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MAPPING CONNECTION, DISCONNECTION AND POWER WITHIN THE SOCIAL NEWS MEDIA NETWORK

A CASE STUDY OF THE GREAT BARRIER REEF UNESCO 2021 'IN DANGER' RECOMMENDATION ON TWITTER, YOUTUBE AND FACEBOOK

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Submitted in fulfilment of the requirements for the degree of
Master of Philosophy

College of Arts, Society & Education
Division of Tropical Environments and Societies
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Keywords

Climate change
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Media power
Mediatised environmental conflict
Network theory of power
Network society
Polarising tactics
Political communication
Problematic information
Science communication
Social media
Social news media network
Social network analysis
Social network theory
Switching point
Twitter
World Heritage
YouTube

Abstract

The decentralisation of traditional hierarchal communication flows in digital spaces has disrupted the way information is created, accessed and distributed. This has forged new opportunities and tactics for 'knowledge' and 'reality' to be framed, reframed and furthered in a way that suits the diverse array of actors embedded in these interconnected environments, now empowered in their own ability for 'mass self-communication' (Castells, 2007).

This ability to craft and contest 'reality' and steer information flows and frames to suit actors' goals is especially significant in the context of environmental issues that are often politicised, and subject to problematic information and polarising tactics. This includes the case study for this thesis: climate change and the protection of the Great Barrier Reef (GBR). Publics come to 'know' and understand these topics through multimedia networks of communication, yet scholars argue that the politicisation and mediatisation of science has stifled the development of environmental policy in Australia. **As such, the primary focus of this study is to further understanding about the dynamic interplays between actors and information within social media news-sharing spaces – the 'social news media network' (Bruns, 2018) – in the context of environmental protection.**

An integrated mixed methods approach is deployed combining social network analysis, in-depth close reading, and framing analysis. These methods are connected to theories from several different disciplines. Namely, Castells' network theory of power (2011b) is adapted to examine dominant actors, information being circulated, and frames, and uses techniques like cluster analysis to consider how 'reality' is being contested on Twitter, YouTube and Facebook through the lens of power. Power is conceptualised in these online news-sharing spaces as the ability to capture attention. The network theory of power is operationalised by assigning a series of power indicators developed from social network theory to explore differing informational power dynamics across the platforms. Hutchins and Lester's mediatised environmental conflict model (2015) is engaged to provide a contextual lens to the case study, and Konkes and Foxwell-Norton's (2021) proposed addition of science as a conflict-inducing entity is empirically investigated.

This research finds that adversarial framing, the problematic use of science, and the strategic interplay of mainstream media with alternative media actors, politicians and ideologically-aligned advocacy groups are three key ways that power is asserted and contested in the social news media network spaces of Twitter, YouTube and Facebook in relation to this case study. Emerging from these findings is the continued authority of mainstream media actors, particularly *The Guardian* and News Corp, as information sources and frame-setters, though via different actor interplays, informational flow dynamics and tactics. There is also evidence to support Konkes and Foxwell-Norton's (2021) argument that the prominence of scientists and scientific knowledge in climate change contests makes science a fifth sphere in the mediatised environmental conflict model (Hutchins & Lester, 2015).

This work furthers knowledge about the mediatisation and politicisation of science in hybrid communication spaces, spanning online and offline, and meets calls for additional multiplatform studies in social media research. It also addresses a gap in empirical studies that examine power dynamics in social media networks, particularly concerning the protection of the GBR. These findings are relevant for scientists, communicators, and policymakers in the context of the GBR's declining health within the global threat of climate change – a conflict situated within an era of informational and epistemological transformation.

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List of Abbreviations

ABC	Australian Broadcasting Corporation
AIMS	Australian Institute of Marine Science
AMCS	Australian Marine Conservation Society
API	Application Programming Interface
ENGO	Environmental Non-Government Organisation
GBR	Great Barrier Reef (also 'the Reef')
GBRMPA	Great Barrier Reef Marine Park Authority
IPA	Institute of Public Affairs
IPCC	Intergovernmental Panel on Climate Change
IUCN	International Union for Conservation of Nature
JCU	James Cook University
MEC	Mediatised Environmental Conflict
SNA	Social Network Analysis
UNESCO	United Nations Educational, Scientific and Cultural Organisation
WHC	World Heritage Committee
WWF	World Wildlife Fund

Glossary

Social network analysis terms

Network	Representations of systems in which the elements (or nodes) are connected by ties (Wasserman and Faust, 1994).
Node	An element of a network. Also referred to as actors or vertices, nodes usually represent individuals, groups or teams. In social media networks, they can often be users, for example Twitter accounts, YouTube channels or Facebook pages (Social Media Research Foundation, 2016; Yang et al., 2017).
Edge	Connection between two nodes. It is also known as a tie or link (Social Media Research Foundation, 2016).
Edges unique	The number of connections where multiple connections between node A and node B are counted only once (Social Media Research Foundation, 2016).
Edges with duplicates	The total number of multiple connections between two nodes (Social Media Research Foundation, 2016).
Edges total	The total number of connections where multiple connections between node A and node B are all counted (Social Media Research Foundation, 2016).
Self-loops	An edge that starts and ends in the same node (Social Media Research Foundation, 2016).
Connected components	A group of nodes that are all connected is a component. This is the number of separate sets of connected vertices (Social Media Research Foundation, 2016).
Isolate	Also known as a single-vertex (node) connected components, nodes that have zero connections are 'isolated' or an 'island' (Social Media Research Foundation, 2016).
Density	Density is the measure of the number edges among a group of vertices over the total possible number if everyone was connected to everyone. A high graph density means that most people are connected to many others. A low graph density means that most people are not connected to many others (Social Media Research Foundation, 2016).
Centralisation	A global metric that characterises the extent to which the network is centred on one or a few important nodes. Centralised networks have many edges that emanate from a few key nodes, while decentralised networks have little variation between the numbers of edges each vertex possesses (Hansen et al., 2010).
Degree centrality	The count of the total number of connections linked to a node (Hansen et al., 2010). The degree is the sum of out-bound (out-degree) and in-bound (in-degree) links (Grandjean & Jacomy, 2019).

In-degree	The number of in-bound links to a node. Being 'cited' is often a good indicator of authority/notoriety (Grandjean & Jacomy, 2019). This can manifest as users sharing a news outlet's content, which creates an incoming link to that news actor.
Out-degree	The number of out-bound links from a node (Grandjean & Jacomy, 2019). This indicates the level that the node is spreading information.
Modularity	"Modularity of a network's structure is a measure of the quality of clustering, a network partitioned into a set of interconnected subgraphs (Newman & Girvan, 2004). Modularity captures the extent to which clusters are disconnected from one another (a range of values from 0 to 1), distinguishing between networks with divided versus unified structures… Highly modular networks are characterised by a few highly intraconnected clusters that are loosely interconnected. Networks where users are highly interconnected regardless of cluster affiliation are, therefore, less modular" (Himelboim et al., 2017, pp. 3-4).
One-mode network	A one-mode, or unipartite, network consists of a node set and an edge set that join pairs of nodes (Chang & Tang, 2014). These nodes are the same type, i.e. one mode (Hansen et al., 2010, p. 36).
Two-mode network	A two-mode, or bipartite, network consists of two disjointed sets of nodes and a set of edges in which each edge only joins nodes in different sets (Chang & Tang, 2014). These nodes are different types, i.e. two modes (Hansen et al., 2010, p. 36).

Media and communications terms

Cultural materials	"The ideas, visions, projects and frames that are embedded in the processes of communication" (Castells, 2011b, p. 776).
Discourse	"A discourse is the language used in presenting a given social practice from a particular point of view. Discourses appertain broadly to knowledge and knowledge construction" (Fairclough, 1995, p. 56).
Disinformation	"Information that is false and deliberately created to harm a person, social group, organisation or country" (Wardle & Derakhshan, 2017, p. 20).
Facebook spaces	Facebook public pages, public groups and verified public profiles (Angus et al., 2021, p. 11).
Frame	Some aspects of perceived reality are selected and made more salient to "promote a particular problem, definition, casual interpretation, moral evaluation and/or treatment recommendation for the item described" (Entman, 1993, p. 52). Framing can be obvious, or more subtle, but is intended to manage the audience's interpretation (Fairclough, 1995, p. 83).

Homophily	The tendency for people to form social ties with others most similar to themselves (McPherson et al., 2001, p. 416).
Information disorder	The umbrella term used to including mis-, dis- and mal-information (Wardle & Derakhshan, 2017, p. 10).
Mass self-communication	The ability of audiences to produce and frame their own messages: "it is self-generated in content, self-directed in emission, and self-selected in reception by many that communicate with many" (Castells, 2007, p. 248).
Mediatised environmental conflict	This is enacted when competing visions of modernity and environmental futures play out in news and communication networks between the competing logics of industry, politics, media, activist and – most recently added – scientists (Hutchins & Lester, 2015; Konkes & Foxwell-Norton, 2021).
Logic (e.g. media)	"Bundles of technologies, genres, norms, behaviours and organizational forms" (Chadwick et al., 2016, p. 4).
Misinformation	"Information that is false, but not created with the intention of causing harm" (Wardle & Derakhshan, 2017, p. 20).
Narrative	Includes two factors: 1) The actual story in terms of a series of events and actors involved, and 2) the presentation – the way the story is realised and organised as a particular text (Fairclough, 1995, p. 91).
Network society	Castells' understanding that modern society is made up of networks and the "prevalence of networks as modes of organisation of social practice is defining social structure in our societies" (Castells, 2016, p. 8).
Polarisation	"The social process whereby a social or political group is divided into two opposing sub-groups having conflicting and contrasting positions, goals and viewpoints, with few individuals remaining neutral or holding an intermediate position" (Sunstein 2002; Isenberg 1986, as cited in Guerra et al., 2013, p. 1). Polarisation can take different forms: ideological, affective and news audience polarisation (Arguedas et al., 2022).
Problematic information	Includes mis- and dis-information, along with more ubiquitous public relations information, advertising and public affairs (Jack, 2017).
Produsage/produser	"The collaborative, iterative, and user-led production of content by participants in a hybrid user-producer, or produser role" (Bruns, 2006, p. 1).
Programmers	"The ability to constitute network(s), and to program/reprogram the network(s) in the terms of the goals assigned to the network" (Castells, 2013, p. 45).

Relational sociology	"Relational sociology investigates social life by studying social relations" (Powell & Depelteau, 2013, p. 1).
Social news media network	"The thoroughly integrated complex that includes conventional news organisations, alternative and citizen media outlets, professional and citizen journalists, industry and freelance newsmakers, dedicated social news curators and ordinary social media users" (Bruns, 2018, p. 349).
Switchers	"The ability to connect and ensure the cooperation of different networks by sharing common goals and combining resources, while fending off competition from other networks by setting up strategic cooperation" (Castells, 2013, p. 45).
Switching point	In the context of mediatised environmental conflict, the point where two or more spheres of action interlock and contest competing goals and logics (Hutchins & Lester, 2015).

Statement of Original Authorship

The work contained in this thesis has not been previously submitted to meet requirements for an award at this or any other higher education institution. To the best of my knowledge and belief, the thesis contains no material previously published or written by another person except where due reference is made.

Signature: Carly Lubicz-Zaorski

Date: 16/05/22

Notes on copyright

Every reasonable effort has been made to gain permission and acknowledge the owners of copyright material. I would be pleased to hear from any copyright owner who has been omitted or incorrectly acknowledged.

Ethics approval

The James Cook University human research ethics committee granted approval on 29/06/2021, no. H8410. The mandatory final report on the study was submitted to the ethics committee on 16/05/2022.

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[1] A term from the Thesis Whisperer (https://thesiswhisperer.com/), whose author, Dr Inger Mewburn, and Whisper Collective colleagues also deserve thanks for this fabulous resource.

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Chapter 1: Introduction

A question at the heart of modern political communication research is about "how power works amid the chaos" of the disrupted media environment (Chadwick et al., 2016, p. 2). This thesis explores power dynamics in decentralised online news-sharing spaces and the impact on informational authority, flows and knowledge. This topic is relevant given contemporary discussion about problematic information in social media platforms, including the need to understand informational interplays and tactics to gain valuable insight into how 'knowledge' and 'reality' are shaped and contested, including the role of mainstream media. This problem is investigated by examining how power is asserted and contested in the 'social news media network' (Bruns, 2018) in relation to a 'mediatised environmental conflict' event (Hutchins & Lester, 2015). While this approach will be explained further over chapters to come, in sum, I have applied Manuel Castells' network theory of power (2011b) to examine Twitter, YouTube and Facebook. The ultimate goal of these news-sharing networks and the majority of actors embedded within them is attention. As such, I have assigned a series of indicators to measure attention, which includes examining the dominant actors, information flows, frames, and the tactics used to re-frame narratives – these can be understood as acts of power in these online information-channelling environments. The case study selected to explore these dynamics is the mediatised and politicised Great Barrier Reef (GBR), with a specific focus on the 2021 United Nations Educational, Scientific and Cultural Organisation's (UNESCO) World Heritage 'in danger' recommendation. This event generated attention throughout multimedia networks of communication due to competing claims about the health of the GBR and, more broadly, differing values and worldviews about the environment in the context of global climate change. I begin this chapter by outlining the key problems that prompted this research inquiry relating to information, epistemology and the broader social context, and then move on to situate the GBR case study within this realm. I also discuss the contributions of this work, limitations, and outline the structure of the thesis.

1.1 THE RESEARCH PROBLEM ASSEMBLAGE

The research problem itself can be conceptualised as a network, or an assemblage of different elements that are ever-changing, or 'becoming', with meaning created by their connections, or disconnections, with other assemblages (Braidotti, 2019; Chadwick et al, 2016; Deleuze & Guattari, 1988). These elements are all interconnected in various ways and to various extents. Each chapter can be considered the same way; even this thesis can be understood as a collection of not just its chapters, but also the elements that relate to my background as a researcher, the decisions I have made, and the tools I have used (Fox & Alldred, 2014). The knowledge foregrounded for interpretation can be situated in the context of the wider 'knowledge assemblage' of communication and media literature and social science, noting that this 'knowing' is never fixed, is impacted by its interactive interplays with other human, non-human and social elements in flux, and always 'becoming'. This is the conceptual position I am coming from when I approach this thesis, and also my own academic journey.

1.1.1 Decentralised contemporary communication networks

Our modern era has been described as the 'network society' by Manuel Castells (2007, 2011a, 2013), who argues that – while information and communication have always been fundamental sources of power and counterpower – they have become so pervasive, interactive and connected that they are now central to implementing power-making processes across our interconnected society (Castells, 2011b). In this largely digitally mediated era, traditional and hierarchical 'few-to-many' communication channels reminiscent of the Habermasian public sphere have eroded, superseded by readily accessible and interconnected digital mechanisms for 'many-to-many' communication (Bruns & Highfield, 2015; Castells, 2008). Once mainly receivers of mass communication, audiences are now empowered to produce, frame and respond to messages, transforming the hierarchical era of mass communication to a more interconnected form of 'mass self-communication' (Castells, 2007, 2011b). Scholars have also referred to the dynamic and relational modern communications environment as the 'hybrid media system' (Chadwick et al., 2016). Those in this system with agency – the actors – are:

> …articulated by complex and ever-evolving relationships based upon adaption and interdependence and concentrations and diffusions of power. Actors create, tap, or steer information flows in ways that suit their goals and

> in ways that modify, enable, or disable others' agency, across and between a range of older and newer media settings (Chadwick 2013, as cited in Chadwick et al., 2016, p. 4).

This decentralisation of communication networks has key implications for who can communicate, what and how, which creates new frontiers for communicators and their information flows to shape meaning. This changed communicative environment has implications for those seeking to frame and channel information in relation to contested issues like the protection of the GBR and responding to climate change, which could ultimately impact public support for policy (see Section 1.4).

1.1.2 Information and communication power – a crisis of…?

The disruption to information flows and traditional communication hierarchies has contributed to a set of interconnected challenges. While social media has unlocked the opportunity for non-elite actors to participate in and shape public debate, the exchange is that the 'democratisation' of these public spaces (Papacharissi, 2002) has also coincided with what some have described as a 'post-truth era' where feelings and personal beliefs trump so-called "objective facts" (Oxford Dictionaries, 2016, as cited in Farkas & Schou, p. 50; see also Davis 2017; Keyes, 2004; Lewandowsky et al., 2017). While incorrect and misleading information and politically-charged propaganda are certainly not new, some have highlighted how 'post-truth' conditions have been fuelled by COVID mis- and dis-information and US political truth-centred discursive contests (Allcott & Gentzkow, 2017; Lazer et al., 2018; Monsees, 2020; Pennycook et al., 2020; Peitz et al., 2021). As such, recent public discourse and scholarly attention has focused on 'information disorders' (Wardle & Derakhshan, 2017) and polarisation, including differing views about the role of social media platforms (Arguedas et al., 2022; Dehghan et al., 2020).

Yet it could be argued that 'problematic information' – which includes mis- and dis-information, along with more ubiquitous public relations information, advertising and public affairs (Jack, 2017) – and polarisation are potentially products of a much broader and interconnected societal failings. As Freedman and Fenton (2017) state in Farkas and Schou (2019), the issue is not "fake news", rather "fake democracy" (p. 126). Farkas and Schou continue:

> We want to suggest that the current democratic crisis is in fact neither sudden nor linked to issues of factuality or reason alone. More fundamentally, what

> is at stake is a crisis of democracy caused by the increasingly pervasive dismantlement of proper democratic institutions, popular sovereignty and political participation. (2019, p. 126)

While the intention of this work is not to study the state of 'fake democracy' per se, the point here is that poor quality information – whether deliberately deceptive or not – is part of a much larger problematic assemblage (Figure 1.1). Rather than focusing on these informational outputs alone, it is useful to consider them as manifestations of power contestations to influence meaning in minds. These power struggles also link to the much broader problems of epistemology – how we come to know what we know – and legitimacy. In other words, where and how do we source our information, who do we trust, and how are certain discourses and knowledge received, internalised and accepted as 'reality', or challenged (Castells, 2016, p. 9)? Therefore, considering this research problem assemblage in the context of power, and specifically communication power, and how these dynamics could be operating in the realms of the hyperconnected and technologically-mediated network society, has allowed me to situate the focus of the research problem. Rather than being concerned about deeming truth and falsehood – which is an act of power in itself – this work seeks to examine how reality is framed, re-framed and circulated in our fractured, yet interconnected, modern day digital communication environments. Through understanding these dynamics we are better placed to understand the heart of informational politics and power – that is "power over minds" (Castells, 2016, p. 9).

1.1.3 The problem with 'the' science

Another interconnected element of power over narratives and so-called 'truth', is what is troublingly referred to as '*the* science' by those wanting to legitimise policy-related decisions, including environmental protection. The idea that there is a single truth or static science is a problematic narrative and has the potential to be delegitimising and divisive (Aklin & Urpelainen, 2014). This simplification does not reflect the true nature of knowledge or science, and in fact these binaries stand in direct contradiction to the idea that knowledge changes and evolves in the manner of an always 'becoming' assemblage (Deleuze & Guattari, 1988; Braidotti & Fuller, 2019). This misguided 'use', or operationalisation, of science has become a key factor in this research inquiry – something that was not initially intended, but was evident following data collection. Casting scientific doubt or uncertainty is a tried and tested tactic that

scholars have previously highlighted in research about climate change science denial and delegitimisation (Ceccarelli, 2011; Dunlap & McCright, 2011; Jacques, 2006; Lewandowsky, 2021; Oreskes & Conway, 2010; Scheufele, 2014).

Most recently, the mediatisation and politicisation of science has been documented in the case of the GBR, which is recognised internationally as a site of beauty, ecological diversity and significance for tourism[2]. In examining recent Reef-related science contestations, Konkes & Foxwell-Norton (2021) argue that scientists can be actors in the mediatisation of science communication and contribute to further polarising debate about climate change (p. 471). The role of science and scientists and their ability to enact conflict and reinforce and contest narratives and scientific knowledge are explored later in this thesis in terms of information flows, framing and power in the contemporary communication environment.

1.1.4 Media power in the social news media network

The role of media in framing, reframing and furthering information flows is also a central element of this research, which influences how publics come to 'know'. The impact and power of media has been long studied for the ability to capture attention and frame reality (Altheide and Snow, 1979; Carvalho, 2010; Strömbäck, 2008). However – as noted by scholars and further explored in Chapters 2 and 3 – mainstream media actors are now competing for audience attention with other content creators. In this thesis, mainstream media is understood as media outlets and media professionals that are existing news brands, or are associated with existing news brands, including commercial or public broadcasters (Appendix C). Yet the extent of the power that mainstream media has over other actors and information flows in these multi-nodal online networks is an interesting and empirically underexplored dynamic. There are now dynamic interplays between mainstream media actors, alternative media actors and other users within the disrupted mass communication multimedia network, with the lines between news producers and news consumers blurred (Hermida, 2013). Bruns (2018) defines this network of news-sharing and engagement as the 'social news media network', saying it comprises: "conventional news organisations, alternative and

[2] Although it should be noted, the Great Barrier Reef is far less promoted and publicly understood for its enduring connection to Great Barrier Reef Traditional Owners, which is of great significance: www.gbrmpa.gov.au/our-partners/traditional-owners/aboriginal-and-torres-strait-islander-heritage-strategy.

citizen media outlets, professional and citizen journalists, industry and freelance newsmakers, dedicated social news curators and ordinary social media users, as a social news media network" (p. 349).

Thus, a key question emerges: while these lines have been blurred, have information flows and power relations changed? This question has been topical in recent public discourse and events in Australia, such as the Digital Platforms Inquiry and Senate Inquiry into Media Diversity (Australian Competition and Consumer Commission [ACCC], 2019; Environment & Communications References Committee, 2021; Flew & Wilding, 2021). As one example, during the time of conducting this research project, Facebook effectively shut down all news-related Facebook pages in Australia in response to the introduction of the Australian Government's "world first" legislation requiring the tech giants to pay news media companies for content posted on their platforms (Bossio et al., 2022, p. 2). To this effect, this work hopes to enhance understanding of mainstream media power in the contemporary communication environment, something I further elaborate upon in the project purpose, scope and objectives section below. Firstly, while briefly discussed above, it is important to situate the research problem assemblage within a broader social realm.

1.1.5 The broader social context

Of course these power relations are not operating in a vacuum, or just within the multimedia mass communication networks of the network society (Castells 2011a), and the research problem needs to be situated in a broader social context (Figure 1.1) As this assemblage is extremely complex and interconnected, Figure 1.1 shows only a fraction of the contributing elements in the problematic mix of the current social context, and does not show interconnections. Yet it has been useful for me, as the curious researcher, to try to situate my specific line of enquiry and consider the significance of the findings. To give a brief overview, the cluster in green relates to elements that directly relate to the operation of the mainstream media industry, but also crossover into digital platforms as information providers and hosts. These elements all contribute to how information is accessed in terms of how it is made available, or limited, and how framing may be impacted.

The group in yellow relates to the engagement of 'produsers' (Bruns, 2006, 2008) – the hybrid user-producers in digital spaces – with content. These factors also contribute to framing and access to information flows, but are more about knowledge-

shaping aspects. These can be internal as part of human cognition factors and behaviour, or external, and include elements like platform design affordances, algorithms, and strategic use of inauthentic accounts and/or coordinated activity (Gorwa & Guilbeault, 2020; Graham et al., 2020b). The items in blue relate to problematic contributors that have epistemological implications, like a broad societal lack of media, information and scientific literacy, which can impact on how people come to 'know' what they 'know'. Specifically, research has shown that a limited understanding of scientific process – namely that science does not deal in 100% guarantees – contributes to the manipulation of this as 'scientific uncertainty' and the undermining of science (Lenzi, 2019). The elements that relate to a distorted understanding of media and platforms' objectives have shared concerns: often the lack of understanding from 'produsers' (Bruns, 2008) that the main objective of these businesses (with some exceptions, like non-commercial public broadcasters and alternative outlets) is profit. In the case of free social media platforms (again, with exceptions), if users are not paying to access the product, they become the product, and the trade-off is in the form of data and privacy. Castells describes this as the "commodification of freedom" where audiences are sold the images of their lives to support the money-making or influence-producing goals of the platforms (2011b, p. 782). Yet currently there is inadequate education available to help users of digital platforms to understand these rules of engagement to help navigate these challenges.

Finally, the elements in grey are some of the broad societal factors that relate to the ability to connect and disconnect, and are central in power dynamics. These include factors that can stoke societal disengagement and prompt certain disempowered social actors to oppose dominant institutions and practices as a way of countering power. As Bruns (2018) notes, this dissatisfaction can fuel problematic information, with some being prepared to share disinformation and propaganda in a deliberate way, even if they know the information is false, as long as it disrupts the power structures they oppose (p. 357).

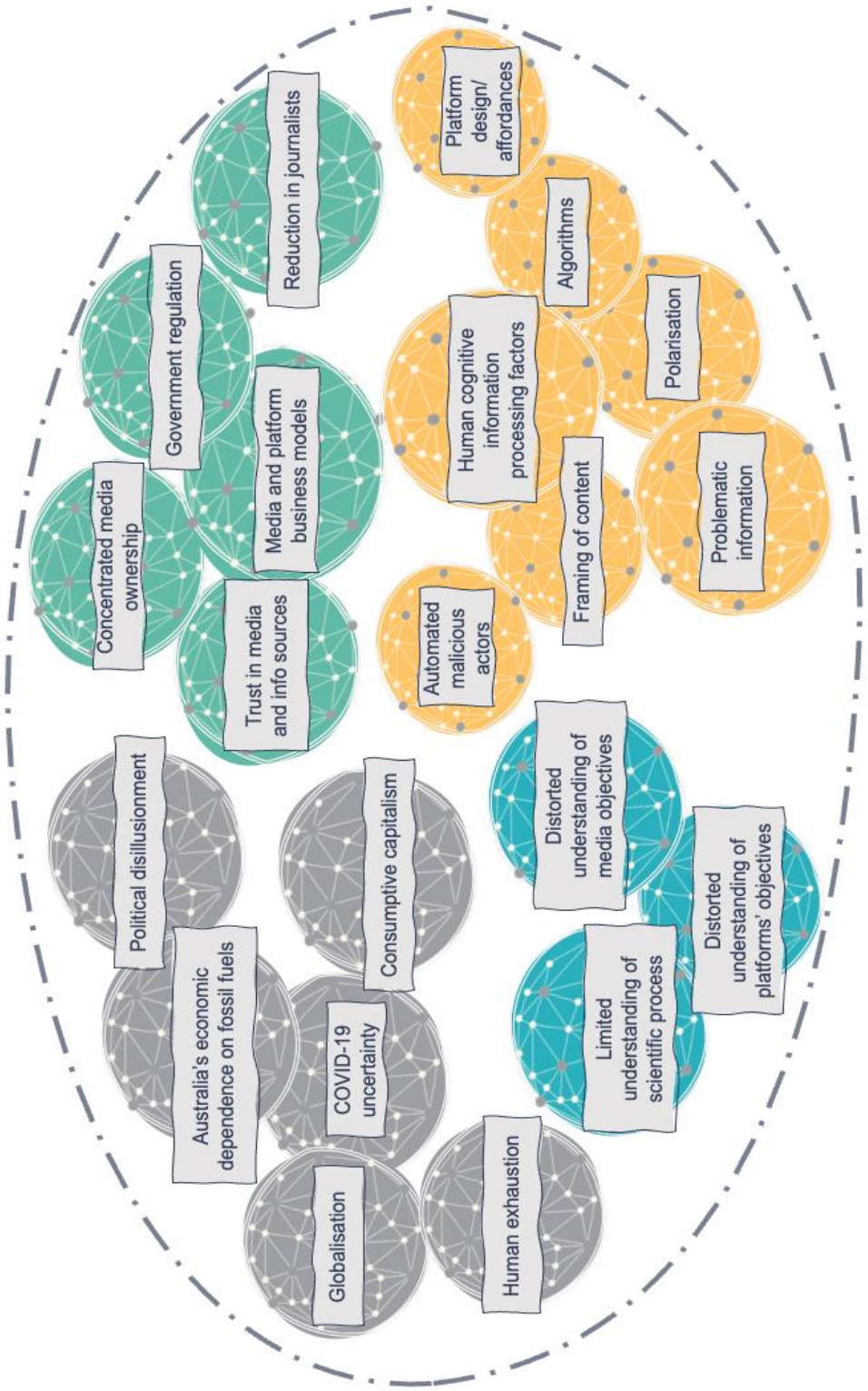


Figure 1.1. An interpretation of some of the elements in the research problem assemblage as part of a wider informational and epistemological context. This visualisation is not exhaustive, and the objective is to highlight that there are many contributing factors. The dotted line represents the permeable boundary of the research problem within the current societal era, highlighting this problematic mix is not fixed. Some of these contributing elements are shown by circular subnetworks. This signifies that these elements are, in-turn, comprised of a series of interconnected elements that are dynamic and ever-changing. Each of these subnetworks is clustered together in 'groups' of related elements, indicated by colour. The idea for this visualisation was inspired from the collective literature reviewed (Chapter 2) and the principles of relational ontology (Braidotti, 2019).

1.2 PROJECT PURPOSE, SCOPE AND RESEARCH QUESTIONS

Noting the research problem and broader context outlined above, the key objective of this inquiry is to explore and understand power dynamics in contemporary communication environments and the impact on informational authority, flows and knowledge. As such, the research question for this thesis is:

How is power asserted and contested in the social news media network in relation to environmental protection?

This study addresses this question by applying Castells' network theory of power, which adopts his idea that, in the network society, social power is mainly exercised by and through networks (2016, p. 10). Specifically, Castells identifies four types that are relevant to modern social and technological conditions: networking power, network power, networked power and network-making power. While these are outlined in Chapter 3, a key point is that each network defines its power relationships according to its goals and objectives. Reflecting Castells' argument that the goal of multimedia communications networks is to attract an audience (Castells, 2011b, p. 781), I therefore argue that the ultimate goal of the social news media network is audience attention. This could be for financial purposes or ideological, though it is often a mix of both. To study power interplays in this hyperconnected communications space, it is necessary to determine how this attention manifests to be able to make claims about power in this specific network.

