalhousie University Research Ethics Board.

Your voluntary participation would involve a 60 minute phone interview with myself once you have read the detailed information sheet and signed a consent form (see attachment).

I appreciate that you are probably very busy with your own work, but I hope that you see the value in participating as the goal of this study is to better understand how Twitter can be used amongst environmental activists in the spirit of environmental justice.

If I do not hear from you by X date [one week from time of second email], I will assume that you are not available and cease from sending further correspondence about the study. But please do not hesitate to get in touch with me at any time should your schedule permit you to do so.

Sincere regards,

Brittany White

Appendix C: Coding Scheme

Parent Nodes (the bolded words) were deductively coded based on a start list which included: Benefits, Community, Concerns, Debate, Environmentalism, Media, and Twitter Functions while the **Child Nodes** were inductively coded from the interview data.

Name	Sources	References
1. Benefits	10	40
a. Anonymous	2	8
b. Brief	3	3
c. Feedback	1	2
d. Free	3	3
e. Immediate	7	9
f. Promotion	3	3
g. Scope	2	2
h. Transparent	3	10
2. Community	10	78
a. Develop Relationships	7	18
b. Include Voices	3	6
c. Like-minded People	7	13
d. Members of Community	10	34
e. Network of Individuals	5	6
f. Sense of Camaraderie	5	7
g. Sense of Connection	7	9
3. Concerns	10	103

a. Addictive	2	3
b. Aware of Risks	8	18
c. Constrains	9	24
d. Drunk Tweeting	2	2
e. Ephemeral	2	2
f. Harassment	6	12
g. Length	5	7
h. Misinformation	5	8
i. Noise	4	5
j. Privacy Policy	10	14
k. Trolls	5	8
4. Debate	10	88
a. Accuracy Based in Fact	4	8
b. Discussion	7	29
c. Democracy	1	2
d. Conversation	5	8
e. Echo Chamber	1	1
f. For or Against	7	16
g. Opinion	9	16
h. Politics	3	6
i. Public Nature	2	2
5. Environmentalism	10	79
a. Effectiveness	8	18
b. Environment	9	13

c. Green	1	1
d. Tar Sands	9	41
e. Tool for Environmentalists	4	6
6. Media	10	69
a. Alternative News	6	10
b. Information Dissemination	5	6
c. Links	7	13
d. News	9	33
e. News Filter	7	7
7. Twitter Functions	10	55
a. Direct Messaging	7	12
b. Frequency of Use	7	10
c. Hashtags	6	11
d. Re-tweeting	9	22

Appendix D: Dalhousie Research Ethics Board Approval



Social Sciences and Humanities Research Ethics Board Letter of Approval

Date: May 28, 2012.

To: Brittany White, School for Resource and Environmental Studies
Dr. Heather Castleden, School for Resource and Environmental Studies

The Social Sciences Research Ethics Board has examined the following application for research involving humans:

Project # 2012-2701 (v2) (R# 1011252)

Title: Who Gives a Tweet About #Tarsands?: Examining Twitter Activity About the Northern Gateway Pipeline

and found the proposed research involving human participants to be in accordance with Dalhousie Guidelines and the Tricouncil Policy Statement on *Ethical Conduct in Research Using Humans*. This approval will be in effect for 12 months from the date indicated below and is subject to the following conditions:

1. Prior to the expiry date of this approval an annual report must be submitted and approved.
2. Any significant changes to either the research methodology, or the consent form used, must be submitted for ethics review and approval *prior to their implementation*.
3. You must also notify Research Ethics when the project is completed or terminated, at which time a final report should be completed.
4. Any adverse events involving study participants are reported immediately to the REB

Effective Date: May 28, 2012.

signed: [Redacted Signature] _____
Dr. Lori Turcotte (Chair SSHREB)

Expiry Date: May 28, 2013.

IMPORTANT FUNDING INFORMATION - Do not ignore

To ensure that funding for this project is available for use, you **must** provide the following information and **FAX** this page to **RESEARCH SERVICES at 494-1595**

Name of grant /contract holder Brittany White Dept. School for Resource Environ. Studies
Signature of grant / contract holder [Redacted Signature] _____
Funding agency Social Sciences and Humanities Research Council of Canada
Award Number [Redacted] Dal Account # (if known) _____

Appendix E: TCPS 2 CORE Certificate

PANEL ON RESEARCH ETHICS <small><i>Navigating the ethics of human research</i></small>	TCPS 2: CORE	
<h1><i>Certificate of Completion</i></h1>		
<p><i>This document certifies that</i></p>		
<p>Brittany White</p>		
<p><i>has completed the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans Course on Research Ethics (TCPS 2: CORE)</i></p>		
Date of Issue:	13 May, 2013	

Appendix F: Consent Form

Research Project: Who gives a tweet about #tarsands?: Examining Twitter activity about the Northern Gateway Pipeline

Principal Investigator: Brittany White, Dalhousie University
Thesis Supervisor: Dr. Heather Castleden, Dalhousie University