This involves considering each of Castells' four forms of power and assigning power indicators that captured the goal of attention-getting that were appropriate to online news-sharing spaces. This included identifying dominant actors, information flows, frames, and the tactics used to further or re-frame narratives and contest power in each social media news network of Twitter, YouTube and Facebook. The theoretical thinking underpinning this approach is outlined in Chapter 3, while the methodological strategy, including how indicators have been adapted to reflect the different affordances of each platform, is discussed in detail in Chapter 4.

The case study selected was the mediatised and politicised GBR, which has already been subject to research about its media politics and the way its protection has been framed to meet the goals of certain actors. The specific event was chosen for its ability to induce 'mediatised environmental conflict' (Hutchins & Lester, 2015) – a

moment when various actors' competing goals and logics collide in the context of environmental protection. This was UNESCO's World Heritage 'in danger' recommendation in June 2021, an event that attracted activity and conflict across multimedia mass communication networks (Section 1.4).

1.3 CONTRIBUTIONS TO KNOWLEDGE

This work makes empirical contributions to knowledge across multiple interconnected disciplines, including – but not limited to – media studies, political communication, environmental sociology and computational social science, and also offers a novel way to apply Castells' network theory of power to social media news-sharing spaces. It contributes to societal and scholarly debate about the role and impact of mainstream media in disrupted digital environments in the context of environmental protection. While this relationship has been studied (Newman, 2017; Veltri & Atanasova, 2017), there are fewer instances of systematic evaluation across multiple digital spaces, particularly within an Australian case study. Understanding the dynamics and power of mainstream news media, alternative media and the interplay of other embedded actors across multiple platforms in framing, re-framing and contributing to information flows is required to inform contemporary discussions about media power and regulation, and help to address the challenges of problematic information, especially with potentially divisive topics.

At the case study level, this research addresses a gap in the literature about how the GBR and its protection is contested in contemporary online communication environments. Work has been conducted that focuses on mainstream traditional media, but far fewer studies explore the media politics of the GBR in digital networks (Newlands & Martin, 2018) and work across multiple social media platforms in this context has not been detected. Furthermore, this work contributes to knowledge at a social media research level by addressing the call for inquiries beyond Twitter, studies that simultaneously consider more than one platform, and draws on mixed methodologies to generate richer insights from the large amounts of data available (Pearce et al., 2019; Rogers, 2017).

Theoretically, this work contributes to two main concepts. It applies Castells' network theory of power to do what the scholar has advocated for: testing how his four forms of power operate in contemporary mass communication networks. This required

developing a series of social network theory-inspired power indicators appropriate to capturing attention within the social news media network, understanding that the ability to capture and hold attention is a form of power. This included adapting them to Twitter, YouTube and Facebook. I have applied these network-specific indicators of power to investigate informational flows and dynamics within these networks during the specific GBR case study. While I intend to continue to test and refine them in relevant future work, I hope they are useful for other researchers to use, modify and expand upon as needed. Finally, this work contributes empirical evidence to Konkes and Foxwell-Norton's (2021) recent argument that science is a fifth sphere of action in Hutchins and Lester's (2015) mediatised environmental conflict model. Verifying that scientists and science are a social sphere in their own right reflects how science is involved in its own power struggles with other spheres, including politics, and plays a role in contributing to environmental conflict rather than simply informing environmental policy (Konkes & Foxwell-Norton, 2021, p. 479; Pielke, 2004; Scheufele, 2014; Chapter 3).

1.4 THE CASE STUDY: THE GREAT BARRIER REEF

1.4.1 Competing priorities, competing frames

As one of the world's most recognisable environmental icons, the GBR offers the potential for an enlightening case study. As noted by Anders Hansen (2011), public debates about environmental issues are as much about communicating to win "hearts and minds", as they are to communicate science-based evidence (p. 8).

The GBR and its protection has long been the subject of proxy arguments about environmental protection versus exploitation (Bowen & Bowen, 2002; Foxwell-Norton & Lester, 2017; Lloyd et al., 2016; McCalman, 2013; Wright, 1977), but the World Heritage site has sat more squarely in the global spotlight in the recent decade due to the decline in its health and long-term outlook, including four mass bleaching events in recent years (Great Barrier Reef Marine Park Authority [GBRMPA], 2009, 2014, 2019; Smith & Cook, 2022). Scientific reports show this decline is predominantly due to global climate change (Intergovernmental Panel on Climate Change [IPCC], 2022), yet there are other more domestically-situated threats like water quality, which has been attributed mainly due to agricultural run-off; plus

pressures from shipping, coastal development and crown-of-thorns starfish outbreaks (GBRMPA, 2022; Creighton et al., 2021; Waterhouse et al., 2017).

Aside from its global significance both ecologically and economically, the pre-pandemic GBR was responsible for generating $6.4 billion annually for the Australian economy and 64,000 jobs (Deloitte Access Economics, 2017). It is also significant in the range of stakeholders who are involved in both its exploitation and protection (Barnes et al., 2022; Fidelman et al., 2013; Morrison et al., 2019). This includes numerous actors, each with competing goals and logics, from tourism operators, commercial fishers, catchment-based cane and beef farmers, major ports and mines, to Traditional Owners, local councils, environmental groups, and catchment communities, including recreational fishers, local GBR users and schools.

Adding to the competing goals of the above-mentioned stakeholders, the operating environment is also extremely politically charged. Not only do political actors need to somehow represent these diverse interests, but as the joint managers of the GBR, both the Queensland state government and the federal government have an interest in ensuring that this management and investment is reflected well on both the domestic and global stages, particularly with the GBR having been subject to international oversight via UNESCO's World Heritage List since 1981 (Day, 2016; Morrison et al., 2020). Understandably, this has the potential to create a scenario where 'truths' and narratives compete in public discourse in accordance with each group's objectives. This can result in 'mediatised environmental conflict' (Hutchins & Lester, 2015) where these differing goals and logics collide.

1.4.2 The media politics of protection

The GBR and its protection have been the subject of media attention for more than 60 years (Foxwell-Norton & Lester, 2017; Lloyd et al., 2016), yet most recently it has become emblematic of inadequate climate change action and policy (Foxwell-Norton & Konkes, 2021; Hughes et al., 2021; Ley, 2021). Recent events that have induced mediatised environmental conflict include the approval to dump dredge spoil from the expansion of Abbot Point coal terminal into the Great Barrier Reef Marine Park in 2014 (Lankester et al., 2015), two consecutive years of mass coral bleaching in 2016 and 2017 (Mitchell & Roffey-Mitchell, 2018), the prognosis of the *2019 Great Barrier Reef Outlook Report* that the global icon had a "very poor" outlook

(GBRMPA, 2019), and further mass coral bleaching events in 2020 and 2022 (Rural and Regional Affairs and Transport References Committee, 2020; Smith & Cook, 2022). Another pressure point has been the Queensland government's Reef protection regulations, which were strengthened in 2019 to address water quality impacts to the GBR (Environmental Protection and Other Legislation Amendment Bill, 2019; Queensland Government, 2022). However, this move met opposition from some members of the farming community, right-wing politicians, lobby groups and a small group of scientists who said the science underpinning the environmental policy was flawed, resulting in a Senate Inquiry with the laws upheld (Rural and Regional Affairs and Transport References Committee, 2020; Stubbs, 2020). Subsequent to this, recent research into GBR water quality communication found that there was a narrative of uncertainty circulating about the health of the GBR (Newlands et al., 2021). In other words, there are competing stories causing confusion, which creates a 'narrative void' for problematic information to fill.

1.4.3 World Heritage status threat

The most recent issue for the GBR, which has become the subject of this case study, is the threat of a World Heritage 'in danger' listing. This threat is not new, with UNESCO and the International Union for Conservation of Nature (IUCN) pulling on this lever in the past to spur the domestic Australian governments into action to lift their protection efforts (Hughes et al., 2021; Morrison et al., 2020). Specifically, the GBR's status was questioned in 2012, and again in 2015 in response to concerns about industry development on the coast and the dumping of capital dredge spoil in the Marine Park, respectively. An outcome of these World Heritage 'in danger' listing threats was the creation of the Australian and Queensland government's *Reef 2050 Long-Term Sustainability Plan* to address the key GBR health threats (Department of Agriculture, Water and the Environment [DAWE], 2021a). Notably, this management plan did not originally include addressing climate change as a threat. This was later added and the plan was further updated and released in December 2021 as part of a scheduled five-year review (Commonwealth of Australia, 2021; DAWE, 2021b; Readfearn, 2021). Alarm bells were also sounded by the World Heritage Committee (WHC) in 2017 due to the impact of back-to-back years of mass coral bleaching, but it was not until June 2021 that the 'in danger' listing threat resurfaced with gusto. This was in response to the aforementioned "very poor" outlook for the GBR signalled by

the Great Barrier Reef Marine Park Authority (GBRMPA), which called for immediate action on climate change (GBRMPA, 2019). GBRMPA is the federal government agency for managing the GBR. As it is of relevance to this study, GBRMPA works closely with another federal government agency – the Australian Institute of Marine Science (AIMS) – which is involved in conducting GBR science, along with James Cook University's ARC College of Excellence for Coral Reef Studies and several other academic and scientific institutions (Waterhouse et al., 2017).

The health of the GBR was on the agenda to discuss at UNESCO's 44th World Heritage Committee session in July 2020, but this was postponed due to COVID-19 and rescheduled to July 2021. However, while the GBR's health had been flagged, as the government press release and media coverage shows, the government was not expecting an 'in danger' recommendation, saying it had been "blindsided" and implied politics was at play (Day et al., 2021a; DAWE, 2021c). Just days before the WHC meeting on July 23, 2021, AIMS released its annual coral cover report. The report showed that the GBR was in a "recovery window" due to a reprieve from extreme weather, with coral rising across all regions, yet it cautioned that the GBR still remained under intense pressure and climate change action was needed (AIMS, 2021a; AIMS 2021b).

The outcome of the July 23, 2021 WHC meeting was to postpone the decision for another year, with Australia required to provide an update on its protection efforts by February 2022 and the committee set to reconvene in 2022[3]. At the time of writing this thesis, the outcome of this meeting is unknown. For additional context that is relevant to the collected data, China was the chair of the WHC at the time of data collection, but this role – and appointment to the 21-seat committee – rotates between the member parties of the general assembly. Australia and another 10 countries ended their membership of the committee in November 2021 and a new committee has been elected (UNESCO World Heritage Centre, 2022). Further, the lead-up to the 2022 decision was in a federal election year and the incumbent Liberal National Party government pledged an additional $1 billion towards the GBR's protection (DAWE,

[3] This meeting was initially scheduled for June 2022 in Russia, but has since been postponed. At the time of writing, no new date has been set.

2022). This commitment has received criticism from some as the initiatives do not directly address climate change (Evans, 2022; Gordon, 2022).

The intersection of the above-mentioned elements creates a ripe environment for 'problematic information' and communication flows and power, especially when a conflict-inducing event poses a threat to political power and neoliberal ideology. Namely, an 'in danger' listing signals to the international community that Australia is not doing enough to address climate change, which could increase global pressure for growth-limiting policy, potentially threatening the social licence of extractive industries' continued production rates, questioning societal consumption and – ultimately – challenging the hegemonic neoliberal social order (Jacques, 2006; Morrison et al., 2020). As such, the highly mediatised, politicised and emblematic nature of the GBR makes it the ideal case study to explore how attention is being attracted in the social news media network to convey and challenge the 'reality' of the GBR's health, the threat of climate change, and – by extension – attitudes, values and practices as a society in an era of environmental, informational and epistemological transformation.

1.5 LIMITATIONS

There are some limitations of this research that need to be acknowledged. While the scope of this study extends to three social media platforms and addresses the need for multiplatform analyses (Chapter 2), the findings and subsequent discussions relate only to these particular networked news environments. Further, Twitter, YouTube and Facebook cannot be directly compared in an 'apples to apples' sense because they each have their own set of platform logics and affordances that affect how information is created and flows. While the research was designed to reflect those affordances, they are still different communication spaces. Moreover, this study considers English-language posts only and, as such, the data gathered does not account for the information flows and framing that occur in non-English-speaking contexts. Further, the observations made and interpretations I make from this data are framed by my own positionality as a person who has lived only in capitalist liberal democracies. The claims about informational authority, flows and knowledge certainly could not be applied to different systems of government or economic conditions as the multimedia networks of mass communication interplay with the political and financial networks in different ways. These relationships, while fascinating, are not the focus of this study.

Another limitation to this work is that, while the scope is clear in its goal to explore the social news media network only and the key actors and information being channelled, these spaces are still impacted by power interplays in the offline world that are not captured in the data. While the analysis is extended by tracking the 'dissemination careers' (Bruns & Keller, 2020) of some key content items and includes this broader context in the discussion, further studies may benefit from strategic semi-structured interviews with key embedded actors to provide greater analytical insight. Finally, there are of course limitations associated with data collection and analysis, which I expand upon in Chapter 4.

1.6 THESIS OUTLINE

Following on from this Introduction chapter, which sets the scene of the research inquiry, the remaining chapters are as follows:

Chapter 2 is the literature review where published work relating to the research problems and case study are explored, including existing work on Twitter, YouTube and Facebook that relate to information flows, media framing and power. It also includes work-to-date about the Great Barrier Reef in the context of media and politics.

Chapter 3 outlines the theoretical 'research assemblage' designed to explore and understand the multifaceted problems highlighted in this chapter. This includes Castells' network theory of power as the central node, which connects with social network theory, framing theory, and Hutchins and Lester's (2015) mediatised environmental conflict concept. The chapter outlines how Castells' four forms of power will be operationalised to explore the research problem, including power indicators that relate to attracting attention.

Chapter 4 explains the integrated mixed methods approach of this research inquiry. This includes how Castells' network theory of power and my proposed power indicators for the social news media network have been deployed via social network analysis metrics, and adapted to meet the affordances of Twitter, YouTube and Facebook. This chapter also includes ethical considerations and methodological limitations.

Chapters 5, 6 and 7 are the results chapters, which report the findings from Twitter, YouTube and Facebook data respectively. Using the power indicators and metrics, these chapters report the most attention-getting actors in the networks (Part

A), dominant information sources and frames (Part B), and power interplays through the lens of connection and disconnection (Part C).

Chapter 8 is the discussion chapter, which considers the research question in light of the results from Twitter, YouTube and Facebook, outlining some of the key ways that power is asserted and contested within the social news media network. It also situates the findings in the broader context of the research problem and existing literature.

Chapter 9 presents the conclusion where this work and its findings are summarised, including discussing the project's broader significance, recommendations, and opportunities for future lines of inquiry.

Chapter 2: Literature Review

2.1 INTRODUCTION

This chapter situates the research problem and research questions by exploring the key literature and identifying some gaps that this inquiry intends to address to understand power in the social news media network in relation to environmental conflict. The main topics covered are informational dynamics; science communication; media networks; politics, media and the environment; and existing media and social media work that relates specifically to the media politics of the GBR. It also provides further clarification to some terms and concepts that are applied in this thesis. This literature review highlights some key research gaps, including examining contemporary informational interplays in digital networks through the lens of power, and exploring how the protection of the GBR is being contested in social media spaces, particularly how actors embedded in these spaces are interacting. There is also an opportunity to address the need for further multiplatform work within social media research, principally in relation to hybrid news-sharing environments to consider the interplay between mainstream and alternative media. Understanding how information is being channelled in networks of news sharing, and by whom, would offer a novel insight into how 'knowledge' and 'reality' are being conveyed and contested across multiple social media platforms in relation to the protection of the GBR. Literature relating specifically to the research design is outlined in Chapter 4.

2.2 INFORMATIONAL DYNAMICS

2.2.1 Problematic information and framing

Our engagement with information, accessible to us through a variety of means, contributes to our sense and knowledge-making. Yet while incorrect and misleading information is not new and has historically been recognised under numerous terms, recent public discourse has seen a focus on 'misinformation' and 'disinformation', particularly following the decentralisation of communication spaces and global events that have diffracted attention from traditional knowledge sources (Marwick et al., 2021). As noted in Chapter 1, the intent of this study is not to attempt to classify information as 'true or false', rather, it is more interested in how messages are framed

to further certain goals. However, it is still useful to define these salient terms in the context of this inquiry.

As such, the term 'fake news' became prolific during recent events in US politics. However, scholars have since foregrounded its problematic use, describing the term as "woefully inadequate" to capture the complex phenomena of information disorder (Wardle & Derakhshan, 2017, p. 5; see also Freelon & Wells, 2020). Carmi et al. (2020) and Krasni (2020) note that the term – originally directed at the media to criticise inaccurate reporting – has since been co-opted by political actors to discredit news reports and reported information they simply do not like, and to undermine science. Contextually, Krasni (2020) situates 'fake news' as an operationalised form of the post-truth concept. Other common terms include 'misinformation' and 'disinformation', which Wardle and Derakhshan (2017) group as components of "information disorder" (p. 20). They define misinformation as information that is incorrect, but not created to intentionally cause harm, while disinformation is deliberately false and intended to "harm a person, social group, organisation or country" (p. 20).

While the consideration of disinformation, or propaganda, is appropriate and valuable for many 'media politics' studies (Faris et al., 2017; Glazunova et al., 2021; Marwick & Lewis, 2017; Starbird et al., 2019), it is not a key focus of this work. Rather, this research is about how 'reality' is positioned and contested by and through certain actors in the social news media network, so the term 'problematic information' (Jack, 2017) is more useful. Caroline Jack explains: "Some information is problematic: it is inaccurate, misleading, inappropriately attributed, or altogether fabricated" (p. 1). Jack notes the lines between advertising, public relations, and public diplomacy can blur with content deliberately designed to manipulate and deceive. Campaigns designed to impart "power of minds" (Castells, 2016, p. 9) can involve both accurate and misleading information.

The strategic positioning of information is also understood in media studies and political communication as 'framing' (Entman, 2010). While framing theory is explored further in Chapter 3, Hansen (2011) and Nisbet (2009) describe how frames are strategically deployed and manipulated by central actors in public environmental debates. This impacts the nature of the media coverage and public understanding of controversial and complex environmental issues. Somerville and Ames (2020) refer to

Goffman (1986), Lepisto-Johansson (2010) and Scheufele (1999) to argue that media consumers subconsciously draw from the frames used to report the news to construct their social reality, with framing occurring during both the delivery of the information (by the media) and receiving the content (by the audience).

In relation to scientific information, Scheufele (2014) says "mediated realities" (p. 13588) are an important conduit between science and non-expert audiences. The media capture and distil the relevant information so audiences do not need to, which results in mediated realities impacting public perceptions of science generally, but also across specific topics (Scheufele, 2014). While scholars have used this lens to understand how environmental issues have been packaged from senders (Nisbet & Newman, 2015; O'Neill et al., 2015), more work is needed to understand how they are unpacked by different receivers in communication environments (Hansen, 2011). This includes understanding how actors like scientists, politicians and 'lay publics' accept or reject frames (p. 19).

2.2.2 Contemporary communication spaces

Social media platforms and their benefits have been the subject of numerous studies (Becken et al., 2017; Dwivedi et al., 2018; Given et al., 2017; Hemsley et al., 2018;Plant, 2004). In the early 2000s, scholars suggested that the Internet could foster deliberative discourse (Stromer-Galley, 2000), thus enhancing the deliberative capacity of society – a condition that has been described as central to democracy (Dryzek, 2009). However, others have cast the spotlight on the drawbacks of digitally-mediated spaces. These include concerns about quality and veracity of the information (Iyengar & Massey, 2019; Park et al., 2020a), the ability for platforms to be used as tools of manipulation (Dobson, 2022; Scheufele & Krause, 2019), the potential impact of inauthentic accounts and coordinated activity (Gorwa & Guilbeault, 2020; Graham et al., 2020b; Vosoughi et al., 2018) and the tendency for business models to target user attention at the cost of information quality (Krasni, 2020).

Also in this mix are concerns about audiences being served information based on their preferences and biases, with this personalisation of content prompting public and academic discussion about the existence of 'echo chambers' and 'filter bubbles' (Pariser, 2011), and instigating a host of work on Twitter in particular (Barberá et al., 2015; Bright, 2018; Conover et al., 2011; Himelboim et al., 2013a) and on other platforms to lesser degrees (Bakshy et al., 2015; Bessi et al., 2016; Bozdag, 2020). The

argument is essentially over human versus algorithmic agency (noting of course algorithms are created by humans) in directing information flows. In an 'echo chamber' situation, it is argued a person will only be exposed to information flows that support their existing views (Sunstein, 2002, as cited in Bright, 2018), largely due to mathematical instructions personalising content for social media users in the form of algorithms (Pariser, 2011, as cited in Barberá, 2020). However, recent research has highlighted how this metaphor is an oversimplification and reality is far more nuanced (Arguedas et al., 2022; Bruns, 2019b; Geiß et al., 2021). For instance, it does not account for the information that hybrid user-producers are exposed to offline, or on other platforms, or even within different topics or issues on the same platform. Also, it does not factor in pre-conditions, like hyper-partisanship (Barbera et al., 2015; Wischnewski et al., 2021) or nuances when encountering information that is contrary to beliefs (Bright at al., 2020; Garrett, 2009).

While it has been shown consistently offline (Petray, 2010; Barnes et al., 2016) and online (Himelboim et al., 2013a; Williams et al., 2015) that human actors exhibit a desire to group with like-others, a concept known as homophily (McPherson et al., 2001), or selective exposure (Himelboim et al., 2013b); research into polarisation seeks to examine whether this connection is also about disconnection. For instance, according to Guerra et al., 2013, to better understand polarisation, researchers need to look for the presence or absence of antagonism, since "homophily is a pattern present both on non-polarised and polarised networks, but antagonism is expected only on the latter" (p. 5).

2.2.3 Refusing to know

Human psychology factors that have been highlighted as knowledge barriers include selective exposure (discussed above), motivated reasoning, and confirmation bias (Weeks et al., 2017; Lenzi, 2019; Scheufele & Krause, 2019) can impede connection. Scheufele and Krause (2019) link these factors to individuals becoming misinformed about political and science information, with audiences choosing to notice and accept information that supports current beliefs (confirmation bias). This avoids 'cognitive dissonance': the uncomfortable feeling of encountering new information that clashes with an established worldview (Scheufele & Krause, 2019). These factors all contribute to a refusal to 'know', even when presented with evidence, and can result in the "backfire effect" (Bail et al., 2018, p. 9217) where information

rejectors further dig into their ideological position when faced with counter 'truths'. Another interesting idea raised by Popkin (1994) in Scheufele (2013) is the notion of "low information rationality" (p. 14044). This concept suggests that humans receive so much information on a daily basis that, in order to process it quickly and efficiently, they employ various shortcuts to prevent decision-making overload, which can often involve defaulting to pre-existing values, or cues from mass media about how to interpret scientific issues.

2.2.4 Societal factors

Broader ranging societal elements can also impact information flows, including science communication. Some of these were highlighted in Chapter 1, but they include political polarisation (Bail et al., 2018; Conover et al., 2011; Lenzi, 2019; Scheufele, 2013), growing economic equalities (Scheufele & Krause, 2019), a changing mainstream media landscape, including reduced diversity, the loss of regional newspapers, decline in science news and science journalists (ACCC, 2019; Newlands, 2020; Park et al., 2020b; Park et al., 2021; Public Interest in Journalism Initiative, 2022; Scheufele, 2013; Simons & Dickson, 2019), fluctuating trust in news (ACCC, 2019; Farhall et al., 2019; Park et al., 2020a; Park et al., 2020b; Park et al., 2021), and links between lower socio-economic circumstances and reduced media literacy (Park et al., 2021), and insufficient media and data literacy more broadly (Carmi et al., 2020). Another element is the 'mediatisation of science' in the way scientists seek coverage to support funding and research exposure, while the media seek stories with conflict to draw attention, or that align with its own goals ideologically (Jacques, 2006; Scheufele, 2014; Konkes & Foxwell-Norton, 2021).

2.3 SCIENCE COMMUNICATION

2.3.1 Misunderstanding science

Research has also found a failure to understand scientific process plays a strong role in undermining scientific trust and credibility (de Melo-Martin & Intemann, 2013; Dobson, 2022). Stating that "misinformation works precisely because the public misunderstands science", Lenzi (2019) argues that scientific illiteracy makes it challenging to identify reliable scientific claims, or distinguish these from misleading claims. A further problem is science's commitment to challenge, revision and refusal to claim 100% certainty, which is misinterpreted as science being "unclear or

muddled" (Douglas, 2015, as cited in Lenzi, 2019, p. 318). Lenzi (2019) further argues an audience's ability to judge the credibility of scientific claims worsens if science is politicised. These thoughts are echoed by Chubb (2012), Scheufele (2014) and Dobson (2020), with the latter saying the "provisional nature of science is often used to attack the process in the media, which sends mixed messages to the public and politicians" (p. 2), with elected officials often undermining scientific credibility for political purposes. Aklin and Urpelainen (2014) concur, recognising the difficulty for scientists to "win debate in the media" (p. 176). This has resulted in the use of terms like "junk science" (Douglas, 2009, p. 10), which morphed into "politicized science" (p. 12), and is used to undermine the results of studies that "one did not like rather than science that was truly flawed" (p. 12).

However, despite the recent politicisation and public discrediting of science for strategic gain (examples from the GBR context: Johnson, 2020; Chubb et al., 2020) and some discussing how trust in science has eroded (Iyengar & Massey, 2019; Dobson, 2022), other literature suggests scientific trust remains more robust than trust in other actors like politicians and media outlets, including confidence in news published on social media platforms (Scheufele, 2013; MacKeracher et al., 2018; Flew et al., 2020; Park et al., 2020b; Park et al., 2021; Park et al., 2022).

2.3.2 Scientific uncertainty and policy

Farkas and Schou (2020) view the "the truth-telling capacities held by science are as much of a product of discursive battles as any other part of society" (p. 27). Yet these discursive battles can have consequences, with Aklin and Urpelainen's (2014) finding how communicating even small amounts of scientific dissent can impact the audience's likelihood to support environmental policy. This means a high degree of consensus is required from the scientific community to successfully convince the public about a problem. As such, the sowing of scientific uncertainty has become a well-trodden tactic for thinktanks, industry and other organisations are willing to "manufacture dissent simply to derail policies they find economically or ideologically undesirable" (de Melo-Martin & Intemann, 2013, p. 233, see also Ceccarelli, 2011; Dunlap & McCright, 2011; Jacques, 2006; Lewandowsky, 2021; Miller & Dinan, 2015; Oreskes & Conway, 2010; Taylor, 2014). Dunlap & McCright (2011) cite Begley (2007) to describe the collective of contrarian scientists, fossil fuel corporations, conservative thinktanks, amateur bloggers, public relations firms,

conservative media and pundits, conservative politicians, and strategically-created 'grassroots' lobby groups as the "denial machine" (p. 144), saying they are able to work towards the shared goal of undermining climate-related regulation, even if their efforts are not being coordinated.

Some argue this approach has served to sow uncertainty in climate science and inhibit the development of climate policy, including in Australia (Chubb, 2012; Environment & Communications References Committee, 2021; Lidberg 2019; Meade; 2020; Parliament of Australia, 2020; Taylor, 2014). Lidberg (2018) recognises that climate policy is already a complex area, yet the misinformation and, at times, "outright lies regarding climate science" (p. 83) has made it even harder for policy makers to navigate this space. Yet de Melo-Martin and Intemann (2013) caution against considering all scientific dissent as an obstacle to public policy, saying curtailing scientific debate for fear of confusing the public or policymakers can deter scientists from voicing genuine doubts, which can stifle the advancement of both science and policy (see also Driscoll et al., 2020a; Driscoll et al., 2020b; Holst & Molander, 2017; Goldberg & Vandenberg, 2021). They argue rather than supressing dissent, a more effective approach is improving scientific literacy. Further, Ceccarelli (2011) argues public education should involve scientists countering claims that dissent is being silenced and explaining how science involves open and lengthy debates amongst experts, but – on the issue of global warming – the science has been decisively settled.

2.4 MEDIA NETWORKS

2.4.1 Media logic(s)

'Mass media logic' was conceptualised more than 40 years ago (Altheide & Snow, 1979) to explain the rationality generated in and by media organisations that penetrated "every public domain" (2013, p. 3). It also explains media's ability to frame reality, while claiming neutrality when it reports the 'truth' as it perceives it. As noted earlier, this framing impacts the way people perceive this reality (Strömbäck, 2008), noting each receiver will also be affected by internal and external factors, including existing values, demography and current social 'realities'. The idea of media logic has since been updated to reflect today's less hierarchical communication spaces, with terms used like 'social media logic' (van Dijck and Poell, 2013), 'network media logic'

(Klinger & Svensson, 2015), and 'social news logic' (Hurcombe, 2019) used to reflect that the objective of audience attention and advertising dollars remain the same, but the ways of achieving this differ (van Dijck and Poell, 2013).

Highlighting the similarities and differences between traditional or mass media logic and social media logic, van Dijck and Poell (2013) argue that while social media logic needs to be understood as separate from mass media logic, it is increasingly being entangled in mass media logic, or – as Klinger & Svensson (2015) suggest – "overlapping" it (p. 1241). Others argue the duality between old and new media is now redundant – instead scholars must look at the dynamic interplay between them within today's "fast-moving media ecology" (Cottle, 2013, p. 20). As such, Chadwick describes "hybrid media logic*s*" (Chadwick et al., 2016, p. 8), which are intentionally plural and combine older and newer media logics in the "reflexively connected social fields of media and politics" (Chadwick et al., 2016, p. 4).

2.4.2 A news-making system

'Mediated reality' was once conveyed to audiences via a linear flow of information, but technological developments have transformed communication systems into interconnected networks where information flows occur in multiple directions and via numerous actors (Katz & Lazarsfeld, 1955; Ognyanova, 2017). Scholars acknowledge how 'communication power' (Castells, 2013) has become radically reconfigured and redispersed in the networked world (Bruns, 2018; Chadwick et al., 2016; Cottle 2013; Khosravinik & Unger, 2016; Scheufele, 2013). In this context, power is understood in alignment with Castells' definition as "the relational capacity that enables a social actor to influence asymmetrically the decisions of other social actor(s) in ways that favor the empowered actor's will, interests and values" (2013, p. 10). The globally interconnected 'network society' (2011a; Chapter 3) has changed the roles and power dynamics between 'communicators' and 'audiences', leading to the creation of terms like 'mass self-communication' (Castells, 2007), which refers to the agency of the audience in shaping and producing messages; and 'produsers' (Bruns, 2008), a term that reflects the hybrid role of content producers and platform users in digital communication environments. Non-expert publics, including industry groups, activists and politicians, can now publish directly via social media networking sites and interact directly with others (Scheufele, 2013). As noted by Khosravinik and Unger (2016), this disrupts the traditional linear flow of

information from "certain (privileged) producers to (ordinary, powerless) consumers" (p. 206) and has allowed modern media users to produce content in a participatory manner (Papacharissi, 2002; Petray, 2011).

As noted above, Chadwick and colleagues (2016) view these disrupted power dynamics as a "hybrid media system" (p. 8) consisting of "news making assemblages" (p. 24). This hybrid thinking stems from the social theory of Gilles Deleuze and Félix Guattari (1988), specifically that meaning and power are understood in terms of an assemblage's connections and disconnections with other assemblages. It also builds upon Manuel Castells' understanding of digital media systems as assemblages, where they continually adapt according to the goals being pursued (Chadwick et al., 2016, p. 6; Castells, 2016). For clarity, Castells uses the term 'network' to describe these dynamic systems (Castells, 2011a, 2011b, 2013, 2016). In Chadwick's hybrid media system approach, there are three theoretical pillars used to explore media politics: power, the idea of a system (or assemblage), and media logics (Chadwick et al., 2016). This thinking closely aligns with Castells' conception of the network society, including frames being embedded in the process of communication to generate meaning (Castells, 2011b, p. 776; Chapter 3).

Other scholars have also understood this news-making assemblage as the 'social news media network'. As noted in Chapter 1, Bruns says this integrated news sharing and engagement space is comprised of traditional news outlets, alternative news sources, professional and non-professional journalists, industry and freelance news-makers, news and information curators and ordinary user-producers (2018). It also includes the social media platforms themselves. Scholars argue that news-making needs to be understood as a networked practice involving multiple stakeholders, with established media outlets understood as "embedded participants" (Bruns, 2018, p. 359) within the social news media network, rather than separate actors (Beckett, 2010; Hermida, 2013).

2.4.3 Media power

Understanding the interplays between these embedded actors and the implications for information flows in these decentralised online networks provides a way to understand power relationships, with a need for further empirical research (Arguedas et al., 2022; Bruns, 2018; Cottle, 2013; Chadwick et al., 2016; Hansen, 2015; Pearce et al., 2019; van Dijck and Poell, 2013). Recent work has considered

information flows in contemporary communication environments. Klinger & Svensson (2015) discuss the role of "popular online intermediaries" (p. 1249) in the form of bloggers, who have fewer readers but can be influential as information-spreading catalysts, as opposed to traditional gatekeepers.

In a Twitter study examining the influential actors, information flows and frames following the release of an IPCC report, Newman (2017) found those who attracted the most attention were 'non-elite actors' (35%), defined as "users that did not have an affiliation with a particular media, nonprofit, or scientific organisation" (p. 818), and included independent bloggers, activists and concerned citizens. The next largest group was media organisations (17%). Of these media actors, mainstream media was the most dominant actor (35%), followed by 'new media' (23%), which included individual blogs and online-only media platforms (p. 821). *The Guardian* was the most dominant mainstream news organisation in the sample, but Newman notes the extent of mainstream media's influence was not universal, with 40% of the links being new media sources, including science and environment news websites (p. 823).

The Guardian was also highlighted as a dominant source in Kirilenko and Stepchenkova's (2014) Twitter study, with 5% of all tweets containing its domain. This compares to the most attention-getting alternative news sources, which were climate sceptic blogs *Watts Up With That* and *Climate Depot* (0.2% each). Likewise, Veltri and Atansova (2017) found that about two-thirds of URLs about climate change in their Twitter data went to "professional news organisations" (p. 733), which included newspapers and public broadcasting companies. Collecting and analysing about 70,000 media stories that were shared on Facebook and Twitter in the lead up to the 2016 US election campaign, Faris et al.'s (2017) found a difference in news-sharing patterns according to political alignment. While there was continued centrality in the role of mainstream news outlets across the political spectrum from centre-right to left, including sources like *The Guardian*; conservative media tended to be more partisan and insular than the left, with a noticeable gap in authority for news sources from the centre-right.

Scholars have surveyed publics across several different countries about their information consumption habits to understand the significance of media actors in digital spaces. In Australia, TV remains the main news source (including for climate change-related news), but since 2019 there has been a shift towards social media as a

news information provider (Park et al., 2020; Park et al., 2021). Yet the majority of social media users do not go to these platforms for news specifically, they tend to encounter news content while they are there for other reasons (Park et al., 2021; Newman et al., 2021). Taking a view across 46 countries, Newman et al. (2021) note that while audiences pay the most attention to information from mainstream news outlets on Facebook and Twitter (28% and 31% respectively), attention is directed to celebrities and influencers on platforms like Instagram, SnapChat and TikTok (p. 24). YouTube is a mix with mainstream news sources and personalities capturing attention (25% and 24% respectively). Those accessing smaller or alternative sources of news remains fairly consistent across all platforms at 11-16% of information sources. Park et al. (2021) had similar findings in their study of Australia-based news consumers, with Facebook, Twitter and YouTube users in Australia mostly paying attention to mainstream news outlets and professional journalists (p. 65).

Amongst the calls for more research in these spaces, Cottle notes exploring the interactions between "networks of operatives" (2013, p. 24) is especially relevant in the context of environmental conflict. This includes considering networks that contain actors from institutions like government and science, with further examination needed to understand how they are influencing environmental news discourses and mobilising online and offline action. Further, Pearce et al. (2019) say additional work is needed into the dynamics within and between groups on social media networks to help to increase understanding about the role of civility in climate change conversations (p. 6). Hansen (2011) identifies a need to map the flows of claims-making and claims to see how media attention is achieved, but also how legitimacy and gained and action is invoked (Hansen, 2011, p. 13). Hansen (2011) and Carvalho (2010) say further investigation is needed about how different publics interact with the frames in media and communications content, including the interplay of alternative media and other actors, and how these messages influence publics' understanding, communication and actions.

2.5 POLITICS, MEDIA AND THE ENVIRONMENT

2.5.1 Australian media, politics, and environmental attitudes

Recognising that media coverage of climate change feeds into the shaping of public attitudes and policymaking (Carvalho, 2010; Lidberg, 2018; Speck, 2010), it is

significant that Australia has been subject to about 20 years of "climate change wars" (Kelly, 2017, as cited in Lidberg, 2018; see also Taylor, 2014). This has seen those sceptical of the existence and impact of climate change, along with mining and fossil fuel advocates, using various tactics to sew dissent and doubt (Holmes & Star 2018; Cook et al., 2019; McKnight, 2010; Taylor, 2014; Tranter & Foxwell-Norton, 2021). The level of government support for policies designed to protect the environment has varied greatly in an environment that is politically hostile (Lidberg, 2018; Manne, 2011; MacNeil, 2021), with the current Coalition government being the subject of criticisms levelled at its lack of action on climate change (Australian Associated Press, 2022; Climate Action Tracker, 2021). This focus on the economy at the expense of the environment is known as 'productivism', defined by Giddens (2009) as a "stress on economic growth as a prime value" (as cited in Hutchins & Lester, 2015, p. 342).

These attitudes are also seemingly reflected within some quarters of the Australian public. While about three quarters of Australians are concerned about climate change (Park et al., 2020b; Quicke, 2021), the *Digital News Report 2020* (Park et al., 2020b), found that the proportion of climate change deniers in Australia was amongst the highest of the 40 countries surveyed, with nearly one-fifth stating climate change was not a serious issue (Park et al., 2020b, p. 15). Further, the authors found that respondents who listened to right-wing commercial AM radio (including 2GB, 2UE and 3AW) and watched News Corp-owned *Sky News Australia* and *Fox News* were less likely to think climate change was serious (35%, 35% and 32% respectively). This compares to seven percent of Nine Publishing's *Sydney Morning Herald* readers, and 12% of the Australian Broadcasting Corporation's (*ABC)*, and 13% of News Corp-owned *The Australian*'s audiences (Park et al., 2020b, p. 17). The annual survey also found there was a divide in terms of political preferences and trust about climate change reporting, with 27% of right-wing news consumers believing climate change reporting was accurate, versus 44% of left-wing consumers (p.21). Further, 55% of those who did not trust the news thought climate change coverage was inaccurate (Park et al., 2020b).

2.5.2 Concentrated media ownership

Australia has a well-documented high concentration of media ownership (Bacon & Jegan, 2020; Papandrea & Tiffen, 2016; Jones & Pusey, 2010; Lidberg 2019; Stanford, 2021). Of the seven commercial media news organisations in Australia,

News Corp and Nine Publishing are the largest and cross all forms of traditional media, plus have a popular online presence (Environment & Communications References Committee, 2021; Lidberg, 2019; Newlands, 2020). The political orientation of offline and online audiences in relation to their news sources is shown in Figure 2.1 and Figure 2.2. New Corp's news brands are distinctly more right-wing (including *Sky News*, *The Australian*, the *Herald Sun*, the *Daily Telegraph*), with *Sky News'* offline audience positioned even further right than *Fox News* (Hopkins & Ladd, 2013; Merkley & Stecula, 2018). In comparison, public broadcaster the *ABC* is generally in the centre, while Nine Publishing's audiences are left-leaning, however not as left as *The Guardian's* audience (Figure 2.2).

News Corp owns more than half of the Australian newspaper market (Bacon & Jegan, 2021), including two-thirds of the metropolitan mastheads, has radio interests, and the majority share of the *Foxtel* news network (Environment & Communications References Committee, 2021, p. xiii). This includes the national daily (*The Australian*) plus nearly all newspapers in Queensland (printed and online), including the majority in the GBR catchment area, and the Queensland state daily newspaper (*The Courier Mail*). Concerns about the concentration of ownership manifested recently in the *Senate Inquiry into Media Diversity in Australia* (2021). It was in response to more than 500,000 signatures on petition instigated by former Australian prime minister Kevin Rudd, with concerns centred on the impact of News Corp to 'democracy' (Parliament of Australia, 2020). It also specifically cited concerns about the "clout" the commercial news outlet had to impact Australian climate policy (2021, p. xiv).

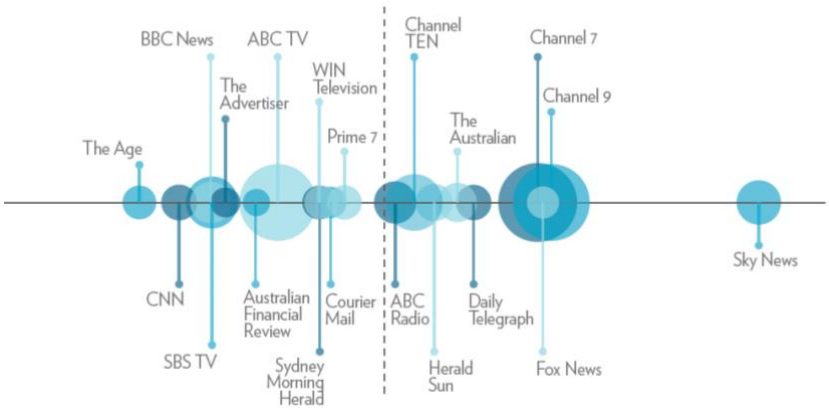


Figure 2.1. The political orientation of audiences of offline news brands. From "The Digital News Report, 2021", by Park, S., Fisher, C., McGuinness, K., Lee, J. K., & McCallum, K. (2021), News & Media Research Centre, p. 105 (www.canberra.edu.au/research/faculty-research-centres/nmrc/digital-news-report-australia-2021). Copyright 2021 by News & Media Research Centre.

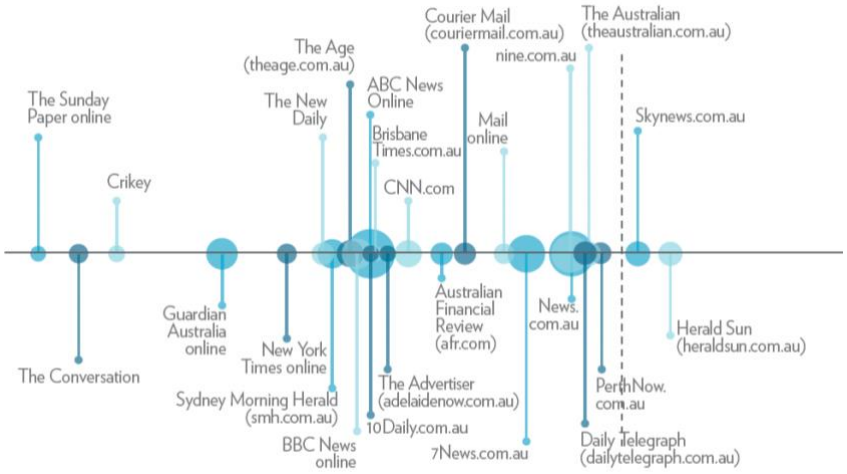


Figure 2.2. The political orientation of audiences of online news brands (citations and as above).

2.5.3 News Corp's media power

News Corp has received considerable scholarly attention. This includes findings that the publisher is "woefully biased" (Newlands, 2020, p. 311); has often privileged the voices of climate sceptics – particularly through opinion pieces and commentary – elevating them to the status of courageous dissidents against oppressive beliefs or censorship; has politicised science; and has either denied or ignored climate science news, including events relating to the GBR (Bacon, 2013; Bacon & Jegan, 2021; Blaine, 2019; Chubb, 2012; Grien & MacNeil, 2022; Holmes & Star, 2018; Lidberg, 2019; Manne, 2011; McKnight, 2010; McKnight, 2012; Painter, 2013). Work is currently underway in exploring the impact *Sky News Australia* has on Facebook and YouTube, with a particular focus on the outlet's role in distributing ideologically divisive and problematic information (Copland et al., 2021).

Castells himself, along with colleague Amelia Arsenault (2008), studied how News Corp and its founder, Rupert Murdoch, have been able to negotiate power dynamics of the network society to serve business goals. They suggest the ability to control connection points between different networks – like business, media and politics – is a critical source of power. The authors found that Murdoch himself is a "switcher", having the ability to connect media, business and political networks in the interests of furthering his company's own goals, and is a businessman above all else (Arsenault & Castells, 2008, p. 508).

2.6 SCIENCE COMMUNICATION IN DIGITAL SPACES

Considering the role that social media networks play as a channel to communicate science information (Scheufele & Krause, 2019), several studies highlight how science-related information flows across these networks. Using a variety of research designs and methodology, some of these investigate the anti-vaccination movement (Smith & Graham, 2019; Johnson et al., 2020; Cinelli et al., 2021) and COVID-19 misinformation and information engagement (Pennycook et al., 2020; Serrano et al., 2020; Wang & Qian, 2021), and others examine environmental issues like climate change (Pearce et al., 2014; O'Neill et al., 2015; Williams et al., 2015; Andreotta et al., 2019; Jaques et al., 2019) and natural disasters (Bec & Becken, 2019).

Taking a closer look at some of the environment-focused studies, Jaques et al. (2019) analysed 900 Facebook comments on the posts of US-based news organisations, finding a "discursive struggle over the concept of science" (p. 11). The critical discourse analysis found, while commentators used different tactics, often scientific claims were not evaluated on the basis of evidence, rather attacked in accordance with the perceived agenda of the scientist or institution, or dismissed based on emotionally-fuelled reasoning, rather than empirical evidence.

Pearce et al. (2014) and Andreotta et al. (2019) had similar findings in their Twitter studies. Pearce et al. (2014) researched the release of IPCC 2013 Working Group I report, seeking to establish if communities were as polarised about climate change as literature suggested. The hashtags related to science showed polarised views in relation to climate science, including hashtags that suggested a "battle or war is being fought over science… with scientists caught in the middle" (Pearce et al., 2014, p. 4). Andreotta et al.'s (2019) mixed methods study also detected climate change denial and the legitimacy of climate change and climate science amongst its five main themes. Another key theme was climate change action, where users were often critical of current progress towards addressing climate change, criticising the approaches by governments and politicians.

A further finding of Pearce et al. (2014) was that people were more likely to make conversational connections (via tags or hashtags) with those who broadly shared their views on climate change, a consistent finding across those supportive and unsupportive of the IPCC (Pearce et al., 2014). Williams et al. (2015) echoed these findings in a four-month-long Twitter study that collected hashtags relating to the topic

and classified user attitudes to climate change based on message content. The authors found strong attitude-based homophily, the tendency to group with others that share similar views, with 'sceptic' and 'activist' groups segregated into 'polarised groups', but also detected mixed attitude communities where these ideologically-opposed actors interacted. They found that 'activists' were more active information spreaders than 'sceptics', but further work was needed to understand the "multi-step flow of online communication about climate change" (p. 136), including how the opinions of social media users are shaped.

In terms of framing, O'Neill et al. (2015) also studied an IPCC report release across Twitter, finding that the most dominant frame was 'settled science', which emphasised the 'broad expert consensus' about climate science, with the authors suggesting that climate change advocates took the opportunity presented by the release of the Working Group reports to legitimise climate science. Newman (2017) built upon O'Neill et al.'s (2015) and Pearce et al.'s (2014) earlier findings by studying the 2013 report's release on Twitter, examining the key actors, information sources and frames. The most salient frame was 'public understanding' (27%) which referred to Tweets helping the public to learn from the report's findings, with the next being 'settled science' (18%), which related to consensus about the report's findings, but also the role of humans in climate change. While Allgaier (2019) analysed 200 videos to see how climate change was being discussed on YouTube, finding that 107 of the videos did not support the scientific consensus on climate change, with 16 denying anthropogenic climate change and 91 furthering climate-related conspiracy theories.

2.7 CASE STUDY: A POLITICISED AND MEDIATISED GREAT BARRIER REEF

There are several publications examining GBR mainstream media framing and communication tactics. Foxwell-Norton & Konkes (2018) examine the way media coverage was framed during two historical switching points – the first being the GBR's addition to UNESCO's World Heritage List in 1981, and the second the threat of removal in 2012. The authors analysed 125 articles from four newspapers, which were all from News Corp publications due to the dominance of the publisher in the GBR catchment. The main findings were that the GBR's protection has increasingly become a feature of Australian news; the coverage was marked by the dominance of political and industry sources; there was a strong absence of scientists, environmental NGOs,

and Aboriginal and Torres Strait Islander people as sources, and there was a significant increase in the framing of protection as a negative, or undesirable, between 1981 and 2012 (Foxwell-Norton & Konkes, 2018). The authors found that protection of the GBR had become a more contested space since pro-protection framing of news in 1981 to a more complex mix of positions in 2012, including frames presenting protecting the environment as a negative outcome for business.

Mitchell and Roffey-Mitchell's (2018) case study of news reports following the 2016 GBR mass bleaching event noted scepticism (about climate science and the cause of climate change) was the most dominant frame in the News Corp reports. In *The Australian*, it was salient in 69% and dominant in 75% of the reports. In contrast, the opportunity frame (specific actions needed to protect the GBR from climate change) was most dominant in *The Guardian* (47 per cent), and *ABC* reports (30 per cent). *The Guardian* had the most pieces of content in the data collection (51), closely followed by News Corp's *Townsville Bulletin* (50). They found Australia's media remains polarised regarding climate change and, when faced with a local disaster as a consequence, dominant groups chose to maintain sceptical or censor media reports, rather than acknowledging the problem and the cause (Mitchell & Roffey-Mitchell, 2018).

This was also reflected in Foxwell-Norton and Konkes' (2021) recent work, which used Google Trends to map how a satirical piece of content about the GBR's health was use to amplify existing conflict between climate science deniers and those advocating for climate action, undermining efforts to mitigate climate-related risks. They note that the way the GBR is communicated is "critical" (p. 1) to enhancing public understanding about climate change and promoting political action. Eagle et al. (2018) also expressed concerns about "predominately sensationalised and negative" media coverage about the GBR being a barrier to future policy development (p. 154). Their analysis on online new articles, press releases and blogs during 2016 found that international media were more likely to use sensationalistic framing about the GBR being dead or dying, while local outlets were more inclined towards adversarial framing, criticising the government's inaction or support for fossil fuels. They note work is needed to understand discussions about the health and future of the GBR, specifically via social media, including YouTube.

Lankester et al. (2015) examined how media represented risk during the coverage of the 2014 Abbot Point dredge spoil approval, finding further evidence of conflict-focused framing. For instance, articles regularly cast an 'industrialism' theme in opposition to 'environmental' and 'socioeconomic disaster' themes, pitting spokespeople from the Ports Corporation and conservation groups against each other to achieve drama. The authors express it would be useful to examine how online media contributes to agenda setting, including as a way for scientific experts to draw attention to issues in the mainstream media. Conversely, while Somerville and Ames (2020) noted the politicisation of the environment in their study about how coverage of the Adani project[4] was framed by the *Morning Bulletin* in Rockhampton, they were surprised to find environmental concerns about the controversial mining project were dominant over support for the community's economic recovery. However, the articles used for the content analysis were published in late 2015 when the publication was owned by APN. In the time between the research and the publication of data, the ownership since changed to News Corp, though this was not noted in the paper.

Foxwell-Norton and Lester (2017) studied GBR power dynamics by comparing two key Reef protest events. While recent efforts hindered development proposals, the authors found that pro-protection proponents had not been successful in convincing political decision-makers to abandon the projects. This was despite heightened communication and technology access, like social media. The authors suggest there is still a concerning "power disjuncture between emerging media and communications practices and logics and the enactment of sustained and meaningful policy" (Foxwell-Norton & Lester, 2017).

Power dynamics were also explored by Konkes and Foxwell-Norton in 2021 in the context of science. Using the case study of Dr Peter Ridd and his challenges to GBR 'policy science' in the mainstream media, the authors argue that the politicisation and mediatisation of science means it should be considered a fifth sphere in Hutchins and Lester's mediatised environmental conflict model. They call for enhanced understanding about how these conflict-inducing 'switching points' are enacted so that science and science communicators can better avoid being an "act of political

[4] Previously named Adani, the company has since rebranded to Bravus Mining and Resources and is delivering the Carmichael Mine and Rail projects in north Queensland. See: www.bravus.com.au and https://theconversation.com/au/topics/adani-group-19252.

communication" (p. 480; Chapter 3). Grien and Macneil (2022) also focused on Ridd's impact as a counter-narrative to scientific consensus by comparing the way that sceptical and non-sceptical climate experts have been framed by News Corp's *The Australian*. The authors found that selective language is used to convey climate "denialist undertones" (p. 7), which is a way that conservative outlets are still able to further sceptical narratives at a time when they say "outright denialism" has become less publicly acceptable (p. 2).

In terms of social media research focusing on the GBR in general, Twitter has been used to research tourism sentiment (Becken et al., 2017) perceptions of risk following Tropical Cyclone Debbie (Bec & Becken, 2019), and public sentiment towards reef restoration projects (Newlands & Melusine, 2018). Chinese social media platform Sina Weibo was used to explore tourism attitudes of various GBR locations (Chen et al., 2019). Coghlan et al.'s (2017) paper looked at the role of GBR images in depicting the Reef's health status to tourists, but this study used a Google image search, rather than social media data mining. There is currently a gap in work that examines GBR 'media politics' interplays in hybrid news-sharing environments.

2.8 CONCLUSION

As noted in this review of scholarly work to-date, including considering the current social context, there are several gaps in the literature. At a case study level, there is work to be done exploring how GBR stakeholders engage online and within social media platforms to further information flows, frames, and assert and contest power over the 'reality' of GBR protection. This would extend the above-mentioned findings about how mainstream media frames the protection of the GBR. It could also help to understand how 'mediatised environmental conflict' (Hutchins & Lester, 2015) and the 'politics of protection' (Foxwell-Norton & Konkes, 2018) are unfolding in hybrid news-sharing spaces, while also considering the important interplay between 'networks of operatives' (Cottle, 2013) embedded in these assemblages, including the role of science and scientists in contributing to power contestations (Konkes & Foxwell-Norton, 2021; Chapter 3).

More broadly, there is a need to empirically examine the influence of mainstream media as an actor is these decentralised news-making environments to understand how influential media information, frames and logics continue to be in these hybrid and

interconnected systems, and what role media play in constructing and contesting frames. Understanding this dynamic is particularly relevant in the context of Australian mediatised environmental conflict, including the GBR and climate change, noting a history of stifled climate policy, condensed media ownership, and research highlighting News Corp as a cog in the climate 'denial machine' (Dunlap & McCright, 2011; Holmes & Star, 2018; Lidberg, 2019).

In a social media research capacity, there is comparatively less work available about communication spaces beyond Twitter, especially within the environmental context. There is therefore an opportunity to expand knowledge about contemporary communications dynamics across multiple platforms (Pearce et al., 2019; Chapter 4). As such, this thesis intends to draw upon the diverse body of existing work to build knowledge address some key knowledge gaps. In doing so, my objective is to further understandings of how power is asserted and contested in the social news media network in relation to politicised and mediatised environmental issues like the protection of the Great Barrier Reef. These informational dynamics could ultimately undermine public support for environmental policy. Moreover, beginning to better understand these interactions in this case study offers a broader insight into the way information is channelled and 'reality' is framed across some of the communication networks that are so central to steering what we come to 'know'.

Chapter 3: Theoretical framework

> Communication networks are the fundamental networks of power-making in society. (Castells, 2013, p. 426)

3.1 INTRODUCTION

The theoretical approach to this thesis can be considered a network itself, or 'research assemblage' (Fox & Alldred, 2014). In this sense, there are several theoretical elements that are interconnected and their interactions allow me to consider the research question through this lens. Within this theoretical research assemblage, a central element is Manuel Castells' network theory of power (2011b, 2013, 2016). This grounded theory has been applied to understand the interactions between communication and power in today's digitally-dominant environment. In this sense, it has been deployed in connection with social network theory (Freeman, 2004; Hansen et al., 2010; Smith et al., 2014; Himelboim et al., 2017) to interpret power relations that are specific to the 'social news media network' (Bruns, 2018). Another interconnected element is framing theory (Entman, 1993; Nisbet, 2009), which also directly relates to Castells in the way he understands frames as embedded in communication and used to meet the objectives of certain networks (Castells, 2011b). These networks can be understood as dynamic assemblages of humans[5] organised around certain projects and objectives. The final node in the assemblage is one that provides additional analytical insight to the GBR case study: 'mediatised environmental conflict' theory (Hutchins & Lester, 2015). Each of these theoretical elements is explained below, including how they will be deployed to answer the research question: **How is power asserted and contested in the social news media network in relation to environmental protection?**

3.2 SOCIAL NETWORK THEORY

While social network analysis offers a methodological approach for the investigation of relationships (Chapter 4), it also encompasses theory for interpreting those relations (Borgatti et al., 2009; Wellman 1988). With foundations in relational sociology (Mische, 2011; Mützel, 2009; Prandini, 2015), as Mützel (2009) explains, social network analysis was a reaction to

[5] Unlike Actor Network Theory and new materialism, Castells focuses on human actors only.

functionalism and individualistic theories, and its focus was to identify social structures based on relations rather than attributes. In other words, social network analysis is chiefly concerned with the interactions (or ties, or edges) between certain actors (or nodes) – the focus does not start with the properties and attributes of these nodes or people, as it does with other sociological approaches (Hansen et al., 2010, p. 32).

Social network analysis builds on and uses concepts from the mathematics of graph theory (Freeman, 2004; Hansen et al., 2010) and provides a graphical language that can be used to help develop meaning about the roles and significance of actors within the network based on their interconnections, or lack of connections. These include measures of how popular an actor is, how well connected they are, and their potential role as a 'bridge' to connect otherwise disconnected others. The metrics to cover these theories are outlined in the Glossary and Chapter 4. This project is specifically focused on engaging the centrality concept via the metric of 'in degree' to establish the dominance of actors within the social media platform (Freeman, 2004; Himelboim et al., 2013b). In-degree reflects the number of incoming connections to that node, or actor, which relates to how much their content, ideas and frames are being exposed. As noted by Grandjean and Jacomy (2019), being 'cited' is often a good indicator of authority and notoriety.

As this thesis is also concerned with communication power, conceptualised in one aspect by connection and disconnection, it draws upon social network theory's clustering, or community detection, for considering relationships between different actors in the network based on their shared connections (Wasserman & Faust, 1994). Practically, this is signified by aspects like modularity class (the group) that the community detection algorithm assigns to each node (Hansen et al., 2010). Himelboim and colleagues (2017) note that users create pathways for information flow when clusters are formed. As such: "The resulting groups define the social boundaries for information flow; within these clusters, information flows freely, while across clusters information flow is restricted by the limited connectivity available across clusters" (Himelboim et al., 2017, p. 3). As noted earlier, this tendency for people to form social ties with others most similar to themselves is called "homophily" (McPherson et al., 2001, p. 416), or colloquially as "birds of a feather flock together" (Himelboim et al., 2017, p. 3). While this behaviour is typical in many aspects of social life, high homophily is displayed in highly clustered networks, and – at the extreme – can result in segregation across network where connections do not extend to other groups that are different (Barnes et al., 2016). Other relevant global metrics that can enable group identification and help to consider the connectivity

between these groups include modularity, which measures the strength of graph partitioning (Grandjean & Jacomy, 2019). Also density, which considers internal connections and how reciprocated those connections are within the group, versus the connections made outside the group (Yang et al., 2017; Himelboim et al., 2013b). In sum, social network theory and its associated metrics for analysis (Chapter 4) provide the foundational mechanisms for understanding influential actors and information flows in online networks, which can be connected to sociological theory to further analyse these interactions as contests of power.

3.3 THE ADVANCEMENT OF A NETWORK THEORY OF POWER

Communications scholar Manuel Castells has spent the past 50 years devising, testing and modifying a grounded theory of power to reflect society's move into an increasingly technologically-connected world (Castells, 2016). Castells' more recent work proposes a network theory of power to reflect the current societal age, which he describes as 'the network society' (2007, 2011a, 2013, 2016). Castells describes his professional purpose as: "to build an analytical framework that can be used in research, rectified, and transformed in ways that allow the gradual construction of a theory of power and counterpower in the network society, our society" (2016, p. 15). The network theory of power was the result of Castells himself feeling like he was "suspended between the two worlds" (2016, p. 17) in attempting to understand the modern realm. One of those 'worlds' is the tradition of deep social theory, including the theories of social power foregrounded by Michel Foucault (1982) and Max Weber (1946, as cited in Castells, 2013), specifically, discourse and violence as ways of enacting and countering power (Castells, 2013). The other 'world' is the contemporary era, inhabited by network analysis and digital culture, with the prevalence of interconnected networks redefining traditional sociological notions of social structure and the parameters of where, and with whom, power contestations unfold (Castells, 2016). As such, Castells' network theory of power seeks to connect these 'worlds' – traditional social theories with a modern era largely mediated by digital technology – so that power and counterpower can be understood in relation to the contemporary network society. To this end, Castells says the interaction between structure and agency was an ontological obstacle in his early work, shifting his interpretative lens between structuralism and subjectivism, considering the power of social systems (structures) versus the power of the individual (agency). Anthony Giddens' structuration theory (1984), which considers both structures and agents in exploring social relations, offered Castells a way to resolve this binary and understand communication in the context of interconnected social practice (Castells, 2016).