Consent Form

- | | | |
|---|-----|----|
| 1. Do you understand that you have been asked to take part in a research study? | Yes | No |
| 2. Have you read and received a copy of the attached Information Sheet? | Yes | No |
| 3. Do you understand the benefits and risks involved in taking part in this research? | Yes | No |
| 4. Have you had an opportunity to ask questions about this study with the Principal Investigator? | Yes | No |
| 5. Do you understand that you can stop taking part in this study at any time?
*You do not have to say why you have decided to withdraw. | Yes | No |
| 6. Do you understand that I will strive for anonymity and confidentiality but given the small number of people using the hashtag, it may be possible to identify you in my thesis and related documents (published articles)? | Yes | No |
| 7. Do you understand who will have access to your interview data? | Yes | No |
| 8. Do you consent to being audio-taped? | Yes | No |
| 9. Do you wish to review a copy of your transcript to check for accuracy? | Yes | No |
| 10. Would you like to receive a summary report of my preliminary analysis? | Yes | No |
| 11. Would you like to see how quotes from your interview are used before report(s) are finalized? | Yes | No |
| 12. Would you like an electronic copy of the final report? | Yes | No |

I agree to participate in this research project.

Signature

Printed Name

Date

Thank you for your participation.

Appendix G: Information Letter

Research Project: Who gives a tweet about #tarsands?:
Examining Twitter activity about the Northern Gateway Pipeline

Principal Investigator: Brittany White, Dalhousie University
Thesis Supervisor: Dr. Heather Castleden, Dalhousie University

PURPOSE: Although some university researchers have examined the ways in which people use Twitter, a great deal still remains unknown. Consequently, the purpose of the study is to conduct an in-depth investigation of Twitter activity on the Northern Gateway Pipeline. By exploring people's use of Twitter on the Northern Gateway Pipeline, we will have a better understanding of the role of social media in the broader environmental movement. At the conclusion of this graduate research study, results will be posted on the Dalhousie Social Media Lab website, published in peer-reviewed journals, and shared at relevant conferences.

YOUR PARTICIPATION: Your voluntary participation involves a one-on-one phone interview for approximately 60 minutes at a time of mutual convenience. During this interview there are no right or wrong answers, the researcher is interested in your perspective and experiences. This interview has five themes: (I) General background about your Twitter use; (II) Northern Gateway Pipeline; (III) Online sense of community; (IV) Twitter and the environmental movement; and (V) Privacy and security. With your permission, the interview will be digitally recorded. Your comments may be used as part of Ms. White's research and in public dissemination. Careful measures will be taken to keep your information confidential and your identity will not be revealed, unless you wish to be identified (and provide your written consent to do so).

HOW THIS RESEARCH WILL BE USED: Direct quotes of what you say may be used in any dissemination. Any oral or written presentations of the research findings will not have your name on them, unless you wish to be identified (and provide your written consent to do so).

BENEFITS OF THIS STUDY: The information obtained from this research study is being used to further our understanding of Twitter use associated with the Northern Gateway Pipeline.

RISKS: There is minimal to no risk in participating in this study. But people are sometimes uncomfortable about being interviewed. Your comfort is my priority. I will strike comments that you have made during your interview from the transcripts if you are uncomfortable with them, and I will omit anything you have shared at your discretion.

WITHDRAWAL FROM THE STUDY: You may refuse to participate or to later withdraw from the study at any time, including before, during, and after the interview, without penalty by simply telling Ms. White (see contact details below). You also have the right to leave unanswered any questions that you prefer not to answer. Should you wish to withdraw after you have completed your interview, you will have the option to also withdraw your interview transcript up until the analysis is complete. You have the option of reviewing a preliminary analysis of your interview.

CONFIDENTIALITY: Because this research is being conducted with a targeted group of Twitter users – a relatively small group of individuals – it may not be possible to keep your participation and responses completely anonymous. However, your name will not be used and a fake name will be employed to strive for anonymity and confidentiality in the dissemination of this research. All information shared during the one-on-one interview will be kept confidential and your identity will not be revealed unless you give your written permission. All data will remain in a secure location on campus (password-protected computer and locked files in the School for Resource and Environmental Studies) and will be destroyed after five years of the study's completion. The digital recording and interview transcript will only be available to the Principal Investigator and her graduate thesis committee.

CONSENT: Attached to this information sheet is a Consent Form. Ms. White will go through this information sheet and the consent form with you, answer any questions you might have about the research and your involvement in it, give you an opportunity to read consent form, and then you can decide if you want to sign it and return it via email, thereby agreeing to participate in the study.

If you have any complaints or concerns about this research that you feel you cannot discuss with Ms. White or her thesis supervisor, Dr. Castleden ([REDACTED]), you can contact Catherine Connors, Director of Dalhousie University's Human Research Ethics Office at (1) Phone: [REDACTED] or (2) Email: [REDACTED] This study has been reviewed by the Dalhousie University Research Ethics Board.