In that sense, some of the critiques directed at Castells' grounded theory are from relational sociologists questioning why, in the age of technologically-mediated communication, everything is now considered a network, when they argue networks of relations and power fluxes have always existed (USC Annenberg, 2010; Venturini et al., 2019). According to Castells, the network theory of power responds to the transformative impact of technology on modern society. As the communication environment has significantly changed, and continues to change, it represents a new form of power interactions that need to be investigated (Castells 2011b, 2016). For Castells, it is therefore not about studying the network in an actor-network theorist sense, but more about studying the flows of power and counterpower that are specific to communication networks in relation to other interconnected networks. This follows Castells' empirical observation that, while information and communication have always been fundamental sources of power and counterpower, a substantial volume of global processes now occur through networks via the new forms of information communication technology. He argues that communication networks have become so pervasive, interactive and interconnected that they are now central to implementing the power-making processes of any network (Castells, 2011b, 2013; USC Annenberg, 2010). This understanding offers an opportunity to explore the role multimedia communication networks are playing in power contestations over constructing the 'reality' of the protection of the GBR. Firstly, I will explain power in the context of the 'network society'.

3.4 DEFINING POWER IN THE NETWORK SOCIETY

As defined in Chapter 2, Castells understands 'power' as: "the relational capacity that enables certain social actors to asymmetrically influence the decisions of other actors in ways that favor the empowered actors' will, interest and values" (2016, p. 2). He describes power as the "DNA of societies" (p. 2) and says it is primarily exercised in two ways, with these manifestations having theoretical linkages to Weber and Foucault. Firstly, by power over bodies, or coercion (the monopoly of violence, legitimate or otherwise, by the state). However, the second way – which he argues is much more effective and enduring – is 'power over minds', or persuasion, as opposed to merely manipulation. He describes this as "the construction of meaning in people's minds through the mechanisms of cultural production and distribution" (p. 2). These mechanisms will be discussed later in this chapter. Meanwhile, Castells argues that where there is power, there is counterpower: essentially, resistance to power. Power is multidimensional and, in the network society, Castells says power is "constructed around

multidimensional networks programmed in each domain of human activity according to the interests and values of empowered actors" (2016, p. 774).

These networks can then be understood as clusters of varied human actors grouped around shared goals and objectives, with each network possessing its own logic. Collectively, these subnetworks comprise the network society – an expansive network itself operating on the "metaprogram", or "source code" (Castells, 2011b, p. 778) of global capitalism and consumption. Some of the key subnetworks that form part of the network society include business networks, political networks, and multimedia networks of mass communication (Castells, 2011b). Importantly, each network has its own power relationships according to its programmed goals, meaning these power exchanges can only be understood in terms that are specific to that particular network. For example, the goal of the political network is to maintain governing power. Yet networks and their logics can overlap to share resources and further each network's own ideas, projects, visions and versions of reality, or frames (Castells, 2013, p. 426). These elements, shared by all networks regardless of their goals, can be understood as "cultural materials" (Castells, 2011b, p. 776). Castells writes that culture is "mainly embedded in the processes of communication, particularly in the electronic hypertext[6], with the global business network and the Internet at its core" (2011b, p. 776).

An example of these cross (inter) network interactions is the connection of multimedia networks of mass communication with global business networks. While communication and business networks were connected long before the digital age, this interconnection and overlap of network goals is now prolific, manifesting in the commodification of audience attention and the further empowerment of global multimedia corporate networks (Braidotti, 2019; Castells, 2011b). Castells explains the owners of these networks, who are themselves networks, "transform humans into audiences by selling us the images of our lives. So they achieve their interests (money making, influence making) by designing the content of our culture according to their corporate strategies" (2011b, p. 782). This includes nascent concerns about the pursuit of human attention regardless of the quality and veracity of the information (known as 'clickbait') and the interrelated issues of problematic information and polarisation (Krasni, 2020; Scheufele & Krause, 2019).

[6] Castells has previous explained the 'hypertext' as "culture organized primarily around an integrated system of electronic media, obviously including the Internet" (2000, p. 12).

3.5 MASS COMMUNICATION AND MASS SELF-COMMUNICATION POWER

Castells argues that the multimedia mass communication networks are the key "fields of power" (2011b, p. 777) in the contemporary networked world, due to nearly everything being mediated by communication and technology: "In the network society, power and counterpower aim fundamentally at influencing the neural networks in the human mind by using mass communication networks and mass self-communication networks" (Castells, 2011b, p. 773). As defined earlier, 'mass self-communication' refers to audiences' ability to produce and frame their own messages: "it is self-generated in content, self-directed in emission, and self-selected in reception by many that communicate with many" (Castells, 2007, p. 248).

To illustrate the power-influencing capacity of communication networks, it is useful to think of them in the relational context of other societal networks. While the economic network is key within the global capitalist system, market responses are most often impacted by updates or news relating to the financial performance, triggering human-induced responses (for example, buying or selling shares). While the political networks have the capacity to regulate to communication networks, this is increasingly challenging in a digital age – particularly for democratic nations – especially when communication has the potential to achieve global reach and information flows can help to determine political outcomes (Castells, 2011b). This is one of the reasons that Castells argues that all politics has now become 'media politics'. While the media, which includes digital networks of communication, are not the unwavering holders of power (this is forever changing due to the complex interactions between other actors within media, business and political networks), they "constitute the space where power is played out and ultimately exercised" (Castells, 2016, p. 10).

On this note, another finding from Castells' research is despite the decentralisation and digitisation of communication networks and the rise of 'mass self-communication', which can empower individuals to effect social change, traditional mass media are still dominant actors in these mass communication networks (2016, p.10). While he says modern communication networks could potentially challenge the power of established corporate media, for now global media corporations and their actors, like Rupert Murdoch and Mark Zuckerberg, remain influential (Arsenault & Castells, 2008; Castells, 2011b). It is this interplay within the social news media network between these embedded, multiple and dynamic nodes – including the resulting power struggles and contesting narratives – that is of interest to this project, particularly in the context of the 'media politics' (Castells 2007, 2011b) involved in the protection of the GBR (Konkes & Foxwell Norton, 2021; Newlands, 2020) and the broader

Australian public discourse about media power and regulation (ACCC, 2019; Australian Government the Treasury, 2019; Bossio et al., 2022; Environment & Communications References Committee, 2021; Meese, 2021). I will explore these interactions further using Castells' network theory of power. To that end, I will now go on to discuss the four forms of power that Castells proposes as conceptual tools to understand power relations in contemporary society.

3.6 FOUR FORMS OF NETWORK POWER

According to Castells' theory, there are four forms of network-related power that operate under the social and technological conditions of the network society. These are **networking power**, **network power**, **networked power**, and **network-making power**. He defines 'networking power' as "the power of the actors and organisations included in the networks that constitute the core of the global network society over human collectives and individuals who are not included in these global networks" (2011b, p. 773). 'Network power' is not so much about exclusion from the network, but rather the need to abide by a set of rules to maintain inclusion, essentially the "protocols of communication" (p. 775). He describes this as "power resulting from the standards required to coordinate social interaction" (p. 773). 'Networked power' recognises that the forms and processes of power are different and specific to each network, with each network defining its power relationships depending on its programmed goals. It is defined as "the power of social actors over other social actors in the network" (p. 773), yet the source of this power is constantly in flux. However, the most "crucial forms of power follow the logic of network-making power", according to Castells (p. 776). This is defined as "the power to program specific networks according to the interests and values of the programmers, and the power to switch different networks following the strategic alliances between the dominant actors of the various networks" (p. 773).

Under this type of power logic, the ability for social actors to exercise control over others depends on some key factors: The ability to form a network and program, or re-program, that network in terms of chosen goals, and to connect and cooperate with other networks to exercise power. Yet the ability to reprogram these networks in the interests of the subordinate actors is a fundamental way to challenge power. Castells calls the first position 'programmers' and the second 'switchers' (p. 2016, p. 12). In most cases, programmers and switchers are not individuals, rather collectives of human actors exercising power via their connections. Switchers can counter network goals and attempt to introduce new 'code', or reprogram the network for their gain. The clash of competing logics and goals is called a 'switching point',

but the way that these contestations occur are again dependent on each network's programmed goals. I will now go on to discuss the other elements in this theoretical research assemblage, and then explain how exactly I am deploying Castells' network theory of power to address this research inquiry.

3.7 FRAMING THEORY AND ENVIRONMENTAL EVENTS

As noted earlier, frames are one of the "cultural materials" (Castells, 2011b, p. 776) involved in programming or reprogramming networks in terms of actors' goals. These cultural materials, which also include ideas, visions and projects, are embedded in the processes of communication (p. 776). While framing theory is used for several purposes in media studies, political science and communications, it can be engaged to investigate how media and audiences co-construct news events (O'Neill at al., 2015). Understanding that all information is framed in some way, these intentional or intuitive positionings provide the "how of communication" and guide audience interpretation (Foxwell-Norton & Konkes, 2018, p. 8; Fairclough, 1995). Notably, some aspects of perceived reality are selected and made more salient in the text to "promote a particular problem, definition, casual interpretation, moral evaluation and/or treatment recommendation for the item described" (Entman, 1993, p. 52). These interpretations of reality, for example, as framed by a particular media story, interact with the audience's existing schemas, which communications scholar Robert Entman explains are largely products of prior framing (Entman & Usher, 2018). As such, when information is framed, frames are reinforced, or information is reframed, power or counterpower is exercised within mass communication networks and mass self-communication networks (Castells, 2011b; Hansen, 2011). This sets the parameters for debate, can impact the amount of attention received, and determine who is involved in the discussions (Nisbet and Newman, 2015). Within political and policy debates about the environment, Nisbet and Newman (2015) note that: "power has turned on the ability to not only control attention to an issue within policy contexts or in the media, but to also simultaneously frame the nature of the problem and what can be done" (p. 326).

In the context of the framing of environmental communication in particular, audiences rely on frames to make sense of and further discuss complex issues. Media use frames to craft interesting and attention-getting news reports, policy-makers apply frames to define policy options and reach decisions, while experts use frames to simplify technical details and make them more persuasive (Nisbet, 2009; Nisbet & Newman, 2015, p. 325). Of course, in the era of

mass self-communication, social media users are also framers of information in multimedia mass communication networks, whether it is content being created, or curated and reframed.

Seeking to further examine the role of framing in the social construction of controversies and the significance of political decision-making, Nisbet (2009) synthesised previous research about science-related policy debates in news coverage to produce a general typology of frames applicable to environmental debates, including climate change (see also Nisbet & Newman, 2015). The full list of these frames is in Appendix D, with further information in Chapter 4 about how this framing typology was deployed methodologically to investigate information flows and power within the social news media network in the context of GBR protection. As a point of theoretical and methodological clarification, while critical discourse theory and analysis will be not formally deployed in this research, I recognise that frames are a cognitive, social and political process that interplay with language in their construction of meaning (Fairclough, 1995). While language and specific discursive tactics will not be systematically analysed, they will still form part of the discussion, and the frames interpreted from the data will be situated in a broader social context to consider the contestation of power.

3.8 MEDIATISED ENVIRONMENTAL CONFLICT THEORY

To further hone in on the environmentally-focused media politics of the case study, it is useful to enlist Brett Hutchins' and Libby Lester's 'mediatised environmental conflict' (MEC) theory (2015), which foregrounds the tension between productivism and ecologically-centred worldviews (p. 339), operationalises Castells' switching point idea, and builds upon Simon Cottle's 'mediatised conflict' concept (Cottle, 2007). Hutchins and Lester proposed an environment-focused understanding of mediatised conflict as part of their research into the long-running clash in Tasmania's forestry industry. They argue that MEC is enacted when two or more of these four key "spheres of action" (Hutchins & Lester, 2015, p. 339) and their competing logics collide over competing visions for modernity in an "age of ecological crisis" (p. 342):

1. Activist strategies and campaigns;
2. Journalism practices and news reporting;
3. Formal politics and decision-making processes; and
4. Industry activities and trade.

To pause here for a moment for clarity, while Hutchins and Lester (2015) discuss the above four elements as 'spheres of action' and there is some overlap with Castells' network society actors – for example, the multimedia, political, economic/financial networks – the intention of this work is not to try to reconcile MEC's 'spheres of action' with the networks of power in the network society. Rather, it is to enlist the MEC model for the actors it argues are central to power contestations in an environmental context. This also includes considering the logics in these conflicts. The logics of 'journalism practices and news reporting' are also aligned to the goal of audience attention and include the ability to frame and filter reality, or to use click-through-rates as a measure of audience demand (van Dijck & Poell, 2013). Given that Hutchins and Lester conceptualise these logics as "much more than the means through which news and conflicts are relayed to audiences" (Hutchins & Lester, 2015, p. 340), I will use the term "hybrid media logics" (Chadwick et al., 2016, p. 5) to reflect this intention. It recognises the dynamic and polycentric social news media network, and removes the binaries between 'mass media' and 'social media' to understand that many actors are using a combination of these logics. For example, a newspaper posting a digital version of a story to its website, then linking to it on a platform, then perhaps paying to boost that story.

The "middle-range theorization" (Hutchins & Lester, 2015, p. 339) of MEC has been included in the theoretical research assemblage as it specifically embodies the key actors involved in environmental conflict that plays out in the social news media network, which is relevant to the case study of the GBR. Other researchers have also deployed it to study Australian environment conflicts (Cullen-Knox et al., 2019; Nixon et al., 2021), including the framing of GBR protection (Foxwell-Norton and Konkes, 2018), and the role of scientists in debates about the health of the GBR and climate change (Konkes & Foxwell-Norton, 2021).

Building on MEC's four spheres of action, Konkes and Foxwell Norton (2021) recently proposed a fifth sphere in the theory to reflect the growing prominence of scientists and scientific knowledge in debates about climate change, resulting in the further mediatisation of science communication and polarisation of this issue (Chapter 2). Science itself is conceptualised as a 'social field' where science is understood as the product, or body of knowledge, but also encapsulates the "various routines and organisational norms of the individuals and institutions that produce it" (p. 473). Konkes and Foxwell-Norton argue that rather than science being just an element within the other spheres of action, science is a fifth sphere in its own right because it is involved in its own power struggles and has the ability to create and contribute to conflict with the other spheres to enact a power-tipping environmental

policy-related ‘switching point’. Part of this research inquiry will include empirically testing Konkes and Foxwell-Norton’s (2021) finding that science and scientists are a fifth sphere of action in the MEC model, including considering how scientific actors and information are involved in asserting and contesting power in the social news media network.

The terms ‘programmer’ and ‘switcher’ also have specific relevance in the MEC context. As noted above, a switching point is about power contestation, but exactly in what form depends on the programmed goals of the network. Hutchins and Lester write: “In the case of mediatized environmental conflict, switching points are instantiated by the production and circulation of contending messages, representations, debates and strategies emanating from each of the specified spheres” (2015, p. 345). These events can be physical (like at protest sites, in political offices, or in newsrooms), or mediated (news reports, social networking, mobile communications) in character. Switching points are also impacted by the timing of political and media cycles, which includes election campaigns, environmental policy reviews, as well as environmental and disaster events that focus public and activist attention on pressing environmental problems.

3.9 APPLYING THE THEORETICAL FRAMEWORK

I will now explain how I have enlisted parts of these interconnected theories to enable me to study power relationships in the decentralised social news media network, specifically in relation to the case study of the mediatised and politicised protection of the GBR. Firstly, as a conceptual and clarifying point: I am situating the social news media network as a cluster, or subnetwork, within Castells’ multimedia networks of mass communication. This reflects the intent of this study to focus on news media specifically and the communication power dynamics in relation to other media actors within the context of the broader disrupted multimedia networks, including alternative news outlets. It also recognises that certain actors involved in mediatised environmental conflict become part of this network during a switching point, with networks connecting and overlapping to contest power, which sees the production and circulation of contending messages, representations, debates and strategies (Hutchins & Lester 2015, p. 345).

Noting that each network defines its own power relationships depending on its programmed goals, I argue, in alignment with Castells, that the ultimate goal, or metaprogram, of the multimedia mass communication network is to attract audience attention (Castells, 2011b, p. 781; van Dijck & Poell, 2013). This extends to the social news media network as a

subnetwork within that. Different actors may have different rationales for seeking this attention, for example, a key priority could be to generate revenue to maximise profits, while another actor's priority could be to influence or change minds. But – ultimately – power is gained in the social news media network by the ability to hook and hold attention. To empirically apply Castells' network theory of power and explore power and how it is being contested within the social news media network, I needed to operationalise power in this context. As such, I have developed some social news media network power indicators – outlined in the section below. These indicators directly align with certain social network theory-related metrics and methods (Chapter 4).

3.9.1 Social news media network power indicators

The power indicators in Table 3.1 consider levels of actor and information attention or dominance, plus provide a way to examine power contestations by investigating inter and intra-cluster relations at the subnetwork level. A table showing the social network analysis metrics deployed to operationalise these indicators is included in Chapter 4 (Table 4.3).

Networking power was considered by identifying what actors were included in the networks by actor type. These actor types are based on the MEC model with inductive additions and refinements, including 'media' being broken into subcategories (Chapter 4). I considered the top 100 nodes only, so a limitation is certain actors may actually be in the network, but not influential, and thus disregarded in this analysis. **Network power** was explored briefly by considering platforms' flagging or removal of problematic content, and suspending or banning users from the networks. **Networked power** was a key focus, examining the centrality of particular network actors noting their dominance as node over other nodes included the connections and relationships they shared with others in the network (incoming ties). Also, the dominance of content and frames was considered a networked power indicator in the social news media network, understanding that framing is an act of power (Castells 2011b; Nisbet and Newman, 2015) and the ability of this framed information to reach audiences to further the projects of the would-be programmers is dependent on the level of exposure (Castells, 2011b, p. 777; Nisbet & Newman, 2015). However, the scope of this inquiry does not extend to other contributing factors that make this content more salient, including the role of platform affordances, algorithms, impact of 'produsers'' (Bruns, 2008) schemas, and other cognitive factors.

Finally, **network-making power** was another key aspect. Behaviour was examined between groups in terms of connection and disconnection, noting connection is needed between

networks of actors to create a switching point to contest and potentially reprogram the network (conceptualised by Castells as adding code, or – in more radical cases – modifying the 'source code', see Castells, 2011b, p. 780). This resistance includes connecting to form separate subnetworks (Castells, 2011b, p. 779) and disconnection from the main network. As part of this analysis, the dominant frames of the global network were compared to counter-frames in key subnetworks. This could be viewed as attempt to switch the program, or narrative, in the subordinate actors' favour to further their own goals, or – as noted earlier via Chadwick et al. (2016) – restrict others' agency. In this case, the information flows related to furthering, or contesting, specific views about GBR health and policy, climate change, and ultimately values about environment protection within the current social context (Figure 1.1). Network-making power was also considered in the context of the actors involved in MEC, including the actors that were central in contesting information and frames to further their own network goals, particularly the role of scientists and media in the production of meaning and conflict.

These metrics are by no means exhaustive, but they allow me to consider power relationships in the form of communication across three social media platforms of Twitter, Facebook and YouTube and modify the approach in accordance with their platform affordances. As noted earlier, I recognise this approach does not consider other contributing factors for these actors and information sources in achieving these levels of dominance, but these elements are out of the scope of this research inquiry. In other words, I am essentially considering the outcome of these power interplays, or the result, rather than the cause.

Table 3.1

Power indicators for the social news media network – a network that has the 'metaprogram' of audience attention

Power form	Description	Power indicator (attention)
Networking Power	The power of the actors and organisations included in the networks that constitute the core of the global network society over human collectives and individuals who are not included in these global networks.	Inclusion of actors in the top 100 for each network by type.
Network Power	The power resulting from the standards required to coordinate social interaction in the networks. In this case, power is exercised not by exclusion from the networks, but by the imposition of rules of inclusion.	Removal of content, or the flagging of content as inappropriate by platforms. Banning or suspension of accounts.
Networked Power	The power of social actors over other social actors in the network. The forms and processes of networked power are specific to each network. Each network defines its own power relationships depending on its programmed goals.	Centrality of actors compared to other actors, dominance of content (ability to get attention), prevalence of frames in content (salience of framed 'reality').
Network-making Power	The power to program specific networks according to the interests and values of the programmers, and the power to switch different networks following the strategic alliances between the dominant actors of the various networks.	Attempts to counter dominant actors, information or frames with alternative information or frames to switch 'reality'.

Note. The power form and description columns are Castells' definitions, and the indicator column is how I operationalise this communications theory using social network theory (Chapter 4), understanding that the ultimate goal of the social news media network is attention. The key focuses are networked power and network-making power.

3.10 CONCLUSION

Using this relational theoretical 'assemblage', which draws upon a range of interconnected theories, this research explores informational flows and power relationships within the social news media network. Manuel Castells' network theory of power (2011b) is the most central element, which is applied using the practical foundations of social network theory. In an interdisciplinary sense, this approach connects communications theory with social network theory to produce the network-specific power indicators, which are then operationalised using social network analysis (Chapter 4). The research is situated within the environmental context of power contestations via Hutchins and Lester's (2015) mediatised environmental conflict theory and Nisbet's (2009) environmentally-focused framing typology. It is hoped this novel approach will help to understand communication flows that further the social news media network's ultimate power-generating goal: audience attention.

Chapter 4: Research Design

4.1 INTRODUCTION

As with any research endeavour, there were numerous conscious decisions made to shape the design of this project. In this chapter I explain how the mixed methods integrated research design was created to answer the research question. I also discuss the rationale for selecting other interconnected elements, including the social media platforms, software tools, timeframe, and case study event. I then outline the specific data collection and analysis methods for each social media network. Each strategy differed slightly to account for the different affordances and functionality of the platforms, but also to accommodate the data that could be collected via each platform's Application Programming Interface (API) (Bruns, 2019a; Weber et al., 2021). Regardless, the objective of each approach was the same: to investigate the dominant actors, information, frames, information flows and power interplays within the 'social news media network' (Bruns, 2018). To do this, I developed and operationalised social news media network power indicators, understanding attracting audience attention as the ultimate goal of these networks (Chapter 3). These are applied in this chapter via social network analysis metrics (Table 4.3). The analysis was conducted in three main parts across Twitter, YouTube and Facebook with the key focus on networked power (Parts A, B and C) and network-making power (Part C); though networking power and network power are also considered in the context of dominant actors (Part A) and information (Part B). This analysis was guided by the following data questions:

Part A – Dominant actors (networking power, network power and networked power)

- Which actor types were not included, or excluded, from the network?
- Which actors received the most attention?
- Which news media actors received the most attention?

Part B – Dominant information sources and frames (network power and networked power)

- What information received the most attention?
- How was the most dominant information framed?

Part C – Connection and disconnection (networked power and network-making power)

- How connected, or disconnected, is the global network?

- How does connection and disconnection at the subnetwork level relate to attention, information flows and frames?

This chapter then discusses ethical considerations associated with this project, particularly privacy, and concludes by reflecting upon the limitations of social media research generally, and this methodological approach specifically, that have not already been noted.

4.2 WORLDVIEW

The philosophical worldview is a fundamental, but often less visible, element of the 'research assemblage' (Fox & Alldred, 2014), and explains the researcher's general philosophical orientation about the world and the nature of the inquiry (Creswell & Creswell, 2018; Neuman, 1994). The worldview can also be understood as epistemologies and ontologies (Crotty, 1998, as cited in Creswell & Creswell, 2018). The worldview I have adopted in this project is broadly pragmatic in the sense that I have sought to use the most appropriate research methods available to understand the problem without being committed to any one system of philosophy or reality (Cresswell & Creswell, 2018, p. 6).

4.3 METHODOLOGICAL FOUNDATIONS OF SNA

Network analysis is a form of structural enquiry that existed long before the advent of social media platforms. It is based on examining the interactions amongst social actors, both human and non-human, and is grounded in the notion that these social ties have important consequences (Chapter 3; Freeman, 2004; Wasserman & Faust, 1994). According to Freeman (2004), modern social network analysis has the following features: it is motivated by structural intuition based on ties linking social actors; grounded in systematic empirical data; draws heavily on graphical imagery; draws upon mathematical and/or computational models; and understands that its structural patterning can be used to explore a wide range of problems and questions (p. 3). Furthermore, social network analysis is increasingly engaging mixed and qualitative methodology.

In 'offline life' we (as actors, or nodes) can experience ties – also known as edges – with neighbours, friends, animals, or objects, like a bike helmet, which can be visualised as directed or undirected relationships (Yang et al., 2017). A directed relationship is when an action from one node is expressly directed at another (for example friend A calling friend B), while an undirected relationship is when two nodes share a mutual relationship (for example, friend A being in the same hiking group as friend B). In online networks, the same principles apply,

resulting in networks that are directed or undirected. For example, actions like 'mentioning' someone on Twitter or posting a comment under a user's video on YouTube is a directed relationship which creates and edge or social tie. For the purpose of this study, all networks are directed as the data analysed is created by 'account A' directing an action at 'account B', or information B in the case of Facebook, which I will explain shortly.

One-mode and two-mode networks

In this study, the nodes in the Twitter and YouTube data form a single set in their networks. Namely, Twitter is an actor network where all accounts are nodes, while YouTube is an actor network where all channels are all nodes. This is called a one-mode or unipartite network, meaning one set of nodes (Chang & Tang, 2014). However, it is also possible to have networks where the node types are different. Due to the nature of the data that is available through Facebook's API, a bipartite, or two-mode network, needed to be created to study connection between the different node sets (Calderer & Kuijjer, 2021; Yang et al., 2017). This means that the nodes are two different types, for example, a Facebook *page* that shared a hyperlink and the *hyperlink* itself are both nodes. The connection, or edge, is only between the different node sets, as opposed to Twitter and YouTube where it is possible to capture the interactions as different types of edges that form patterns of connections with other nodes within the network (Himelboim et al., 2017).

Clustering algorithms are applied to group these nodes according to their connections and resulting information flows, which can then be analysed as a visualisation, along with considering the network's global and local network metrics (Venturini et al., 2021). Figure 4.1 is an example of local, global and visual network analysis elements (Grandjean & Jacomy, 2019). However, Facebook data are more limited and it is not possible to determine which actors are engaging on posts made to pages, so these connections cannot be calculated or mapped. One way to interpret the data is by mapping the relationship between the 'Facebook spaces' (a term used by Bruns et al., 2020 to collectively denote Facebook pages, groups and verified profiles) that share certain content and the hyperlink associated with that content posted in that space.

I explain the specific methodological approach for each network later in this chapter, but this initial background is intended to clarify these key concepts.

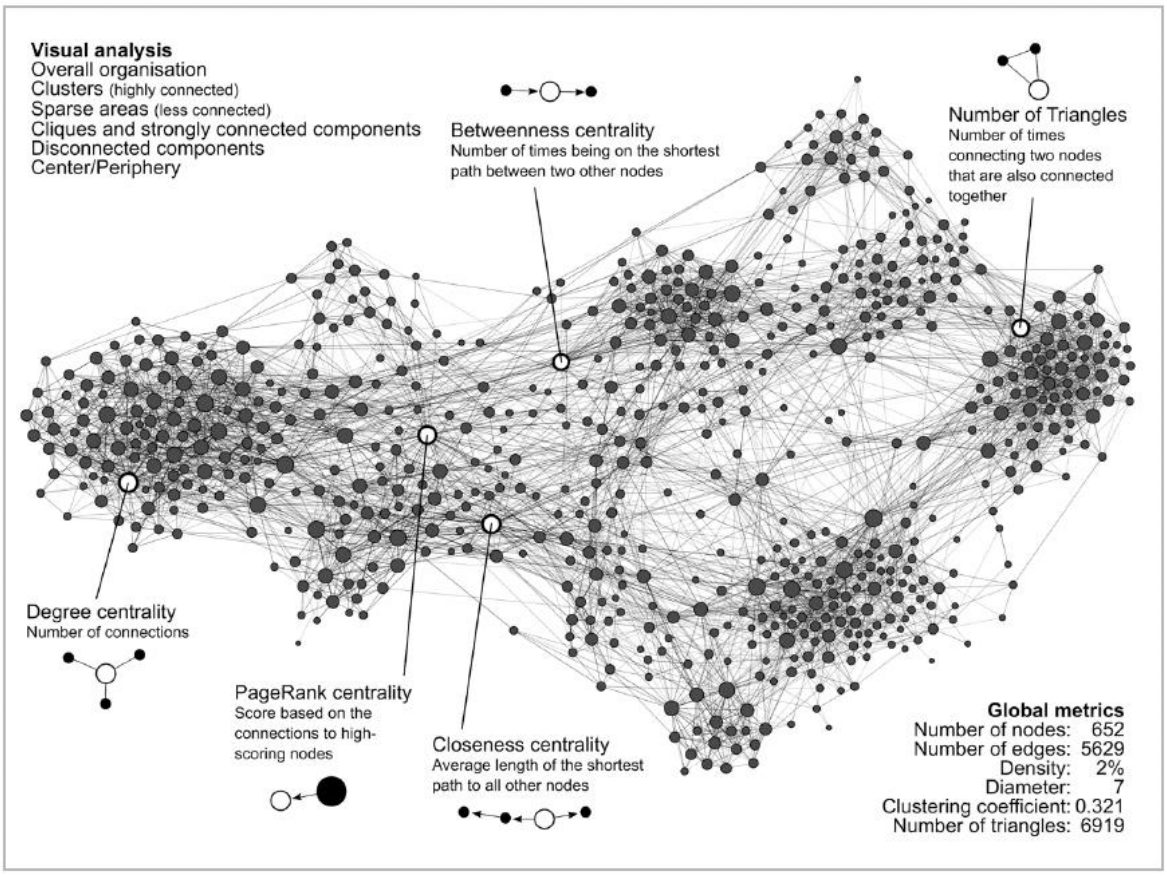


Figure 4.1. The different levels of social network analysis: local metrics (for example, degree centrality), global metrics (like density) and visual analysis (such as clusters). From "Translating networks: Assessing correspondence between network visualisation and analytics", by Grandjean, M., and Jacomy, M., (2019), Digital Humanities, p. 5 (https://halshs.archives-ouvertes.fr/halshs-02179024). Copyright 2019 by the authors.

4.4 METHODOLOGICAL APPROACH

Adopting a mixed methods approach allowed me to examine patterns and relationships between actors and informational flows using social network analysis. It also provided the means to drill deeper into the content of the interactions within the social media networks to examine the way information was framed and some of the tactics involved. However, rather than understanding these as completely separate yet interdependent stages, this approach is wholly integrated in accordance with Pat Bazeley's (2018) thinking about integrated mixed methods. Bazeley views the separation and binaries between qualitative and quantitative approaches – and the way they often do not integrate as intended in mixed methods – as problematic:

> It is in our approach to thinking about things that we begin to divide and classify what is, by nature, integrated. The primary way in which we take nature apart is to separate

> quantity from qualities, but, in so doing, we ignore other ways of representing a phenomenon… as we can lose the perspective of the whole. (Bazeley, 2018, p. 336)

In other words, data generally contains both qualitative and quantitative components and the meaning can change unless they are viewed collectively (Anguera and Izquierdo, 2006; as cited in Bazeley, 2016). Having a clear delineation is particularly difficult when it comes to SNA, which Bazeley argues naturally relies on hybrid methodologies for data collection, management and analysis (2016, p. 191). With this sentiment in mind, this project has adopted an integrated and interconnected approach, with a holistic analysis and "inextricably intertwined" methods (Miles & Huberman, 1994, p. 41) through data collection and analysis to understand the informational interplays within the case study of the GBR.

4.5 RESEARCH DESIGN

The research was designed to explore actors, information flows, connection, disconnection and, ultimately, power within the social news media networks of Twitter YouTube and Facebook. As such, it was broken down into three main parts, with each part deploying both quantitative and qualitative techniques to understand the informational dynamics. SNA was used to calculate global and local network metrics, along with create data visualisations (Hansen, 2010; Smith et al., 2014; Himelboim et al., 2017; Grandjean & Jacomy 2019). This included considering metrics like centralisation, modularity, density, and isolates and visual patterns of connection and disconnection based on the way people interact and the actors and content they connect with (Angus et al., 2021; Bruns et al., 2020; Himelboim et al., 2013b; Himelboim et al., 2017; Smith et al., 2014). Qualitative analysis, including in-depth close reading (Bruns et al., 2020; Graham et al., 2020a), was integrated within this approach. This included interpreting and coding the top 100 actors and their actor type from the SNA dataset (Foxwell-Norton & Konkes, 2018; Newman 2017). Key information sources were then calculated for each network using quantitative techniques, with the top 10 items subjected to a qualitative framing analysis (Foxwell-Norton & Konkes, 2018; Nisbet, 2009; Nisbet & Newman, 2015). The global network was then broken into subsets for further analysis of informational interplays (Dehghan et al., 2020; Himelboim et al., 2013b; Himelboim et al., 2017). For Twitter and YouTube, this saw two relevant clusters analysed for dominant actors, information sources and frames, which were compared to each other and the results from the global network. Inter and intra-cluster dynamics were also explored at this stage to enhance understanding of connection and disconnection (Smith et al., 2014). The Facebook approach used network visualisations to drive the exploration of connection, disconnection and

information-sharing patterns (Angus et al., 2021; Tan, n.d). This will be explored in detail in the Data Analysis section of this chapter.

4.5.1 Social Media Platforms

The majority of social media research tends to focus on a single platform (Pearce et al., 2019; Driscoll & Thorson, 2015). Most work has used Twitter as a study site, partially due to the relative ease of access to data (Andreotta et al., 2019; Bruns, 2020; Pearce et al., 2019). While there is expanding literature available on Facebook, and significantly less on YouTube, there is far less work that uses three platforms for empirical studies (Pearce et al., 2020; some examples of exceptions are Burgess & Matamoros-Fernandez, 2016, who mapped #gamergate across Twitter, YouTube and Tumblr; Cinelli et al., 2021 who studied informational dynamics with controversial topics on Twitter, Facebook, Reddit and Gab; and Smith et al. 2012 who mapped how users were engaging with two retail brands across YouTube, Facebook and Twitter). Moreover, there was value in comparing results across more than one platform due to their use by different audiences for different reasons. Results for Twitter may not be echoed on Facebook or YouTube, so multiple platforms added to the richness and depth of the study. However, there are limitations with comparing platforms directly due to their differing "platform specific semantics" (Weber et al., 2021, p. 62), programmability 'logics' (van Dijck & Poell, 2013) and available data (Bruns, 2019a). This has been addressed as best as possible in the choice of metrics, but it is not possible to compare affordances as equivalents in analyses that span more than a single platform (Rogers, 2017).

Twitter, Facebook and YouTube were chosen for this study as they all have relevance to this research question. Facebook is the most widely used platform in Australia (Park et al., 2020b, 2021) and most English-speaking countries (Newman et al., 2021). However, use of Facebook is declining, particularly with younger audiences (Park et al., 2021; Newman et al., 2021). This decrease could be related to criticism about mis- and disinformation and the misuse of private information (Bruns, 2019a), and/or the rise of fresher social media offerings, like Snapchat and TikTok, which use video as a communication medium – a format that is accessible for a wide range of literacy levels (Allgaier, 2019). Perhaps this is a contributing factor to why YouTube is now the second most widely used platform in Australia, and a growing source of news in the past five years (Park et al., 2021; Figure 4.2). YouTube's popularity and its video format, which offers different insights to text, make it an important and relevant inclusion for this research inquiry (Burgess & Green, 2018). Allgaier (2019) also found that the platform is underexplored in the context of environmental and science communication research.

Twitter is a notable communication platform for its significance in political discussion in Australia (Bruns et al., 2021; Bruns & Burgess, 2011; Bruns & Burgess, 2015; Graham et al., 2020a; Pearce et al., 2014). A relatively high proportion of its users access it for news (50% of Australian Twitter users, according to Park et al., 2021), and it is especially relevant to this inquiry due to its high use by media, politicians and activists – three of the 'mediatised environmental conflict' enactors (Hutchins & Lester, 2015). It has also had a key role to play in the transformation of journalistic process (Beckett, 2010; Bruns, 2018; Hermida, 2013), which is useful and relevant for examining information flows and power exchanges. While Twitter is not as widely accessed as Facebook or YouTube, tweets make their way into loungerooms via their inclusion in mainstream news bulletins, and can even set news agendas (Ahmed & Lugovic, 2019). Including this platform within this study was also important for the ability to compare findings with existing research. Finally, the three platforms all have different owners. While the implications of this are not a key concern for this study, it is relevant background in the context of power-making and recent events, including Facebook's rebranding to Meta and Twitter's ownership discussions (Fournier-Tombs, 2022; Lockett, 2021).

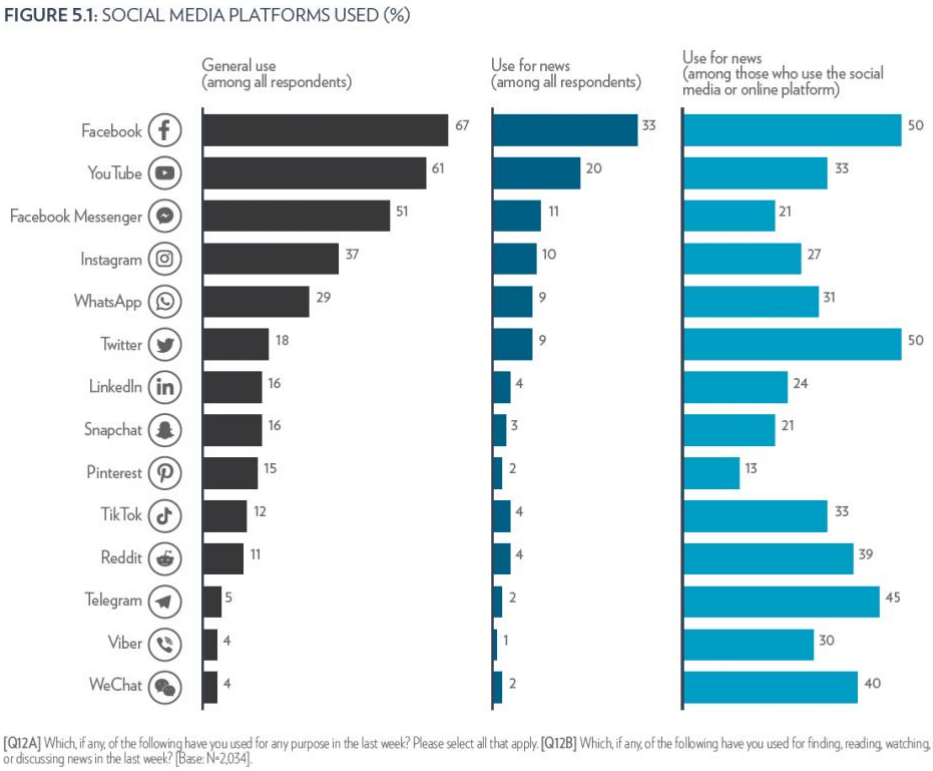


Figure 4.2. Social Media platforms used by Australians, including use for news. From "The Digital News Report, 2021", by Park, S., Fisher, C., McGuinness, K., Lee, J. Y., & McCallum, K. (2021), News & Media Research Centre, p. 63 (www.canberra.edu.au/research/faculty-research-centres/nmrc/digital-news-report-australia-2021). Copyright 2021 by News & Media Research Centre.

4.5.2 Software Tool Selection

Careful consideration was given to the software approaches used to ensure they could answer the research questions within the scope of this project, including meeting my 'becoming' computer programming skills as a researcher. I collected data directly from Twitter and YouTube using the relevant APIs via packages in R, while using Facebook-owned data provider CrowdTangle for the Facebook data collection. I used Microsoft Excel for data preparation and the qualitative framing analysis. I conducted the social network analysis and visualisations across two platforms: the Social Media Research Foundation's NodeXL (Smith et al., 2010) and via open-source graph and network analysis software Gephi (Bastian et al., 2009). Detail about these tools and methods is provided in Sections 4.6 and 4.7.

4.5.3 Choosing a Case Study

The primary objective of selecting a case study was to have an environmental policy event that prompted significant media activity and involved all of the spheres of action operationalised in 'mediatised environmental conflict' (Hutchins & Lester, 2015; Chapter 3). UNESCO's draft recommendation to put the GBR on the World Heritage 'in danger' list provided such a 'switching point' event (Chapter 1). WHC decisions have been the subject of other GBR studies that have examined how environmental protection is framed by the mainstream media (Chapter 2). It provided an opportunity to expand on these research findings and potentially use the collected data in future longitudinal studies to compare previous and future 'in danger' conflicts (Morrison, 2021).

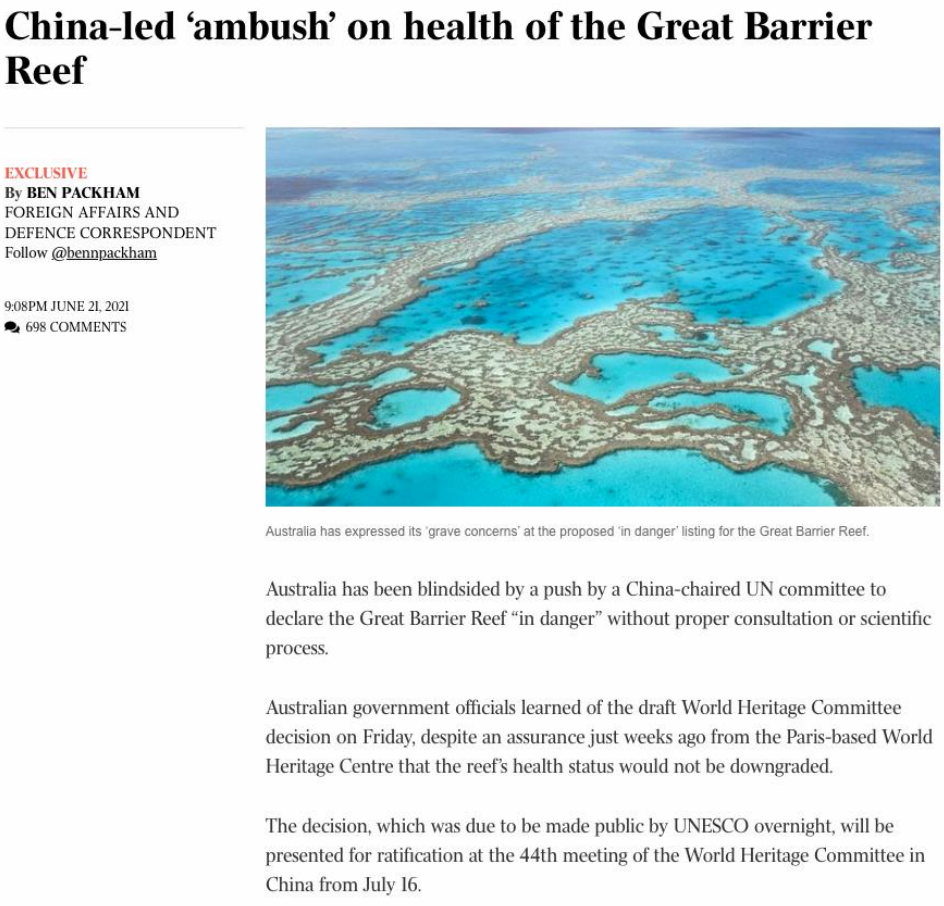
4.5.4 Refining the Timeframe

News of the 'in danger' recommendation was broken as an exclusive by *The Australian* newspaper on Monday, June 21 at 21.08. The headline was: 'China-led 'ambush' on the health of the Great Barrier Reef' (Packham, 2021a; Figure 4.3). The initial tweet appeared at 22.47 (UTC+10) from the journalist who wrote the story (Packham, 2021b).

Coverage spiked on June 22, 2021 across all three social media platforms in response to the new information. There was also another activity increase, albeit it not as significant, for WHC's decision *not* to list the GBR as 'in danger' on the evening of July 23, 2021 (at approx. 20.00 UTC+10). There is a time-series analysis for each of the platforms in the respective results chapters.

The exact data collection window was defined after analysing social media activity over the approximately six-week period between the draft recommendation and WHC decision. Time series graphs and tweet and Facebook post counts were collected and cross-checked with YouTube activity[7]. After examining this data in more detail – including reviewing the content for relevance – the data collection window was narrowed to **Monday, June 21, 2021, 21.00 (UTC+10) to Sunday, August 1, 23.59 (UTC+10)**. This window was selected to capture the two distinct spikes and allow for some longer-term media analysis.

This approach also aligns with similar studies featuring environmental policy-related switching points on social media where the collection window ended approximately a week after the event (Pearce et al., 2014). Further, having an extended data collection period is considered useful in studies of information engagement, as it captures a wide range of users who are active at different times (Himelboim et al., 2013a).



China-led 'ambush' on health of the Great Barrier Reef

EXCLUSIVE
By **BEN PACKHAM**
FOREIGN AFFAIRS AND DEFENCE CORRESPONDENT
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9:08PM JUNE 21, 2021
698 COMMENTS

Australia has expressed its 'grave concerns' at the proposed 'in danger' listing for the Great Barrier Reef.

Australia has been blindsided by a push by a China-chaired UN committee to declare the Great Barrier Reef "in danger" without proper consultation or scientific process.

Australian government officials learned of the draft World Heritage Committee decision on Friday, despite an assurance just weeks ago from the Paris-based World Heritage Centre that the reef's health status would not be downgraded.

The decision, which was due to be made public by UNESCO overnight, will be presented for ratification at the 44th meeting of the World Heritage Committee in China from July 16.

Figure 4.3. The breaking news story about the GBR 'in danger' recommendation (Packham, 2021a).

[7] I used R package AcademicTwitteR's 'TweetCount' function, CrowdTangle's Facebook post activity graph, and NodeXL's YouTube video importer to collect and review this data.

Search Query

The search query "Great Barrier Reef"[8] was used across all three data collections for consistency. Where possible, the search parameter for English-language only was set. This generic search string was selected after testing more specific queries across all the platforms that included words like "UNESCO" and "World Heritage Committee". However, running this more event-specific search query risked missing content, as the objective of the study was to look at all narratives during the switching point event timeframe. The limitation is that content containing only "Reef" and "Barrier Reef" was not collected.

4.6 DATA COLLECTION METHODS

4.6.1 Pilot Studies

In the lead-up to formal data collection, several pilot studies were conducted across Twitter, Facebook and YouTube. The objectives were to become familiar with the collection techniques and tools that differed across the platforms, refine the search parameters and collection dates, and develop some initial exploratory understandings to help refine the qualitative data collection approach and analysis.

4.6.2 Twitter Data Collection

Twitter data were collected using Twitter's API v.2 Academic Research product track (Twitter, n.d), which enables approved researchers to access a much larger range of data. This includes access to Twitter's entire historical database of tweets, a monthly tweet cap of 10,000,000, and the ability to use enhanced filters to source data – these features are not available through the standard API (v1.1)[9].

In order to make the API calls, I used R package AcademicTwitteR (Barrie & Ho, 2021), which is designed to help researchers query the Twitter Academic Research product track and access the v.2 API endpoints[10]. I modified the code provided in the package literature and ran it via R Studio to collect the six weeks of data. I used the search query "Great Barrier Reef",

[8] This was treated as "Great" AND "Barrier" AND "Reef", which includes "GreatBarrierReef" and the #GreatBarrierReef hashtag.
[9] The standard Twitter API is readily available and allows for collection of approximately seven days of public data.
[10] Twitter Developer's 'Getting started with the API v.2' tutorials recommend AcademicTwitteR for data collection: (https://github.com/twitterdev/getting-started-with-the-twitter-api-v2-for-academic-research/blob/main/modules/6c-labs-code-academic-r.md).

included retweets, set the language to English (en), and set the tweet number to infinite to attempt to capture every relevant tweet for this specified timeframe.

This resulted in a total of 85,818 tweets. I then imported the TweetIDs into NodeXL using the TweetID List Network. The software uses this unique identifier to download the tweet data, including associated actors (nodes) and activities (edges) from Twitter. NodeXL's importer was able to import 84,941 of these 85,818 tweets[11], which formed two separate sheets within an Excel workbook – edges and vertices (Note: NodeXL uses the term 'vertices', but I will continue to use 'nodes' for consistency). The benefit of collecting the tweets via AcademicTwitteR and importing them into NodeXL was that I had access to the larger pool of data available through Twitter's API v.2 Academic Research product track and greater control over the parameters of the collected data, while having the benefit of NodeXL's functionality for initial analysis. The end result from the **84,941 tweets** was **37,503 nodes** and **118,012 edges** (Table 4.1). The detailed steps for data collection are outlined in Appendix A.

4.6.3 YouTube Data Collection

YouTube data were collected via the YouTube API v.3, which is obtained through the Google Developers Console (Google Developers, 2020). As there is less literature available on YouTube research than Twitter (Allgaier, 2019), it required more trial and error during pilot studies. I settled on a two-phase method that gave me confidence I would collect the most relevant results. I used R package TubeR (Sood, 2020), which can be used to collect video IDs straight from YouTube. This required creating another layer of authorisation in addition to the API key (OAuth 2.0 consent). I modified the code to suit my search parameters using the TubeR documentation (Sood et al., 2020), which included specifying the search query "Great Barrier Reef", the type as 'video', and the date window. This returned 464 video IDs.

I imported these video IDs into NodeXL using the YouTube User Network importer, setting a limit of 150 comments and 150 replies[12]. This resulted in two separate sheets within an Excel workbook – edges and vertices (nodes). While there were some edges containing non-

[11] When I queried the missing 877 tweets with NodeXL's developer, a likely reason provided was that these tweets had been deleted in the interim. There was an approximately three-week period in between collecting the Tweets via AcademicTwitteR and then importing the Tweet IDs from them into NodeXL due to hardware issues.
[12] This number was chosen after reviewing previous data collections and noting that 150 comments and 150 replies covered the bulk of the interactions on most videos.

English-language content, I did not remove these from the dataset to ensure consistency with the Twitter approach.

NodeXL's importer was able to import 389 of the 464 videos[13], resulting in **4326 nodes** and **7022 edges** (Table 4.1). The detailed steps for data collection are outlined in Appendix B.

4.6.4 Facebook Data Collection

The Facebook data were collected through CrowdTangle, which is a database that was acquired by Facebook in 2016 that contains data for Facebook's public pages, groups and verified profiles (Newton 2016, as cited in Bruns, et al., 2020). As above, I will collectively refer to these as 'Facebook spaces', following Bruns et al. (2020). Changes made to Facebook's API in 2018 mean that information posted outside of these public spaces is no longer available to researchers for privacy reasons (Freelon, 2018). As explained above, this means it is possible to collect data about the activities of pages and groups, but not individual Facebook users, which means the results of the collection are different from the other networks. While this creates considerable limitations, valuable insights can still be generated, particularly if the research is designed to suit accessible data (Bruns, 2019a, Lazer, 2020). Access to the CrowdTangle platform is available to researchers, but requires approval and the applicant needs to have an active Facebook account (CrowdTangle, n.d).

The CrowdTangle platform has a user-interface which makes it straightforward to build search strings and set search parameters. In alignment with the data collection from Twitter and YouTube, the search string used was "Great Barrier Reef". The search was conducted across Facebook only (as opposed to including Instagram), it included all public pages, groups and verified profiles, all post types, English only content, and the consistent date range.

A comma-separated values (CSV) file containing the results was downloaded for further analysis, which included 4663 Facebook posts (Table 4.1).

[13] Upon reviewing the data, videos were not imported that had the comment functionality disabled on YouTube. This is likely to be due to an absence of comments and replies to comments creating a lack of edges.

Table 4.1

Data collected from each social media platform

Platform	Total	Edges	Nodes
Twitter	84,941 tweets	118,012	Twitter accounts: 37,503
YouTube	389 videos	7022	YouTube accounts: 4326
Facebook	4663 posts	**Bipartite network 1:** 4563 domains	**Bipartite network 1:** Facebook Spaces (unique): 2430 Domains (unique): 619
		Bipartite network 2: 4563 URLs	**Bipartite network 2:** Facebook Spaces (unique): 2430 URLs (unique): 3074

4.7 DATA ANALYSIS METHODS

The data analysis for each network took a different approach according to the affordances of the platforms and the nature of the data available for collection. Table 4.2 offers an overview of the networks and analysis type undertaken for the social network analysis component.

Table 4.2

Networks and analysis type, including nodes and edges

Network	Network type	Node level	Nodes	Edges
Twitter	Directed	One-mode	Twitter accounts (37,503)	Activities (Tweet, retweet, reply tweet, @mention) – 118,012
YouTube	Directed	One-mode	YouTube accounts (4326)	Activities (Post video, comment, reply) – 7022
Facebook	Directed	Two-mode	**Network 1:** 1. Unique Facebook Spaces (2430) 2. Unique URLs (3074)	URLs (4563)
			Network 2: 1. Unique Facebook Spaces (2430) 2. Unique Domains (619)	URLs (4563)

The following sections step through the data analysis approach for each network. The method outlined for the three networks is explained under each part: Part A – Dominant actors; Part B – Dominant information sources and frames, and Part C – Connection and disconnection. As noted earlier, these parts and their associated metrics operationalise Castells' four forms of network power and the social news media network power indicators for attention. These indicators and the associated SNA metrics are shown in Table 4.3.

The choice of clustering algorithm is an important decision when it comes to network analysis, with each using a different formula to allocate actors into communities, resulting in different network partitions – or modularity classes – depending on the algorithm enlisted (Guest, 2020). Each user can only belong to one community (Williams et al., 2015). Various algorithms have been used in research to-date about connection and disconnection in online networks, yet often these choices are subjective, with no single algorithm universally considered the ultimate for exploring network community dynamics and ultimately interpreting meaning from them (Fortunato & Hric, 2016). For this reason I analysed the Twitter and YouTube data using two different algorithms. More detail is provided below, but this approach proved to be useful for analysis (Chapter 5; Chapter 6).

Table 4.3

SNA metrics used to operationalise Castells' network theory of power in the social news media network

Power form	Power indicator (attention)	Metric
Networking Power	Inclusion of actors in the top 100 for each network by type.	**Twitter** In-degree Qualitative coding by actor type
		YouTube In-degree Qualitative coding by actor type
		Facebook In-degree (Domains) Degree (Spaces) Qualitative coding by actor type
Network Power	Removal of content, or the flagging of content as inappropriate by platforms.	**All platforms** • Temporarily banned users and/or accounts • Terminated accounts • Content warnings or removal

Networked Power	Centrality of actors compared to other actors, dominance of content (ability to get attention), prevalence of frames in content (salience of framed 'reality').	**Twitter** **Actor attention:** In-degree (top 100) + media-specific (top 10) **Content attention:** Top 30 most frequently-occurring URLs and top 30 Domains **Most salient frames:** Close reading and framing analysis (top 10)
		YouTube **Actor attention:** In-degree (top 100) + media-specific (top 10) **Content attention:** Most engaged with 30 videos **Most salient frames:** Close reading and framing analysis (top 10)
		Facebook **Actor attention:** Facebook spaces-URLs: Degree (top 100) + media-specific (top 10). Facebook spaces-Domains: In-degree (top 100) + media-specific (top 10) **Content attention:** Top 30 most frequently-occurring URLs and top 30 posts by engagement **Most salient frames:** Close reading and framing analysis (top 10 by engagement)
Network-making Power	Attempts to counter dominant actors, information or frames with alternative information or frames to switch 'reality'.	**Twitter** 1. Global network metrics 2. Network visualisations x2 3. Subnetwork analysis **Subnetwork analysis:** • Actors (top 10) • Information sources (top 10) • Frames (top 10) • Intra and inter-cluster sharing
		YouTube 1. Global network metrics 2. Network visualisations x2 3. Subnetwork analysis **Subnetwork analysis:** • Actors (top 10) • Information sources (top 10) • Frames (top 10)

	• Intra and inter-cluster sharing
	Facebook 1. Network visualisations 2. Subnetwork analysis **Subnetwork analysis:** • Facebook spaces–domains • Facebook spaces–URLs.

Note. See Chapter 3 for a summary of each network power form.

4.7.1 Part A – Dominant actors (networking power, network power and networked power)

Overview

Part A was concerned with the presence and dominance of actors in the networks, which relates to Castells' (2011b) 'networking power' and 'networked power'. The hierarchical position of nodes was considered in terms of centrality, as per Himelboim et al., 2017. The authors argue that hubs, or gatekeepers, in the network can have greater control of information flow (p. 4) (networked power). The inclusion and exclusion of actors in the top 100 list by type was also considered (networking power and network power), noting that actors included have more power than those excluded (Castells, 2011b). As only the top 100 nodes are considered (as per Newman, 2017; Faris et al., 2017), a limitation is that some actors may have been in the network, though outside of this parameter.

Part A also specifically considered the centrality of media actors in the network in relation to other non-media actors (Newman, 2017). Noting 'media' can take many forms in the social media news network, the media actors were further classified into 'media non-news', 'mainstream media' and 'alternative media' (Appendix C). While inspired by Newman (2017), these media subcategories were identified inductively through the data and coding process. While there are limitations in this classification process as the distinction between mainstream and alternative can be difficult to make with some actors (Hiashutter-Rice & Weeks, 2021), making these distinctions was necessary to help consider the extent to which mainstream news outlets and alternative news outlets had centrality in the social news media network (Bruns et al., 2021b; Bruns et al., 2021c; Faris et al., 2017; Graham et al., 2020a; Newman, 2017; Newman et al., 2021).

The non-media actors were coded in the context of mediatised environmental conflict (Hutchins & Lester, 2015; see also Foxwell-Norton & Konkes, 2018), with classifications modified accordingly or added inductively (Appendix C). The term 'activist' (Hutchins & Lester, 2015) was replaced with 'advocacy' (a term used in Newman, 2017, although in a different way). This was to avoid negative associations linked to activism (Hanabeth et al., 2018), and also to encompass actors who are climate change action and policy advocates, and also those who advocate based on concerns or scepticism about GBR health science, or climate change action or policy. Environmental non-government organisations are included in 'advocacy', as are thinktanks; this category represents non-media actors whose logic is to champion an issue, change minds, or make a difference. This was considered a less binary way to code the groups, yet captured the same ideologically-motivated logic. The code 'political' also included government departments and local councils, as they operate from similar public accountability logic. The end result was the following list of actors: media non-news, media mainstream news, media alternative news, vlogger (with subcategories), advocacy, political, international, industry, Indigenous, science, community, individuals, unknown, inauthentic. The codebook in Appendix C describes each category, and Chapter 6 explains the inductive process used to code inauthentic accounts.

The top 10 news media actors were then extracted from the top 100 actors list from the global network. These were further analysed and classified by political stance using Media Bias Fact Check (https://mediabiasfactcheck.com/). Media Bias Fact Check is an independently-owned website that classifies the political bias, factual accuracy and credibility of range of media sources. While it has a defined method to rate all media outlets using the wording of headlines, credibility of sources, story choices, and political affiliation (Mehta & Guzman, 2018), there are limitations with this resource. Namely, while it is funded by reader donations, third-party advertising and membership subscriptions and makes its Likert-scale methodology publicly available, it is not an academic source nor accredited in any way[14]. Still, it is used by academics and serves as an adequate resource for this research inquiry.

Finally, coding was checked with random samples provided to another person who understood the project and GBR case study context. The samples were crosschecked with the coding instruments (Appendix C; Appendix D).

[14] For example, unlike *Disinformation Risk Assessment: The Online News Market in Australia* (Glazunova et al., 2021), yet this publication does not reveal the outlets deemed higher risk of spreading disinformation.

Twitter

Using the data imported into NodeXL, the global and local network statistics were calculated, including modularity, density, the number of isolates, and centrality. These metrics all relate to the degree that connections are gathered around just a few actors in the network and give insights into the hierarchy of information flow (Borgatti et al., 2009; Himelboim et al., 2017). The Wakita-Tsurumi community detection algorithm was selected for the Twitter data as it is recognised as a suitable choice for larger communities (Rodrigues et al., 2011; Wakita & Tsurumi, 2007). NodeXL was used to run the algorithm to analyse the network data, which grouped actors into relational communities and gave them a group number, otherwise known as modularity class.

To determine the most dominant actors within the network, the top 100 Twitter accounts were identified via in-degree. In-degree was the most appropriate measure of media influence due to it being an indication of the number of incoming connections, or authority (Grandjean & Jacomy, 2019; Hansen et al., 2010; Himelboim et al., 2017). In other words, from a content producer's perspective, incoming ties represent other actors sharing their content, which is more significant to this research enquiry than being well-connected (as per betweenness centrality, for example). These actors were then coded as outlined above. This involved checking each username against their Twitter description, the link in their profile and even Googling them to determine their fit.

YouTube

Using the data imported into NodeXL, the Wakita-Tsurumi community detection algorithm was selected to ensure consistency with the Twitter data analysis. As per the rationale with Twitter, the top 100 actors were identified via the in-degree centrality metric, although in this instance the nodes were YouTube channels and the edges were created by the original video being uploaded, or comments and replies on that video.

The same actor classification process was conducted as outlined above, however new actor classifications needed to be added to reflect the different affordances of YouTube (Appendix C). Classifying actors was more difficult on this channel due to the high number of accounts that appeared to be individuals in the top 100. This involved in-depth close reading of profiles and associated comments to determine if the account seemed authentic (Graham et al., 2020a). While some actors had a generic profile photo and few channel subscriptions and no video content of their own, their comments on other videos had human-like syntax and

engagement with other users. Examples are shown in Appendix C. The top 10 media actors were also isolated from the list and further analysed as per the section above.

Facebook

A different approach was required with Facebook (Fan, n.d). CSV files were prepared, then imported into open-source graphing software Gephi using the CSV plugin (Bastian et al., 2009; Levallois, 2013). The Louvain clustering algorithm was used to identify communities. Two different networks were produced: 1) Facebook spaces and unique URLs, with the Facebook spaces as a node type, and the unique links as another node type, and the hyperlinks between them as edges; 2) Facebook spaces and unique domains, with the Facebook spaces as a node type, and the unique domains as another node type, and edges the hyperlinks between them, but expressed as a simplified domain rather than a URL (Angus et al., 2021; Bruns et al., 2021d). In a practical sense, the edges are the relationships created by a Facebook space account posting their own content onto their own page (expressed as an internal or external URL), or a Facebook space account posting another actor's URL to its own page or group.

To examine the most dominant Facebook spaces, I selected the metric of 'degree' and used the Facebook spaces and URLs data. With the other platforms, I chose in-degree to measure the number in incoming ties. However, in the case of the Facebook spaces, this value is '0' because the pages and groups themselves are furthering the information, whether it is URLs, videos or photos (out-degree). In reality, other individuals are of course then furthering that information, but this level of detail cannot be captured by the API. 'Degree' was therefore chosen to consider the dominance of Facebook spaces. In a directed network, degree is the sum of the incoming and outgoing links, which is an indication of how much information the spaces are sharing[15] (Grandjean & Jacomy, 2019). As these spaces are often information-based actors – like media outlets posting news content to their pages, or Facebook groups linking to external media content – it is an appropriate measure of informational authority in this context (Grandjean & Jacomy, 2019).

However, I approached the Facebook spaces and unique domains dataset differently. As noted earlier, the Facebook spaces account holders post content on their pages, which – apart from the case where it is text only (this was very rare in the data collected, see Chapter 7) – also features a URL. This URL can be internal (for example, to an image or video that has been

[15] Out-degree could have been used instead, with the same result in this case.

directly uploaded to Facebook and therefore has a Facebook domain), or could be a link to an external information source, like a news website. In this case, these are all incoming ties to the piece of content. Therefore, in-degree was determined to be the most appropriate metric to measure the dominance of the domain nodes as it captured these incoming ties.

As with the other networks, the top 100 actors were calculated for each Facebook network and coded (Appendix C). The top 10 media outlets were then extracted from the list and coded by political stance using Media Bias Fact Check.

4.7.2 Part B – Dominant information sources and frames (network and networked power)

Overview

Part B was focused on the information sources that are dominant with the overall network (Angus et al., 2021; Faris et al, 2017, Newman, 2017), and considered whether the prominence of the information was also connected to the centrality of the main actors. This also interconnects with Castells' 'networked power'. In the case of multimedia communication networks, the power of one social actor over another can be exercised via the effectiveness of information virality, noting that "communication networks are the fundamental networks of power making in society" (Castells, 2011b, p. 785). Importantly, differing platform affordances made it necessary to focus on different forms of information sharing to assess prevalence.

Part B also considered the framing of the information being circulated through this overall network and associated patterns. Hansen (2011) and Nisbet and Newman (2015) say framing an issue is "an important exercise in power" (p. 325), with framing and reframing used as a tactic to program and re-program networks (Castells, 2011b). Frame schemas can be developed inductively (Foxwell-Norton & Konkes, 2018; O'Neill et al., 2015) or deductively (Mitchell & Roffey-Mitchell, 2018), or a mixture of both (Newman, 2017). Due to climate change issues being strongly connected to GBR protection (Konkes & Foxwell-Norton, 2021), Nisbet's typology of frames applicable to climate change and environmental debates (Nisbet, 2009; Nisbet & Newman, 2015) was applied to this study with the understanding that this list could be added to inductively if required. The frames outlined in the typology are general organising devices, rather than specific policy positions (Nisbet, 2009). Namely, the frame can include supportive, oppositional and neutral stances.

Nisbet's frames are: 'social progress', 'economic development and competitiveness', 'morality and ethics', 'scientific and technical uncertainty', 'Pandora's box/Frankenstein's monster/runaway science', 'public accountability and governance', 'middle way/alternative path', and 'conflict and strategy'. These frames are defined in Appendix D. Some content was eliminated from the framing analysis if it was deemed either irrelevant, or of low analytical value. For example, while content did not need to directly mention the WHC or UNESCO 'in danger' recommendation, it did need to be related to GBR protection, GBR policy, GBR science, or threat mitigation. Items that were excluded included general tourism posts that did not mention threat mitigation, fishing-related videos, and irrelevant non-GBR-related content. For comparison purposes, irrespective of the number of frames contained within each information source, it was coded once with the most salient frame.

Finally, this part examined the act of limiting information through via 'network power' – that is, the affordances and roles of the platforms themselves as facilitators or boundaries to information flow.

Twitter

For Twitter, calculating the occurrence of hyperlinks – and specifically news hyperlinks – was the most suitable way to consider informational prevalence and power, noting the primary objective of audience attention. Twitter has a 'micro blog' format (Batrinca & Treleaven, 2015) with a limited number of characters (280) afforded per Tweet. Therefore an effective way to share information is for platform 'publics' to identify and post URLs to an external source of information (Boyd & Ellison, 2007; Bruns & Stieglitz, 2013). In the case of Twitter, this is often to social news media content, noting this is a main reason that users engage with the platform (Park et al., 2021; Newman et al., 2021). As noted by Dehghan (2020), external links are an indicator of information sources that social media users feel are worthy of sharing. In the context of studying different actors and discursive powerplays within a network, they offer valuable insights into the information ecosystem and what ideological content and 'cultural materials' (Castells, 2011b) actors are connecting and disconnecting over (De Maeyer, 2013). Newman (2017) also notes that studying hyperlink sources can provide insights into elite media influence in online environments compared to other actors, like blogs and non-for-profit news outlets.

In NodeXL, hyperlinks are identified in the tweet text and automatically expanded to separate URL and domain columns within the edges sheet for further analysis. However, in completing this step of the strategy, I noticed that not all hyperlinks had been extracted from

the tweet text during the TweetID import or expanded from their shortened format. Namely, they were still in the format of Twitter's shortened links, which appear as in a 'http://t.co' format (Twitter, 2021). To address this, I extracted all URLs from the tweet text using Excel formulas and resolved the URLs using a link-expanding tool[16]. I manually went through the 118,012 rows and cleaned any non-resolved links, then reinserted the URLs back into the data using VLookUp functions.

From here, a list of the most frequently-occurring 30 URLs from the entire Twitter network was made, along with a list of the top 30 domains. The top 10 URLs were subject to a framing analysis as outlined above. The framing coding process involved in-depth close reading of the content of the link destinations (either a media article, blog article or a tweet), which was coded using the schema (Nisbet, 2009). Noting there are potentially several frames present within each information source, if in doubt, the dominant frame was determined by prioritising the headline, first paragraph, the presence and order of quoted sources (Foxwell-Norton & Konkes, 2018). In the case of a single Tweet (for instance, a status update), the frame was coded using the text and accompanying visuals.

YouTube

Due to the affordances of YouTube, the most prevalent content was considered in terms of video interactions. Unlike Twitter, where the key information is shared via hyperlinks, for YouTube the focus was the content that actors uploaded in the form of videos. In the case of news content, this was mainly news reports that had been broadcast on television and then uploaded, or parts of media conferences. There were 389 unique videos in the global YouTube dataset. Metrics were not accessible in NodeXL for the number of video views or likes, so total interactions was used as a metric to gauge video salience. This involved calculating the total number of interactions per video and ranking them in order of prevalence. This included edges that were comments, replies to comments and original video posts that were related to each video. For additional rigour, a cross-check was completed on the most dominant information sources to ensure the number of views were reflective of their ranking.

The top 30 videos were identified per interaction, with the top 10 subject to a framing analysis as per Nisbet's (2009) framing schema. This involved watching the video several times

[16] Urlcheckr Premium, available at https://www.urlcheckr.com/.

to assess the dominant frame, including considering the description text about the video on the channel, the video title and the spokespeople featured.

Facebook

To assess information dominance on a platform like Facebook, it is necessary to look at information shared via hyperlinks and the content posted to the platform itself to capture the engagement of media information that is being shared with audiences in different ways, for instance uploading a video directly. As such, the Facebook spaces and URLs dataset was used to determine the most prevalent content by in-degree – essentially the number of times a Facebook space had cited the link. The top 30 links were identified, with media links highlighted.

However, not all posts included external links, and internal links (like facebook.com) did not reveal much about the nature of the content, so dominant information sources were also identified via interactions on posts. CrowdTangle defines engagement as "reactions, comments and shares" (CrowdTangle, n.d). The top 30 posts were identified, and media actors were highlighted. A framing analysis, as per Nisbet (2009) was conducted on the top 10 Facebook posts, which considered the post text itself, plus any additional content like images, videos and the nature of external links. Some posts were removed from analysis due to irrelevance to the case study. An outcome of this process was to inductively add a new frame to Nisbet's typology. This was 'hope or solutions' to reflect the position that the GBR is under pressure, but there is hope for its future, which includes showing evidence of work being done in the field.

4.7.3 Part C – Connection and disconnection (networked power and network-making power)

Overview

Part C examined the relationship between subgroups (clusters) noting the critical role that network connection and disconnection plays in steering, furthering, limiting and contesting information flows and frames (Himelboim et al., 2017), which I am understanding as assertions and contestations of power. Using social network analysis and framing analysis, the dominance of actors and information within strategically-selected subnetworks was compared to the main network (networked power). This included examining connectivity and informational sharing between these key clusters, noting that selective exposure can influence the ability of information and its associated frames to flow across groups (Himelboim et al., 2013b).

Using this data and network visualisations that were mapped with two different algorithms to further explore these informational power dynamics (noting Twitter and YouTube had two, while Facebook had two different networks with one algorithm), the analysis considered whether there was any indication that these subnetworks were contesting, or attempting to 'switch' the dominant narrative with alternative information and frames. This included examining the tactics deployed during this powerplay. This is the form of network society power that Castells describes as the most "crucial": network-making power (Castells, 2011b, p. 776; Chapter 3). For clarity, I am not implying that these actors were consciously trying to 'switch the narrative' or the programmed goals of the network, they were most likely circulating information they felt was more in alignment with their 'truth' in relation to this issue, thus 'reframing reality'.

Twitter

Connection and disconnection were considered at a global network scale through evaluating metrics like density, modularity and isolated actors (Himelboim et al., 2017; Smith et al., 2014). While this overall network approach was used as a starting point, connection and disconnection needed to be explored at the subnetwork, or cluster level, to explore the extent to which actors were central and what information was getting attention – or not – and what this could mean in a network-making power sense (Castells, 2011b).

As such, the analysis in Part C was guided heavily by the network visualisations and intra and inter-cluster comparisons (Grandjean & Jacomy, 2019; Smith et al., 2014; Venturini et at., 2021). The Twitter data was mapped in NodeXL using the Harel-Koren Fast Multiscale layout algorithm (Harel & Koren, 2001), and using the "meta-layout" 'group-in-a-box', which uses a treemap space-filling technique to display each of the subnetworks or clusters into segmented boxes along with the top keywords identified for that group (Rodrigues et al., 2011, p. 1). While this approach pulls the partitioned nodes into separate boxes for visualisation, it also highlights bridges between clusters (Smith et al., 2014). The conversational archetypes identified by Smith et al. (2014) were also considered at this stage to consider connection and disconnection.

In addition, the raw Twitter data – without any modularity pre-applied – was mapped in open source network visualisation and manipulation software Gephi (Bastian et al., 2009; Jacomy et al., 2014). I created separate nodes and edges CSVs and imported these data via the CSV plugin (Levallois, 2013). The CSV files also included the node attribute of follower counts, and the edges attributes of relationship, favourite count and retweet count. My first step was to run modularity, which applied the Louvain community detection algorithm to partition

the nodes (Blondel et al., 2008). For the layout algorithm, I used ForceAtlas2 (Jacomy et al., 2014) as per the approach taken by many contemporary studies. ForceAtlas2 is a force-directed layout algorithm and uses repulsive and attractive forces to connect and disconnect nodes in order to produce a visually meaningful composition (Venturini et al., 2021). The outcome of this force-directed layout was used to help guide the direction of the analysis. While this visualisation acted as a meaningful guide, the further analysis was conducted on the dataset that was created in NodeXL and clustered using the Wakita-Tsurumi algorithm.

This cluster analysis was based on Himelboim et al's (2013b) selective exposure cluster method, which compared actors, information sources and sharing patterns between a set of network clusters. As such, a subset of data was created from the Group 2 and Group 3 clusters in the NodeXL data – Group 1 was disregarded as the accounts were unconnected isolates, which were not useful for the phase of this analysis. Group 2 and Group 3 were the next largest groups, plus it was evident from the Gephi visualisation that they were spatially distinct from the network. The cluster analysis was done by filtering the data to show the nodes in the relevant group and extracting the members of each group into a separate worksheet. Once these data subsets were created, analysis was conducted to investigate the top 10 actors in each cluster by in-degree, including further research and in-depth close reading to code their actor type. The most frequently-occurring information sources, in the form of URLs, were then identified for each cluster and a framing analysis was conducted on the top 10, as per the approach in Part B. The actors and the information sources were then compared across the clusters for evidence of connection and disconnection both at a SNA level, and a 'framing reality' level, which included considering the roles of any potential bridges (Smith et al., 2014).

The final step was to examine the extent of the sharing of information within each cluster, versus sharing external to each clusters and, in particular, the instance of sharing and interconnection between the Group 2 and Group 3 clusters (Smith et al., 2014). Comparisons were made again between each cluster within the context of the broader network interconnectivity (Himelboim et al., 2017). This included taking selective qualitative content deep dives when needed to understand certain interactions and potential power interplays. For example, if a certain node appeared prominent in a cluster that was ideologically opposed to the other cluster (considering the most central actors and information being shared), further investigation was conducted to find out why. For example, was that actor being antagonistically engaged via @mentions (Graham et al., 2020a)?

YouTube

The same approach was taken with the YouTube data. The network was mapped using the Harel-Koren Fast Multiscale layout algorithm in NodeXL, plus ForceAtlas2 in Gephi. The force-directed visualisation was again useful in directing the subnetwork comparison with Group 1 and 5 selected. Group 1 was the largest group, and Group 5 was again spatially distant yet was relevant as it had the most dominant video in the entire network. There was also evidence of a bridge to explore from a potential network-making power perspective. The top 10 actors, content and framing analysis was completed across each cluster[17]. An inter and intra-cluster analysis was also conducted to examine connection and disconnection between these two subnetworks.

Facebook

The Facebook network visualisations also provided an inductive direction for further analysis. The two largest groups were compared in the Facebook spaces and domains networks, examining the type of media actors that shared similar connections. The next part of the analysis examined both datasets to look at the relationships between some of the most prominent actors and the prevalent information sources they were sharing as hyperlinks. The shape of the network was considered in the context of whether certain Facebook spaces and URLs were spatially removed from the main cluster of the network, including what actors were furthering certain information flows.

4.8 ETHICS

This research undertaking was approved by the Human Research Ethics Committee at James Cook University (JCU) as a project with a "low/negligible risk" category (Ethics Approval Number H8410). This level of risk is explained as: "research in which there is no foreseeable risk of harm or discomfort and any foreseeable risk is no more than inconvenience" (National Health and Medical Research Council, 2018, p. 13). However, privacy and consent are both complex and debated areas in social media research, particularly in the absence of a standardised approach or unifying guideline for human ethics committees (Hibbin et al., 2018). Hibbin et al. (2018) argue that it is necessary for researchers and review boards to move away from "old ethical norms" (p. 157) for social media research and instead incorporate "systematic

[17] There was only one content source in Group 5.

risk-benefit assessments [of SM research] and new procedural and technology solutions" (p. 157).

Leading computational social science researcher and sociology professor, Michael Salganik (2019), explains this risk-based approach another way, using Nissenbaum's (2010) concept of 'context-relative informational norms', where privacy becomes not so much about public or private, but about the "right to the appropriate flow of personal information" (2019, p. 315). As such, digital researchers should consider three parameters when considering privacy: "actors (subject, sender, recipient), attributes (types of information), transmission principles (constraints under which information flows)" (Salganik, 2019, p. 315).

In this case, data has been collected from only publicly-accessible content published on social media networks Facebook, Twitter and YouTube. These sites can be viewed by anyone with internet and computer access – viewers do not need an account. However, while information is readily available, it is recognised that it was not created with the express purpose of being part of a research study (National Health and Medical Research Council, 2018, p. 36). As it is logistically unfeasible to contact every public profile holder directly[18], to overcome this inability to obtain consent individuals were deidentified, or 'anonymised', in this inquiry. Importantly, individuals in this case are defined as those who are general members of the population and not a public intellectual, or someone who is in a position to benefit from a public profile. 'Benefit' could be financially, or professionally. Examples of individuals who benefit from a recognised public profile and are therefore not anonymised are journalists, celebrities, politicians, public-facing advocates (for example, Greta Thunberg), and scientists with a public profile. A test of this is whether the individual regularly consents to media interviews, appearances, or makes contributions in the form of opinion or commentary.

One public-facing scientist proved to be salient in the data: marine geophysicist Dr Peter Ridd, who is now leading a Reef-related project at conservative thinktank the Institute of Public Affairs (IPA)[19]. Dr Ridd's employment was terminated with JCU in 2018 based on a range of conduct, including public criticisms made to media about the veracity of GBR science (Swannie, 2021). While I did consider the removal of Ridd's name due to a concern about a

[18] For example, YouTube has removed its direct messaging functionality.
[19] At the time of writing, Dr Ridd and colleague Dr Jennifer Marohasy launched an initiative at the IPA called the 'Project for Real Science'. The project targets "young Australians" to show the GBR first-hand to challenge "the media narrative they otherwise consume" (Project for Real Science, 2022). It also aims to address "bad science" and academic censorship (Project for Real Science, 2022).

perceived conflict of interest, this actor met the criteria outlined above for inclusion, and other researchers have mentioned Ridd by name in recent work that relates to the mediatisation and politicisation of the GBR and climate change (Konkes & Foxwell-Norton, 2021; Grien & Macneil, 2022). Further, Ridd's dismissal was before my time as a research student at JCU. While I worked at the Great Barrier Reef Marine Park Authority in the communications team from 2016 to 2019 which fostered my interest in this topic and case study, I have no professional or personal dealings with Ridd, nor the professional knowledge to evaluate his scientific claims (Ridd, 2020). In this research, I am situating the resulting informational interplays of his contrary views within the broader scientific consensus (Great Barrier Reef Marine Park Authority, 2019; IPCC, 2022; Waterhouse et al., 2017) and considering the impact of these counter-frames in the context of connection, disconnection and power within the social news media network. In other words, I am considering Ridd's impact as a public representative of the science sphere of action in relation to interactions with other actors (Chapter 3), rather than evaluating any individual motivation or intent.

4.9 LIMITATIONS

While limitations have been highlighted throughout this chapter, I will elaborate further on some that were not covered, or that need further expansion. One of the key limitations to this project is that while it considers the framing of information in the global network and subnetworks, it does not drill down into the responses of social media users involved in those information flows or the context of their participation in these debates. While it has the breadth of the three networks, it does not have the depth. The value of having this additional scope would have allowed for a systematic analysis of the responses to information by 'produsers' (Bruns, 2008), particularly in the cluster analysis where dominant frames and narratives seemed to be contested. This additional work could have provided greater insight into the relationship between the framed content that certain actors are circulating and its impact, if any, on the responses of other actors embedded in these dynamic news-sharing spaces in the struggle of 'power over minds'. Noting, of course, even with this additional analytical step, there are a myriad of other factors at play in shaping meaning (Chapter 2; Chapter 3).

Another limitation relates to data collection. A universal limitation with social media-based data collection is that different data collection tools have been shown to produce different datasets (Weber et al., 2021). Also, there is a lack of publicly-available information to explain how exactly the platforms' APIs collect data. Therefore, it is unlikely that every piece of content containing "Great Barrier Reef" was collected (as well as relevant content about the GBR that

did not include this term, as discussed above). Further, not all collected data could be imported for analysis, as outlined earlier. However, these limitations still enable the exploration of social behaviours and processes via the networks if the researcher is aware of exactly how the data were sourced, the limitations, and the potential impact on conclusions drawn (Weber et al., 2021).

Similarly, there are also limitations in determining the dominance of information sources and attitudes in clusters based on using community detection algorithms alone, which – as noted above – can only group actors into a single group based on its connections. For example, an information source could be circulated in an oppositional way, an actor could be tagged in an antagonistically, or journalists could follow certain accounts professionally while they may not share the same ideological position (Dehghan, 2020). However, due to the connections created, the actor could appear in the same group. This limitation was addressed somewhat with qualitative in-depth close reading when outliers were detected, but it also highlights the value of further analysis of 'produsers'' (Bruns, 2008) responses in comments, as noted at the start of this section.

This thesis will now turn to the results chapters, starting with Twitter.

Chapter 5: Twitter Results

5.1 OVERVIEW

5.1.1 Data collected

Using the methods and parameters outlined in Chapter 4, **84,941 Tweets** were collected during the June 21, 2021 – August 1, 2021 timeframe for the query "Great Barrier Reef". These tweets included **37,503** accounts, or nodes, and **118,012** relational ties, or edges (Table 5.1).

Table 5.1

Global Network Metrics for Twitter

Graph metrics	
Graph type	Directed
Nodes – unique Twitter accounts	37,503
Edges unique	87,882
Edges with duplicates	30,130
Edges total	118,012
Number of edge types	5
Retweet	67,660
MentionsInRetweet	24,603
Mentions	9510
Tweet	11,355
Replies-to	4884
Self-loops	11,720
Connectivity metrics	
Groups	1,200
Isolates	3653
Connected components	4688
Density	0.0000647167041633203
Modularity	0.461069

Note. The graph metrics are a summary of the data collected. The connectivity metrics are global statistics that relate to connection and disconnection, which will be discussed in Part C.

5.1.2 Time series analysis

Activity on Twitter peaked as news of UNESCO's draft recommendation was made public late on June 21, 2021, and began widely circulating the following day. The two peaks in activity were June 22 with 17,079 tweets and July 23, 2021 with

10,184 tweets, with the latter being the day of the WHC's decision (Figure 5.1). The highest peak at the announcement reflects the impact value of the news to recommend the GBR for an 'in danger' listing. Yet this level of attention was not sustained throughout the duration of the data collection period, which suggests it was not a key issue for the broader social news media network. This is supported when viewing the Australian Twitter News Index for the collection period, with the GBR absent from the top 20 stories shared on Twitter by the 35 Australian news outlets tracked in the six-week timeframe (QUT, 2021).

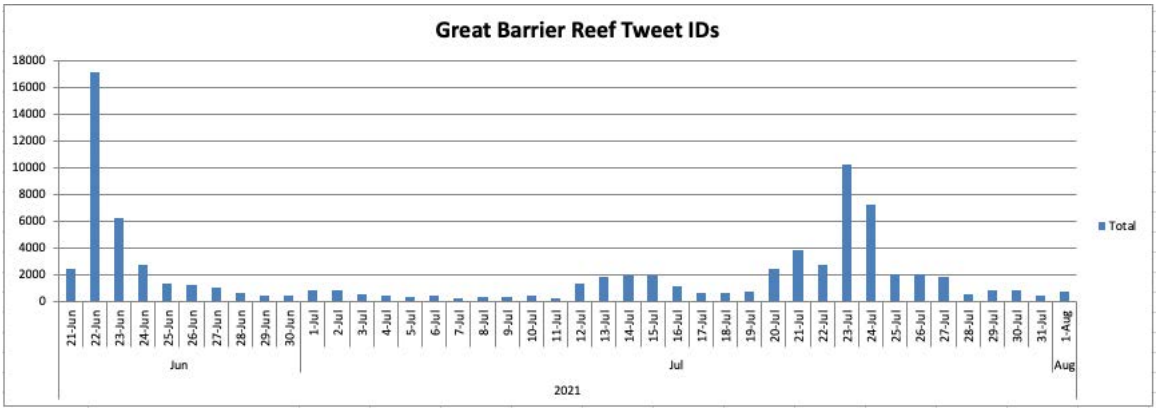

Figure 5.1. Time series bar graph showing the date (horizontal axis) and the number of edges created (vertical axis) to highlight the concentration of Twitter activity around the two MEC events.

5.2 PART A – DOMINANT ACTORS

Networking power, network power and networked power

5.2.1 Which actor types were not included, or excluded, from the network?

In the top 100 accounts, none identify themselves as representing Indigenous people or GBR Traditional Owners, which is consistent with other research into communications in this context (Foxwell-Norton & Konkes, 2018). Also, while there are politicians, there are no GBR management or science government agencies in the top 100 (Table 5.2).

5.2.2 Which actors received the most attention?

Forty-six of the top 100 Twitter accounts are media. Of these media actors, the 46 were further classified into 'media non-news' (three), 'media mainstream news' (31) and 'media alternative news' (12). Of the remaining most prominent actors, 29 are advocacy, 15 are political, three are science, four are industry, two are international, one is 'unknown'.

Table 5.2

Top 100 Actors on Twitter by In-degree

	Name	In-degree	Group	Actor type
1	Sarah Hanson-Young	2681	7	Political
2	UNESCO #Education #Sciences #Culture UN	2569	5	International
3	Terry Hughes	2253	3	Science
4	Graham Readfearn	1933	3	Media mainstream news
5	Sussan Ley	1793	8	Political
6	David Ritter	1488	15	Advocacy
7	Patrick Moore	1320	2	Advocacy
8	Climate Council	941	3	Advocacy
9	Kevin Rudd	935	4	Political
10	abc730	882	4	Media mainstream news
11	Greenpeace Australia Pacific	853	9	Advocacy
12	Reuters	830	10	Media mainstream news
13	Scott Morrison	814	13	Political
14				
15	Michael Pascoe	769	4	Media mainstream news
16	Larissa Waters	730	7	Political
17	GetUp!	658	5	Advocacy
18	RN Breakfast	650	8	Media mainstream news
19	Adam Morton	640	3	Media mainstream news
20	@GrettaPecl	633	11	Science
21	The Conversation	626	3	Media alternative news
22	Ketan Joshi	606	14	Media alternative news
23				
24	GWPF	571	2	Advocacy
25	Lenore Taylor	525	6	Media mainstream news
26	ABC The Drum	522	21	Media mainstream news
27	Mike Cannon-Brookes AU	515	8	Industry
28	Peter Whish-Wilson	501	13	Political
29	Zali Steggall MP	499	8	Political
30	Amy Remeikis	498	4	Media mainstream news
31	Daniel Bleakley	491	27	Advocacy
32	Craig Reucassel	491	21	Media non-news
33	Michael Rowland	490	8	Media mainstream news
34	Fight For Our Reef	485	5	Advocacy
35	Jon “Fleet Of Airships” Kudelka	479	11	Media mainstream news
36	BBC News (World)	467	6	Media mainstream news
37	ABC News	446	6	Media mainstream news
38	Peter Garrett	436	3	Advocacy

39				
40	Ellen Fanning:Journo	432	8	Media mainstream news
41	Kailas Wild	428	4	Advocacy
42	Adam Zwar	415	22	Media non-news
43	Terri Butler MP	409	4	Political
44	Sleeping Giants Oz	399	4	Advocacy
45	Australian Marine Conservation Society	386	5	Advocacy
46	SBS News	374	5	Media mainstream news
47	Occupy Centrelink	353	4	Advocacy
48	simon holmes à court	352	2	Industry
49				
50	Guardian Australia	341	8	Media mainstream news
51	MFW	341	4	Advocacy
52	Andrew Leigh	339	8	Political
53	Svein T veitdal	328	9	Advocacy
54	Mike Carlton	325	4	Media mainstream news
55	DW News	323	28	Media alternative news
56				
57	Cheryl Kernot	309	4	Political
58	Denise Shrivell #Independentsday is coming	306	4	Media alternative news
59	The Guardian	303	16	Media mainstream news
60				
61	CNN	295	6	Media mainstream news
62	Bill Hare	288	6	Science
63	Elaine Johnson	283	3	Advocacy
64	Guardian Environment	279	14	Media mainstream news
65	Matthew Canavan	277	2	Political
66	theJuiceMedia	274	22	Media alternative news
67	Annastacia Palaszczuk	273	13	Political
68	Mongabay	257	16	Media alternative news
69	AJ+	254	23	Media mainstream news
70	Assaad Razzouk	251	14	Media alternative news
71	Ed King	251	6	Media alternative news
72	Voters of Kooyong	250	4	Advocacy
73	John Tanzer	240	16	Advocacy
74	CNN International	238	25	Media mainstream news
75	Barnaby Joyce	236	4	Political
76	The Washington Post	232	6	Media mainstream news
77	Thérèse Rein	231	4	Industry
78				
79	Peter Hannam	228	3	Media mainstream news
80	Prof Kerryn Phelps AM	223	8	Political
81	Discovery	217	31	Media non-news

82	Sky News Australia	216	2	Media mainstream news
83	John Pilger	215	12	Media mainstream news
84	Climate Realists	215	2	Advocacy
85	Anika Molesworth	213	5	Advocacy
86	Greg Jericho	210	3	Media mainstream news
87	Sabra Lane	207	4	Media mainstream news
88	Watts Up With That	205	2	Media alternative news
89	Scott Hamilton	205	39	Industry
90	Lijian Zhao 赵立坚	204	12	Political
91	Dr. Fanny Douvere	199	3	International
92				
93	Mick Foley	197	3	Media mainstream news
94	Plant Based News	195	24	Media alternative news
95	Imogen Zethoven	194	3	Advocacy
96	Greenpeace	193	2	Advocacy
97	zerohedge	191	26	Media alternative news
98	Steve Milloy	190	2	Media alternative news
99	The Times	187	18	Media mainstream news
100	AFP News Agency	186	33	Media mainstream news

Note. This table includes the in-degree value, the group number of each actor (how they were clustered as per the Wakita-Tsurumi algorithm) and the actor classification. The yellow-coloured rows are media and the greyed-out rows have been deidentified for the privacy of individual Twitter users.

5.2.3 Which news media actors received the most attention?

To focus on the most dominant media actors alone, Table 5.3 shows the top 10 media nodes in the entire Twitter network with the description from their Twitter bio. Each is classified by media type and coded for their political stance using Media Bias Fact Check (MBFC). While two could not be classified using this methodology, the remaining outlets are either 'left of centre', or what MBFC calls 'least biased', which is more politically centre. Eight are mainstream news outlets, four of these are associated with Scott Trust Limited-owned *The Guardian Australia* (Graham Readfearn, Adam Morton, Lenore Taylor and Ketan Joshi is a columnist), and three relate to Australian national broadcaster the Australian Broadcasting Corporation (*ABC*) (abc730, RN Breakfast, ABC The Drum). The remainder are breaking news provider Reuters; finance commentator Michael Pascoe, who has previously worked for mainstream corporate news outlets and is currently contributing editor at independent news outlet *The New Daily*; and academic and journalistic collaboration,

The Conversation, which publishes content supplied by academics and edited by journalists.

Aside from their political alignment, these outlets – or representatives from the outlets – also share another common trait: free access to their information, as opposed to pay-walled content.

Table 5.3

Top 10 Media Actors in the Twitter Global Network

	Name	In-degree	Group	Media type	Political stance[20]	Description[21]
1	Graham Readfearn	1933	3	Media mainstream news	Left-Centre	"Journalist doing climate and environment @GuardianAus https://t.co/W6UBebViSs Dad. Burnley fan. Ops mine. DMs open."
2	abc730	882	4	Media mainstream news	Left-Centre	"7.30 is the ABC's national flagship current affairs program. Monday to Thursday on the ABC. This is an official @ABCaustralia account."
3	Reuters	830	10	Media mainstream news	Least Biased	"Top and breaking news, pictures and videos from Reuters. For more breaking business news, follow @ReutersBiz."
4	Michael Pascoe	769	4	Media mainstream news[22]	*Data not available*	"Journalist, commentator, speaker, contributing editor for The New Daily, rugby follower, would prefer to be skiing."
5	RN Breakfast	650	8	Media mainstream news	Left-Centre	"Bringing you comprehensive coverage and analysis of national and international events - serious, fun, topical and diverse. Live from 6am to 9am weekdays."
6	Adam Morton	640	3	Media mainstream news	Left-Centre	"Climate and environment editor @GuardianAus. Co-founder of the award-winning @TasInquirer. Other things. Email: adam.morton at https://t.co/Uc3b9G1UOp."
7	The Conversation	626	3	Media alternative news	Least Biased	"Independent news from the sharpest academic minds. Read: https://t.co/pXIyo0sdkZ Sign up: https://t.co/tTlAQjh3cS Donate: https://t.co/TvbSODXXxw."
8	Ketan Joshi	606	14	Media alternative news	*Data not available*	"Climate and clean tech author and analyst. Tech, data, science, justice, community. My book Windfall has words and pictures. We are cancelling the apocalypse."
9	Lenore Taylor	525	6	Media mainstream news	Left-Centre	"Editor of Guardian Australia."
10	ABC The Drum	522	21	Media mainstream news	Left-Centre	"Mon-Fri 6:00pm ABC TV & 11:00pm AEST ABC News | Quotes represent the views of individual panellists and aren't a reflection of the views of The Drum."

[20] In the case of individual journalists, it is the stance of the outlet they work for, or is mentioned in their Twitter bios, not them as individuals.
[21] Description is directly from the Twitter account's bio.
[22] To note: *The New Daily* has been coded 'media alternative news' in the Facebook data as an outlet, but Michael Pascoe is 'media mainstream news' due to his involvement with other mainstream media outlets.

5.3 PART B – DOMINANT INFORMATION SOURCES AND FRAMES

Network power and networked power

5.3.1 What information received the most attention?

Due to the affordances of Twitter, URLs were identified as the most suitable type of 'digital trace' (Freelon, 2014) to answer the research question. There were **85,542 hyperlinks in total**, and **4707 were unique**.

Top 30 URLs

The top 30 hyperlinks (by frequency) for the entire Twitter network are listed in Table 5.4. *The Guardian* is the most central information source in the entire network in terms of URLs shared. Its content represents 13 of the top 30 URL. In terms of the number of links (n= 32078), *The Guardian* is associated with to 58 per cent of all links in the top 30 (18,721), including the entire top six. This is consistent with other studies (Chapter 2) and could be for several reasons. *The Guardian* covered the environmental policy event extensively during the data collection period with a total of 31 stories. This included four on the day of the initial announcement, with a steady flow of content through the six weeks from news stories to investigative pieces, opinion and podcasts. The full list of Guardian coverage is in Appendix E. As noted earlier, *The Guardian's* business model means its content is free to access, and, therefore, more likely to be shared than content with restricted or subscriber-only access.

While the majority of the information sources are politically central or centre-left, and reflect the position of the scientific consensus, one outlier is EcoSenseNow (number seven). This account belongs to Patrick Moore, who is also number seven in the top 100 actors (Table 5.2). Other outliers are the Global Warming Policy Forum (GWPF) content (number 22 on this list and number 24 in the top 100 actors) and ZeroHedge (29 here, and 97 in the top 100 actors). Climate scepticism advocates Patrick Moore (Holman, 2021) and the GWPF are discussed in the subnetwork framing analysis later in this chapter. Further background about the GWPF is provided in the following section due to its dominance as a domain. ZeroHedge is described as a "far-right libertarian financial blog" and has more than one million followers on Twitter (zerohedge, 2021). While at the time of writing, the account appeared to be active, it

was banned by Twitter in 2020 in an exercise of network power for publishing a COVID19-related conspiracy theory (Hawkins, 2020).

Table 5.4

Top 30 URLs in the Twitter Global Network by Frequency

	Information source: URL	N=
1	https://www.theguardian.com/environment/2021/jun/22/great-barrier-reef-should-be-listed-as-in-danger-unesco-recommends	3102
2	https://www.theguardian.com/environment/2021/jul/21/coalition-believes-it-has-numbers-to-stop-great-barrier-reef-being-listed-as-in-danger	2742
3	https://www.theguardian.com/environment/2021/jul/23/world-heritage-committee-agrees-not-to-place-great-barrier-reef-on-in-danger-list	2417
4	https://www.theguardian.com/environment/2021/jul/20/joanna-lumley-and-jason-momoa-join-prominent-group-backing-great-barrier-reef-in-danger-listing	1717
5	https://www.theguardian.com/environment/2021/jul/14/fossil-fuel-friends-saudi-arabia-and-bahrain-back-australias-lobbying-on-great-barrier-reef-unesco	1682
6	https://www.theguardian.com/environment/2021/jun/23/un-official-rejects-australias-claim-it-was-told-great-barrier-reef-wouldnt-be-listed-as-in-danger	1537
7	https://twitter.com/EcoSenseNow/status/1418593627253534721/photo/1[23]	1322
8	https://www.getup.org.au/campaigns/climate-justice/unesco-world-heritage/unesco-protect-our-reef	1310
9	https://www.washingtonpost.com/world/2021/06/22/great-barrier-reef-climate-australia/	1111
10	https://www.theguardian.com/environment/2021/jul/13/australian-environment-groups-urge-un-to-put-great-barrier-reef-on-in-danger-list	1094
11	https://twitter.com/sussanley/status/1418545556591235079	1025
12	https://www.theguardian.com/environment/2021/jul/23/whether-or-not-the-great-barrier-reef-is-listed-as-in-danger-wont-alter-the-fact-it-is-at-risk-from-climate-change	988
13	https://twitter.com/ABCthedrum/status/1407982469010264066/video/1	961
14	https://www.theguardian.com/environment/2021/jul/30/coalition-criticised-after-great-barrier-reef-foundation-receives-351000-in-jobkeeper-payments	937
15	https://twitter.com/david_ritter/status/1417975003182632962	890
16	https://www.theguardian.com/commentisfree/2021/jul/12/the-government-must-take-responsibility-for-the-great-barrier-reef-and-stop-looking-for-someone-else-to-blame	825
17	https://theconversation.com/almost-60-coral-species-around-lizard-island-are-missing-and-a-great-barrier-reef-extinction-crisis-could-be-next-163714	701
18	https://www.reuters.com/world/asia-pacific/great-barrier-reef-should-be-listed-danger-un-committee-recommends-2021-06-22/	678
19	https://www.afr.com/rear-window/great-barrier-reef-foundation-doubled-revenue-kept-jobkeeper-20210726-p58d3w	659
20	https://www.abc.net.au/news/2021-06-22/environment-minister-great-barrier-reef-listed-in-danger/100233088	647
21	https://www.sbs.com.au/news/australia-accused-of-censoring-science-after-great-barrier-reef-avoids-being-added-to-world-heritage-in-danger-list	624
22	https://www.thegwpf.com/peter-ridd-record-coral-cover-of-great-barrier-reef-refutes-climate-alarmists/	602
23	https://www.theguardian.com/world/2021/jun/26/unesco-says-in-danger-listing-would-be-call-to-action-on-great-barrier-reef	599
24	https://news.mongabay.com/2021/07/great-barrier-reef-in-danger-dont-fight-the-diagnosis-fight-the-threats-commentary/	589
25	https://www.bbc.com/news/world-australia-57562685	582
26	https://www.marineconservation.org.au/leading-australians-urge-the-world-heritage-committee-to-put-science-before-politics-for-the-good-of-the-great-barrier-reef/	566
27	https://www.abc.net.au/news/2021-07-23/great-barrier-reef-avoids-in-danger-unesco-tag/100319652	552
28	https://www.theguardian.com/business/commentisfree/2021/jun/27/from-barnaby-joyce-to-the-great-barrier-reef-coalition-climate-inadequacy-is-on-parade	545
29	https://www.zerohedge.com/geopolitical/record-coral-cover-great-barrier-reef-shames-climate-alarmists-media	538

[23] This also includes the hyperlink https://twitter.com/EcoSenseNow/status/1418593627253534721/ as, although they are slightly different links, they divert to the same content. https://twitter.com/EcoSenseNow/status/1418593627253534721/photo/1 appeared 1208 times and https://twitter.com/EcoSenseNow/status/1418593627253534721/ appeared 114 times.

Top 30 Domains

The top 30 domains in the overall network are shown in Table 5.5. There are **1430 unique domains**. As expected by its dominance in the top 30 URLs list, *The Guardian* is the number one information source by domain. This takes into account the actor's presence across the entire network rather than the dominance of particular pieces of content. Also unsurprisingly, the Twitter domain is in number two position, reflecting the volume of status updates that appeared in the data collection[24]. From number three to 10, the next main information sources are centre/centre-left media outlets and environmental non-government organisation (ENGO) websites, with both GetUp and the Australian Marine Conservation Society (AMCS) conducting campaigns/petitions to urge the WHC to place the GBR on the 'in danger' list as a way to prompt the Australian government to take stronger action on climate change.

Number 11 is right-wing UK-based tabloid mainstream news outlet, *The Daily Mail* (Media Bias Fact Check, 2022a). Mentioned earlier as a URL, the GWPF is at number 12 for its dominance as a domain. This group is the campaigning 'wing' of the Global Warming Policy Foundation, a London-based thinktank (DeSmog, 2021a). It has a controversial history with the charitable organisation being described as a "high-profile climate change denialism group" that has spread misinformation about climate change (Bloomfield & Tillery, 2018; Lovett & Hoar, 2021; Ward, 2013). However, the organisation says it is "open-minded" about "the contested science of global warming", and wants to correct the "misinformation" that media, public and politicians are being "subjected at this present time" (Happer & GWPF, 2011, p. 17). In October 2021, the GWPF rebranded to 'Net Zero Watch', with all web URLs and social media channels redirecting from www.gwpf.org to www.netzerowatch.com. According to its new website, its role is to advocate for "more balanced and transparent scrutiny of climate science and policy research" to avoid "hugely expensive climate and energy policies", saying: "Net Zero Watch will argue for the development of alternative approaches that are politically realistic and economically feasible" (The GWPF, 2022).

[24] These always include the Twitter domain as they are in this format (italics here indicate the variables that change): "https://twitter.com/*AccountName*/status/*TweetID*

Further down in the list is a small grouping of actors who share similar political stances and climate change attitudes: wattsupwiththat.com (number 22), climatism.wordpress.com (number 23), zerohedge.com (number 24), theaustralian.com.au (26) and skynews.com.au (27). *The Australian* and *Sky News Australia* are both mainstream news outlets owned by News Corp, which has a documented history of opposing climate science and policy (Manne, 2011; McKnight, 2010; Bacon & Jegan, 2020; Konkes & Foxwell-Norton, 2021). The prevalence of skynews.com.au may be underestimated as some of this content would be captured in the youtube.com domain.

Table 5.5

Twitter Information Source Prevalence by Domain

	Information source: Domain	N=
1	theguardian.com	24716
2	twitter.com	17245
3	abc.net.au	3228
4	theconversation.com	3057
5	smh.com.au	1609
6	getup.org.au	1319
7	marineconservation.org.au	1212
8	sbs.com.au	1201
9	washingtonpost.com	1193
10	reuters.com	1108
11	dailymail.co.uk	962
12	thegwpf.com	839
13	bbc.com	822
14	climateactionaustralia.wordpress.com	804
15	afr.com	693
16	greenpeace.org.au	661
17	thesaturdaypaper.com.au	623
18	news.mongabay.com	613
19	edition.cnn.com	592
20	bbc.co.uk	569
21	youtube.com	564
22	wattsupwiththat.com	561
23	climatism.wordpress.com	540
24	zerohedge.com	538
25	theaustralian.com.au	527
26	thenewdaily.com.au	526
27	skynews.com.au	481

28	bloomberg.com	459
29	nbcnews.com	411
30	nytimes.com	404

5.3.2 How was the most dominant information framed?

The top 10 items in the global network were analysed for framing, as per Nisbet's (2009) typology of frames relevant to climate change. See Table 5.6 for my deductive interpretation of the framing as per Nisbet's classifications (Appendix D).

Table 5.6

The Top 10 Information Sources and Dominant Frames in the Twitter Global Network

	Information source - URL	N=	Headline	Frame
1	https://www.theguardian.com/environment/2021/jun/22/great-barrier-reef-should-be-listed-as-in-danger-unesco-recommends	3102	Unesco recommends Great Barrier Reef world heritage site should be listed as 'in danger'	Public accountability and governance
2	https://www.theguardian.com/environment/2021/jul/21/coalition-believes-it-has-numbers-to-stop-great-barrier-reef-being-listed-as-in-danger	2742	Coalition believes it has numbers to stop Great Barrier Reef being listed as 'in danger'	Conflict and strategy
3	https://www.theguardian.com/environment/2021/jul/23/world-heritage-committee-agrees-not-to-place-great-barrier-reef-on-in-danger-list	2417	World Heritage Committee agrees not to place Great Barrier Reef on 'in danger' list	Conflict and strategy
4	https://www.theguardian.com/environment/2021/jul/20/joanna-lumley-and-jason-momoa-join-prominent-group-backing-great-barrier-reef-in-danger-listing	1717	Joanna Lumley and Jason Momoa join prominent group backing Great Barrier Reef 'in danger' listing	Conflict and strategy
5	https://www.theguardian.com/environment/2021/jul/14/fossil-fuel-friends-saudi-arabia-and-bahrain-back-australias-lobbying-on-great-barrier-reef-unesco	1682	'Fossil fuel friends': Saudi Arabia and Bahrain back Australia's lobbying on Great Barrier Reef	Conflict and strategy
6	https://www.theguardian.com/environment/2021/jun/23/un-official-rejects-australias-claim-it-was-told-great-barrier-reef-wouldnt-be-listed-as-in-danger	1537	UN official rejects Australia's claim it was told Great Barrier Reef wouldn't be put forward for 'in danger' list	Public accountability and governance
7	https://twitter.com/EcoSenseNow/status/1418593627253534721/photo/1	1322	*[Tweet with image of record high coral cover. First sentence]*: The Great Barrier Reef, after extensive aerial and dive monitoring, is shown to have the highest live coral cover in recent decades.*	Scientific and technical uncertainty
8	https://www.getup.org.au/campaigns/climate-justice/unesco-world-heritage/unesco-protect-our-reef	1310	[Petition]. UNESCO: Protect our Reef	Public accountability and governance
9	https://www.washingtonpost.com/world/2021/06/22/great-barrier-reef-climate-australia/	1111	Australia's Great Barrier Reef should be listed as 'in danger,' U.N. body says	Public accountability and governance
10	https://www.theguardian.com/environment/2021/jul/13/australian-environment-groups-urge-un-to-put-great-barrier-reef-on-in-danger-list	1094	Australian environment groups urge UN to put Great Barrier Reef on 'in danger' list	Conflict and strategy

Note. *The full tweet is later in this chapter in Table 5.10.

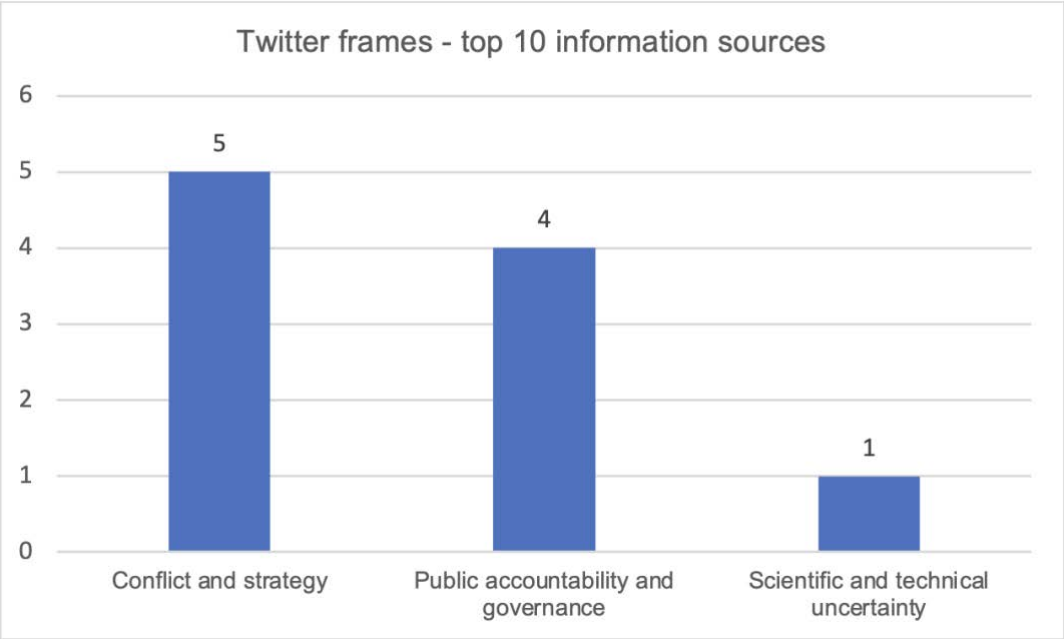

Figure 5.2. The dominant frames from the top 10 information sources in the Twitter global network.

The most common frame in the top 10 items in the Twitter global network was conflict and strategy (n=5), followed by public accountability and governance (n=4) and scientific and technical uncertainty (n=1) (Figure 5.2). The dominance of the 'conflict and strategy' and 'public accountability and governance' frames is also supported by the prominence of political spokespeople in the reports. This suggest that the Reef and its protection is politicised, but also that the issue is subject to divisive and delegitimising tactics in the sense that half of the most widely circulated information has elements that present the issue as "a game among elites" and about "who is winning or losing the debate" (Nisbet, 2009, p.18). In this case, the main battles were between the domestic government and the international governance of UNESCO, and ENGOs to a lesser degree. This finding and the potential implications will be discussed further in Chapter 8.

5.4 PART C – CONNECTION AND DISCONNECTION

Networked power and network-making power

Connection and disconnection were considered at the global network level using metrics like modularity and density to give an overview, but these factors needed to be considered at the subnetwork, or cluster, level to get an in-depth understanding of

connection and disconnection, information exchange and power interplays (Chapter 4). The below section briefly discusses the global metrics, then examines the two largest clusters to study the dominant actors, information sources and intra and inter cluster sharing.

5.4.1 How connected, or disconnected, is the global network?

Connection and disconnection were initially considered at the global network level to give a high-level initial insight into informational dynamics. Using the Wakita-Tsurumi algorithm in NodeXL, modularity is 0.461 for the global Twitter network, which is evidence of a medium level of community division or quality of clustering (Himelboim et al., 2013b). This could be an indication of both connection (partitioning within the graph as users connect with each other in the clusters to create and share information: homophily) and disconnection – the extent that these clusters are separate from other actors in the graph. The network density is incredibly low at 0.000064, but this can be typical of larger networks: the more actors there are in a network, the less likely they are to be connected (Himelboim et al., 2017). The particularly low density is also likely affected by the high number of isolates (unconnected users) within this network: Group 1 is the largest in the network at 3653 nodes, and these are all isolates (Figure 5.3 – the top-left square represents unconnected nodes). This is typical of newsworthy topics that have a wide-ranging public appeal. As a comparison, Group 2 has 3417 nodes and Group 3 has 2659.

Engaging Smith et al.'s (2014) Twitter conversational archetypes, this network could be considered a mix of community clusters with 'hub and spoke' style broadcast networks due to the media outlets being central in most of the larger clusters. Figure 5.3 shows these community clusters indicated by different colours. NodeXL also detects the top keywords for each cluster, which is shown on this visualisation, but was not formally used in the analysis. The isolate group is shown at the top left as a square, and the other groups are labelled with a 'G' (group) and a number. The groups get progressively smaller, which is shown at the bottom right. The top 10 actors in the global network are added to the graph for clarity.

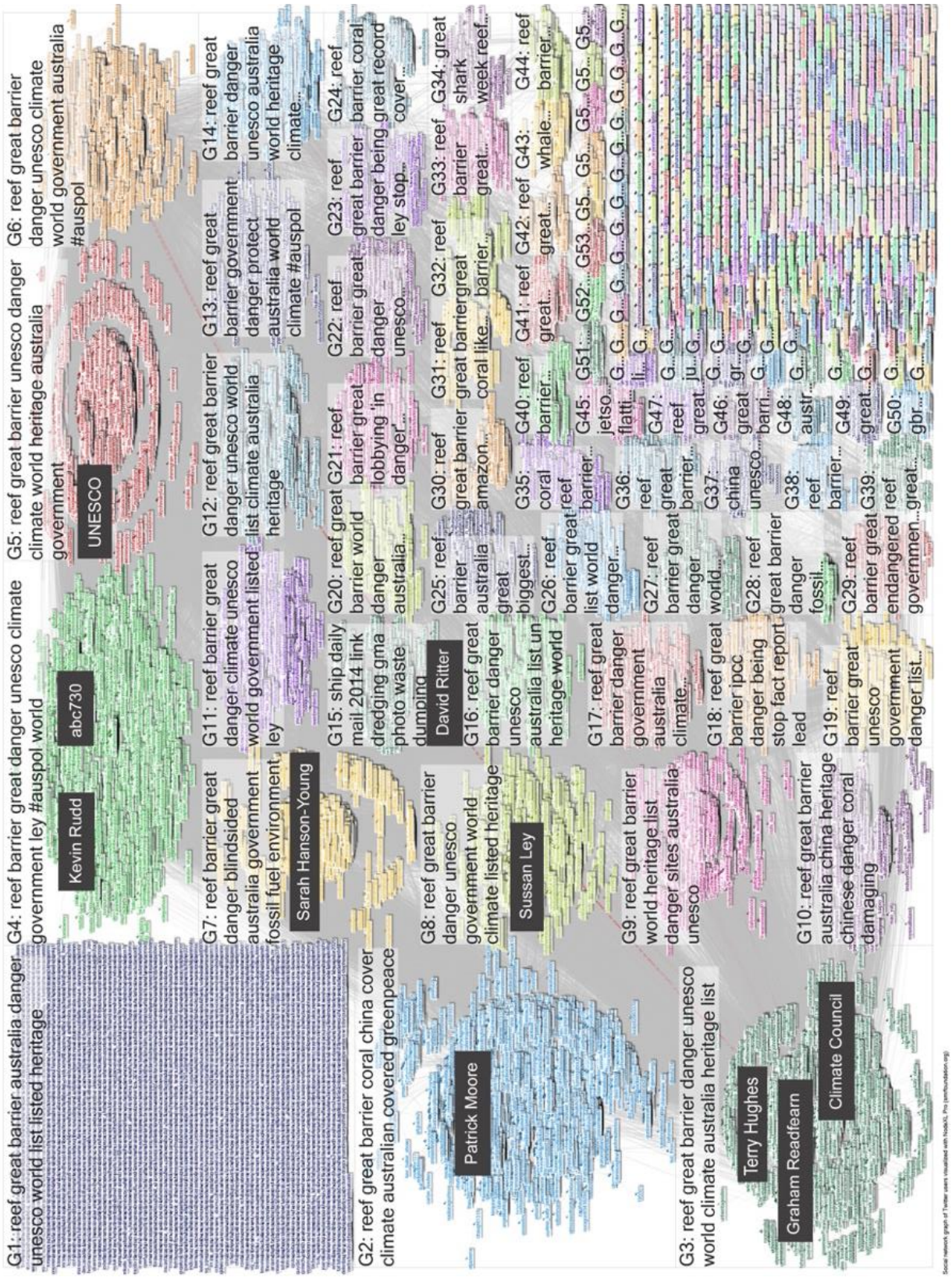

Figure 5.3. Visualisation using the Wakita-Tsurumi algorithm in NodeXL and the Harel-Koren tree-map layout. The top 10 actors in the global network are marked on the relevant clusters.

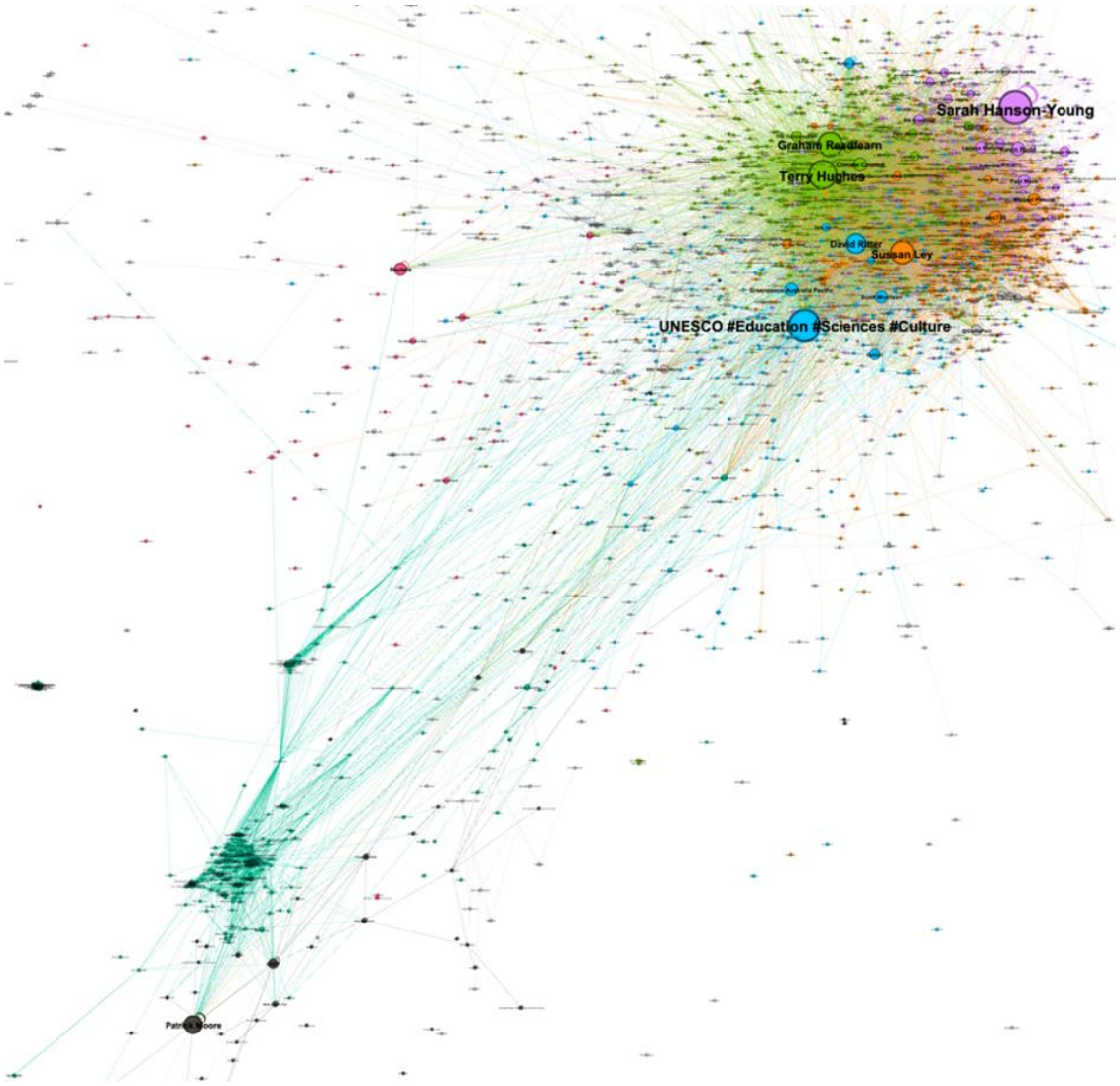

Figure 5.4. Visualisation using the Louvain community detection algorithm and ForceAtlas2 force-directed layout algorithm with Gephi. Modularity is by colour and nodes are sized by in-degree, filtered to in-degree of >3.

As noted in Chapter 4, different results are achieved with different algorithms. Modularity was also calculated using the Louvain community detection algorithm in Gephi (Blondel et al., 2008; Bastian et al., 2009). The Louvain algorithm returned a global network modularity value of 0.529 (compared to Wakita-Tsurumi's 0.461), with this higher value showing a more intense level of clustering. While these values are similar at a global level, the differences in the algorithms are more noticeable at the subnetwork, or cluster level, when users are classified into modularity classes, or groups. There is further discussion on this topic later in this chapter.

While the NodeXL data analysed using the Wakita-Tsurumi algorithm has been used for the bulk of the analysis for Twitter, the advantage of deploying different layout algorithms at the global network level can be seen when comparing the resulting

visualisations. Figure 5.4 shows the Louvain community detection algorithm and ForceAtlas2 force-directed layout algorithm (Jacomy et al., 2014) using Gephi. The Harel-Koren tree-map layout used in NodeXL (Harel & Koren, 2001) gives a good visual indication of the size of the clusters and the key actors within them, for instance, how certain media outlets act as subnetwork hubs for information flows (Figure 5.3). However, the ForceAtlas2 algorithm is useful for visually highlighting the level of connection and disconnection between the groups. Namely, it is visually apparent from Figure 5.4 that – while users are classified into different groups in accordance with their ties and shown by different coloured modularity classes – most actors are clustered together spatially. However, the dark grey-coloured group is noticeably separate from the rest of the graph, and there is another group that is even further removed (note: This has been cropped from this visual in order to enhance visibility, but is available in Appendix F). While the 'Patrick Moore' group in the NodeXL visualisation is Group 2, in the Gephi visualisation, the dark grey nodes represent the Patrick Moore cluster.

However, due to differences in the clustering algorithms, the dark grey group in the Gephi data does not exactly correlate with Group 2 in the NodeXL data. While the algorithms classified the top 10 actors the same via in-degree in the global networks, I was curious to see what the consistency was in the subgroups with modularity class classification. I mapped the top 20 actors in each group (the dark grey group and Group 2) to compare and contrast what actors were included and excluded (Appendix G). While there are varying top 20 actors in the 'Patrick Moore Group' via the Wakita-Tsurumi (NodeXL) and Louvain (Gephi) clustering algorithms, the key actors remain consistent across the different algorithms' groupings. Of particular note are Patrick Moore, GWPF, Climate Realists, *Watts Up With That*, *Daily Mail*, YouTube, DonKeiller and Greta Thunberg. The perhaps unexpected inclusion of the well-known climate change activist of Thunberg will be discussed below.

In summary, the Gephi visualisation proved a useful prompt to further explore the 'Patrick Moore' group within the NodeXL data, which turned out to be the largest subnetwork of connected users within the broader global Twitter network, and therefore, a worthwhile data subset for further exploration.

5.4.2 How does connection and disconnection at the subnetwork level relate to attention, information flows and frames?

Connection and disconnection within the network, including information flow, was examined by comparing the two largest clusters within the global Twitter network (not including the isolate group) in the data analysed with the Wakita-Tsurumi algorithm (Chapter 4). These were Group 2 (3417 nodes) and Group 3 (2659 nodes).

Who are the dominant actors in the subnetworks?

The dominant actors in Group 2 are shown in Table 5.7 by in-degree. By analysing the Twitter bios and further researching each account, the majority of actors in this group are (non-media) climate scepticism advocates (Patrick Moore, GWPF, Climate Realists), right-wing mainstream or alternative media (*Sky News Australia*, *Watts Up With That*, *Fox News* contributor and self-professed "influential climate science contrarian" Steve Milloy; see McKnight 2012), and anti-climate action politicians (Matthew Canavan, an Australian pro-coal senator, see Abram et al., 2021). The outliers are businessman and renewal energy advocate Simon Holmes à Court, ENGO Greenpeace, and well-known environmental advocate Greta Thunberg. A targeted examination of the data suggests that these actors are the subject of oppositional @mention tagging, which is revealing about the tactics used to contest and oppose narratives (Graham et al., 2020a) – see information source five in Table 5.9 for one example. However, a more systematic analysis of the interactions is needed to confirm this hypothesis, which is outside the scope of this current project.

Table 5.7

The Most Dominant Actors in Group 2 by In-degree

Account	Name	In-Degree	Followed	Followers	Description
ecosensenow	Patrick Moore	1320	1239	99009	"BSc Biology PhD Ecology, Greenpeace co-founder, Now a Sensible Environmentalist.Director, https://t.co/LjFddksLZh. Science & logic, not sensation & fear. CelebrateCO2!"
thegwpfcom	GWPF	571	672	14924	"London-based climate policy think tank, The Global Warming Policy Forum. Reason over emotion. Facts over fear."
simonahac	⏣simon holmes à court	352	16473	66588	"energy transition insights & opinions informed by the data. RTs+likes≠endorsements. DoB: 329.7ppm"
mattjcan	Matthew Canavan	277	2626	23490	"END THE LOCKDOWNS! Authorised by Matt Canavan, LNP, 34 East St, Rockhampton Qld 4700"
skynewsaust	Sky News Australia	216	15009	556781	"Real news, honest views. Watch Sky News Australia on Foxtel, Sky News Regional or listen live on iHeartRadio."
climaterealists	Climate Realists	215	1020	48252	"The Fingerprint of the Sun is all over Earths Climate.. IMHO Climate Change/Global Warming

					has NOTHING to do with Man Made CO2... #WhatClimateEmergency”
wattsupwiththat	Watts Up With That	205	304	28722	“...the world's most viewed climate website Retweets ≠ endorsements”
greenpeace	Greenpeace	193	4077	1888250	“Greenpeace exists because this fragile Earth deserves a voice. It needs solutions. It needs change. It needs action.”
junkscience	Steve Milloy	190	91	33912	“Perhaps the most influential climate science contrarian' (Nature). Trump EPA transition. Biostat. Atty. Fund mgr. FOX News contrib. Founder, https://t.co/18cFDFvc4w.”
gretathunberg	Greta Thunberg	181	2619	5031904	“Climate- and environmental activist with Asperger’s Born at 375 ppm”

Note. There is a column for how many other accounts the actors’ accounts are following (followed) and the number of followers the actors’ themselves have (followers). The information in the description column is from the accounts’ Twitter bios at the time of data collection.

Table 5.8

The Most Dominant Actors in Group 3 by In-degree

Account	Name	In-Degree	Followed	Followers	Description
profterryhughes	Terry Hughes	2253	1134	23433	“Scientist, mentor, tweeting on #science, #environment, #coral #reefs, #climate change, #conservation, Views are my own”
readfearn	Graham Readfearn	1933	6665	12661	“Journalist doing climate and environment @GuardianAus https://t.co/W6UBebViSs Dad. Burnley fan. Ops mine. DMs open.”
climatecouncil	Climate Council	941	17133	59020	“Providing Australians with a reliable source of information on climate science.”
adamlmorton	Adam Morton	640	1814	13186	“Climate and environment editor @GuardianAus. Co-founder of the award-winning @TasInquirer. Other things. Email: adam.morton at https://t.co/Uc3b9G1UOp”
conversationedu	The Conversation	626	4924	187953	“Independent news from the sharpest academic minds. Read: https://t.co/pXIyo0sdkZ Sign up: https://t.co/tTlAQjh3cS Donate: https://t.co/TvbSODXXxw”
pgarrett	Peter Garrett	436	597	61938	“Musician, activist, former federal minister.”
elaineedo	Elaine Johnson	283	9142	9264	“Director, Legal Strategy @EDOLawyers. Working in pursuit of a world where nature thrives. #RockyHillLitigation #FightForTheBight #EmpowerTheEPA #ManyanaMatters”
p_hannam	Peter Hannam	228	8414	23141	“Journalist covering enviro issues esp climate change for @smh & @theage. EV driver. Usual re RTs; 'likes' are OFTEN bookmarks. DMs open or phannam@smh.com.au”
grogsgamut	Greg Jericho	210	2132	91184	“Columnist on economics and politics for Guardian Australia”
fdouvere	Dr. Fanny Douvere	199	834	2943	“Works as Head marine programme @UNESCO #WorldHeritage Centre. Views are my own.”

Note. There is a column for how many other accounts the actors’ accounts are following (followed) and the number of followers the actors’ themselves have (followers). The information in the description column is from the accounts’ Twitter bios at the time of data collection.

Quite differently from Group 2, the majority of the top 10 actors in Group 3 represent centre/centre-left-wing mainstream and alternative news media outlets (Graham Readfearn, Adam Morton, *The Conversation*, Peter Hannam and Greg Jericho), climate action advocates (Climate Council, Peter Garrett and Elaine Johnson), plus prominent GBR scientist Terry Hughes, and UNESCO marine program leader Dr Fanny Douvere. Noting the aforementioned dominance of *The Guardian* as an information source, three of the top 10 actors here are from, or represent this mainstream media outlet.

In summary, the two largest subnetworks on Twitter (when disregarding the unconnected isolate group, Group 1), are dominated by actors who are very different in their attitudes to GBR protection and climate change. This is further explored below in the framing analysis of the top content shared in each subnetwork.

5.4.3 What information was shared in both groups and how was it framed?

The top information sources by URL, number of times the source was shared by a node from the cluster, and the dominant frame of the content is shown in the tables and figures below.

Dominant information and frames – Group 2

Table 5.9

Dominant Information Shared and its Framing in Group 2

	Information source - URL	N=	Headline	Frame
1	https://twitter.com/EcoSenseNow/status/1418593627253534721/photo/1	1268	The Great Barrier Reef, after extensive aerial and dive monitoring, is shown to have the highest live coral cover in recent decades. Unfortunately only The Australian newspaper has covered this and it is behind a paywall. The usual liars, Greenpeace and China, continue with lies:	Scientific and technical uncertainty
2	https://www.thegwpf.com/peter-ridd-record-coral-cover-of-great-barrier-reef-refutes-climate-alarmists/	501	Peter Ridd: Record coral cover of Great Barrier Reef shames climate alarmists	Scientific and technical uncertainty
3	https://climatism.wordpress.com/2018/12/11/alarmists-u-turn-scientists-confirm-great-barrier-reef-is-recovering-from-bleaching-again/	478	ALARMISTS U-TURN : Scientists Confirm Great Barrier Reef Is Recovering From Bleaching, Again	Scientific and technical uncertainty
4	https://wattsupwiththat.com/2021/07/25/record-coral-cover-of-great-barrier-reef-shames-climate-alarmists-media/	265	Record Coral Cover Of Great Barrier Reef Shames Climate Alarmists, Media	Scientific and technical uncertainty

5	https://twitter.com/ClimateRealists/status/1419264113134424065/photo/1	221	Dear Greta (@GretaThunberg).. There is a “clear signal” that the Great Barrier Reef has returned back after your call for “urgent help” in your message of concern on 9/04/2020.. please can you now tell your followers about the good news	Scientific and technical uncertainty
6	https://twitter.com/climatecouncil/status/1417612835765379074	128	No matter how much the Federal Govt lobbies to stop the Great Barrier Reef being listed as "in danger" it doesn't change the science. Climate change remains the single biggest threat to the reef and the Federal Govt's response to this threat is woeful.	Public accountability and governance
7	https://joannenova.com.au/2021/07/great-barrier-reef-has-more-coral-growing-on-it-than-ever-recorded/	121	What climate disaster? The Great Barrier Reef has more coral growing on it than ever recorded	Scientific and technical uncertainty
8	https://www.dailymail.co.uk/sciencetech/article-9819169/UNESCO-determines-Great-Barrier-Reef-NOT-danger-despite-60-hit-bleaching-events.html	115	UNESCO determines the Great Barrier Reef is NOT in danger despite 60% of it being impacted by bleaching events linked to climate change	Morality and ethics
9	https://www.youtube.com/watch?v=ST6xYhFp2d8 [Sky News]	110	Data ‘unequivocally’ shows Great Barrier Reef is in ‘extremely good condition’	Scientific and technical uncertainty
10	https://www.theaustralian.com.au/nation/chinaled-ambush-on-health-of-the-great-barrier-reef/news-story/b99813fe30fbc1919325058327980ce6	106	China-led ‘ambush’ on health of the Great Barrier Reef	Conflict and strategy

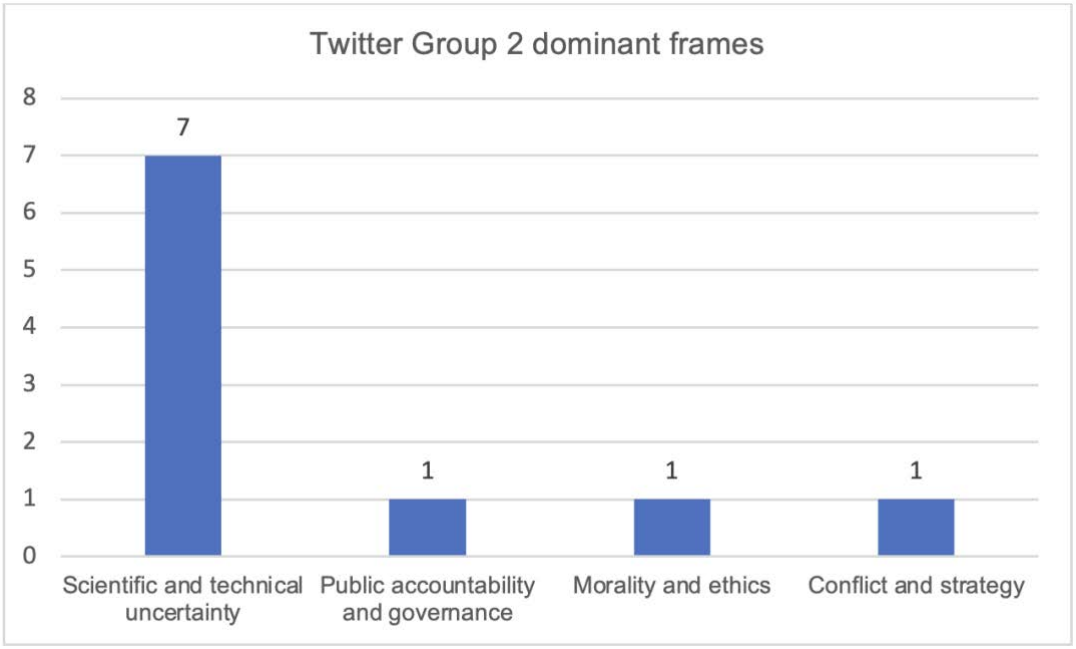

Figure 5.5. The dominant frames in Group 2 expressed as a bar chart. The horizontal axis is the frame and the vertical axis is the frequency it appeared.

Seventy-per-cent of the top 10 information circulated in Group 2 has a dominant frame of ‘scientific and technical uncertainty’ (Figure 5.5). The use of this frame is much higher here than at the global network level, where it was 10 per cent. In every instance of information coded with this frame, Ridd and/or AIMS’ coral cover report

were mentioned, with the scientific report used as a tool to dispute concern over the health status of the GBR, and criticise the science informing the policy. For comparison, the only piece of content that was coded as 'scientific and technical uncertainty' in the global top 10 was the *EcoSenseNow* (Patrick Moore) tweet, which also appears at number one in this Group 2 list. It also should be noted that since collecting this data, the climate change denial blog *Climatism's* Twitter account has since been suspended for violating Twitter's rules (Climatism, 2021), an example of the platform exercising network power.

When considering both the type of dominant actors in this subnetwork and the high prevalence of content being circulated by that questions GBR and climate science, this large subnetwork appears to be furthering views that run contrary to the scientific consensus, and are different to the narratives and actors that are otherwise dominating the global Twitter network. Of course, a deeper content analysis of Group 2, including coding individual tweets and studying discursive tactics, would provide greater context into the true attitudes of this issue-focused public (Bruns & Burgess, 2015).

Dominant information and frames – Group 3

Table 5.10

Dominant Information Shared and its Framing in Group 3

	Information source - URL	N=	Headline	Frame
1	https://www.theguardian.com/environment/2021/jun/22/great-barrier-reef-should-be-listed-as-in-danger-unesco-recommends	783	Unesco recommends Great Barrier Reef world heritage site should be listed as 'in danger'	Public accountability and governance
2	https://www.theguardian.com/environment/2021/jun/23/un-official-rejects-australias-claim-it-was-told-great-barrier-reef-wouldnt-be-listed-as-in-danger	550	UN official rejects Australia's claim it was told Great Barrier Reef wouldn't be put forward for 'in danger' list	Public accountability and governance
3	https://www.theguardian.com/environment/2021/jul/21/coalition-believes-it-has-numbers-to-stop-great-barrier-reef-being-listed-as-in-danger	535	Coalition believes it has numbers to stop Great Barrier Reef being listed as 'in danger'	Conflict and strategy
4	https://www.theguardian.com/environment/2021/jul/23/world-heritage-committee-agrees-not-to-place-great-barrier-reef-on-in-danger-list	438	World Heritage Committee agrees not to place Great Barrier Reef on 'in danger' list	Conflict and strategy
5	https://www.theguardian.com/environment/2021/jul/23/whether-or-not-the-great-barrier-reef-is-listed-as-in-danger-wont-alter-the-fact-it-is-at-risk-from-climate-change	429	Whether or not the Great Barrier Reef is listed as 'in danger' won't alter the fact it is at risk from climate change	Public accountability and governance
6	https://theconversation.com/is-australia-really-doing-enough-for-the-great-barrier-reef-why-criticisms-of-unescos-in-danger-recommendation-dont-stack-up-163641	411	Is Australia really doing enough for the Great Barrier Reef? Why criticisms of UNESCO's 'in danger' recommendation don't stack up	Public accountability and governance
7	https://www.theguardian.com/environment/2021/jul/13/australian-environment-groups-urge-un-to-put-great-barrier-reef-on-in-danger-list	373	Australian environment groups urge UN to put Great Barrier Reef on 'in danger' list	Conflict and strategy
8	https://www.theguardian.com/world/2021/jun/26/unesco-says-in-danger-listing-would-be-call-to-action-on-great-barrier-reef	349	Unesco says 'in danger' listing would be 'call to action' on Great Barrier Reef	Morality and ethics

9	https://www.theguardian.com/commentisfree/2021/jul/12/the-government-must-take-responsibility-for-the-great-barrier-reef-and-stop-looking-for-someone-else-to-blame	342	The government must take responsibility for the Great Barrier Reef and stop looking for someone else to blame	Public accountability and governance
10	https://www.theguardian.com/environment/2021/jul/14/fossil-fuel-friends-saudi-arabia-and-bahrain-back-australias-lobbying-on-great-barrier-reef-unesco	321	'Fossil fuel friends': Saudi Arabia and Bahrain back Australia's lobbying on Great Barrier Reef	Conflict and strategy

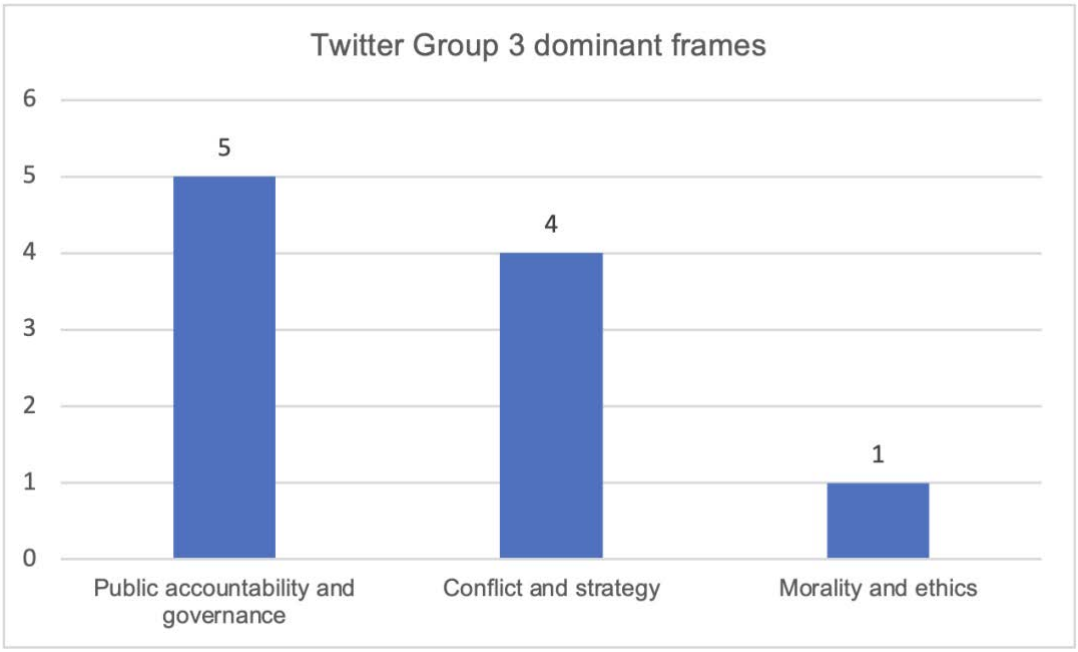

Figure 5.6. The dominant frames in Group 3 expressed as a bar chart. The horizontal axis is the frame and the vertical axis is the frequency it appeared.

As shown in Table 5.10 and Figure 5.6, the appearance of the content in Group 3 is similar to the most dominant content seen at the global network level above, including a large representation from *The Guardian*. Therefore, the framing across the 10 most commonly-shared sources is also fairly consistent, with the most dominant frames being public accountability and governance and conflict and strategy, yet they have swapped first and second places compared to the global network. The notable exceptions are the absence of the scientific and technical uncertainty frame from Group 3 and the inclusion of morality and ethics. In summary, the narratives conveyed about the GBR, including the politicisation at the expense of its protection, in Group 3 are largely consistent with the dominant narratives of the global Twitter network for the six-week snapshot in time.

5.4.4 How connected or disconnected were the groups?

Inter-cluster and intra-cluster sharing were examined across the two groups. This is an indication of connection within the clusters themselves where information flows more freely, yet recognises information flow can be restricted by the limited connectivity, or disconnection, across other clusters (Himelboim et al., 2017, p. 3).

Group 2 intra-cluster and inter-cluster sharing

Table 5.11 shows the intra and inter-sharing between Group 2 and other clusters that had 100 or more relationships. Group 2 has the largest number of connections within its own group – 9088 of the total 10650 relationships (85.3%) that started within that group and stayed in that group. It has 302 shared connections with Group 3 – the next most interconnected group – which equates to 2.8% of the total links that originated in Group 2. This is shown with the bar graph in Figure 5.7.

Table 5.11

The Number of Intra and Inter-cluster Relationships in Group 2

Source group	Target group	Relationships, N=
2	2	9088
2	3	302
2	4	253
2	8	241
2	5	154

Note. These are relationships that started in Group 2 and either stayed within that cluster, or travelled cluster boundaries. Only groups within 100+ relationships are included.

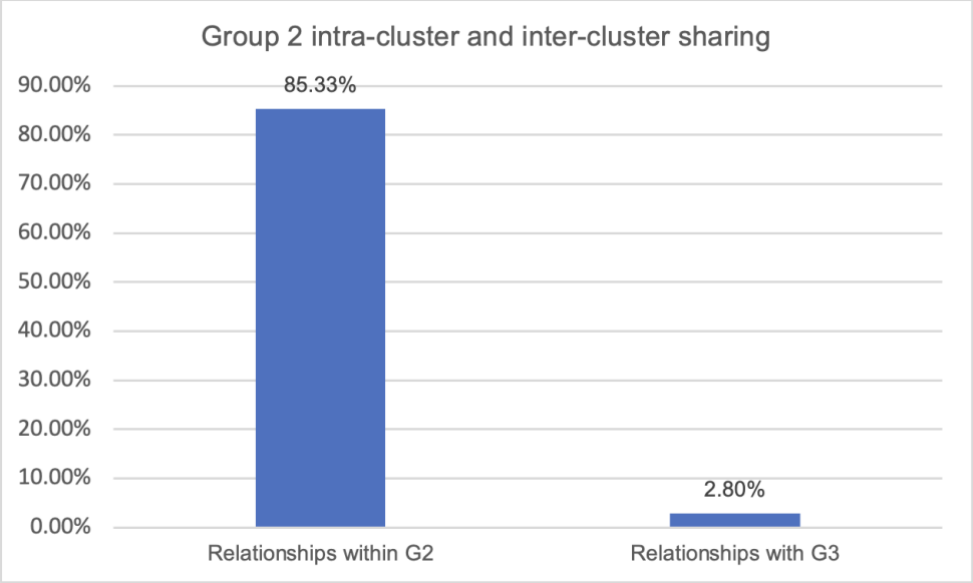

Figure 5.7. The percentage of connections that started and remained within Group 2 and the percentage that started in Group 2, but interconnected with Group 3.

Group 3 intra-cluster and inter-cluster sharing

Table 5.12 shows the intra and inter-sharing between Group 3 and other clusters that had 100 or more relationships (note: there are many more clusters that had fewer than 100 connections). Group 3 has the largest number of connections within its own group: 12054 of the total 19850 relationships (60.7%) that started within that group and stayed in that group. It only has 196 shared connections with Group 2, which equates to 0.98 per cent of the total links that originated in Group 3. This is shown with the bar graph in Figure 5.8.

Table 5.12

The Number of Intra and Inter-cluster Relationships in Group 2

Group number	Relationships, N=
3	12054
8	1423
4	1353
5	1166
6	518
15	506
7	393
13	336

9	269
14	243
2	196
11	195
16	146
21	121
22	119
27	100

Note. These are relationships that started in Group 3 and either stayed within that cluster, or travelled cluster boundaries. Only groups within 100+ relationships are included.

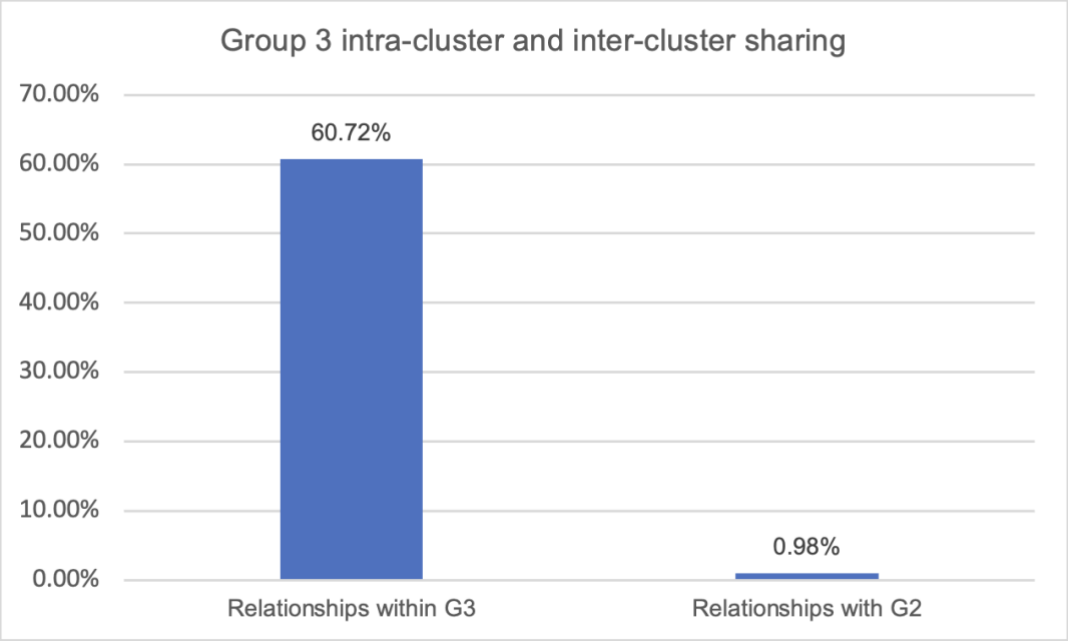

Figure 5.8. The percentage of connections that started and remained within Group 3 and the percentage that started in Group 3, but interconnected with Group 2.

5.5 CONCLUSION

Media actors are the most dominant actor type in this network for this particular event and data collection period. These are mainly mainstream outlets and, of the most dominant media actors, most were politically left-of-centre offering information that was not behind a paywall. In terms of networked power, *The Guardian* had dominance as an actor. Its environment reporter, who was the producer of most of the stories throughout the data collection period (Graham Readfearn), was at number 4 in the top 100 list, and was also the media actor to receive the most attention in the global network. Other Guardian actors contributed to this dominance, with the top 10 media

list featuring four Guardian-related actors. The mainstream news outlet was convincingly the most attention-getting information source in the global network, both in terms of volume of content within the top 30 URLs, and more broadly as the top domain across the network, even beyond the Twitter domain itself. Most of *The Guardian*'s content was framed using conflict and strategy and public accountability and governance, with its networked power again reflected by these frames being the most dominant in the global network. As such, the central narrative was focused on whether the government was doing enough to protect the Great Barrier Reef or was more concerned about appearing to do enough to escape political pressure.

However, looking at actors and information flows at the subnetwork level shows the potential to counter this framing and switch the narrative – the exercise of networking-making power. When analysing the two largest groups in the network (disregarding the unconnected isolates in Group 1), Group 3 – the second largest cluster – was largely consistent with the global network in terms of actors, attention-getting information sources and frames (notably, with nine out of the 10 top information sources being *The Guardian*). However, the largest relevant cluster – Group 2 – was dominated by actors and information that run counter to the scientific consensus on the status of the health of the GBR and climate change. This includes climate scepticism alternative media sources, and mainstream conservative media outlets of the *Daily Mail UK*, and News Corp's *Sky News Australia* and *The Australian*. These are very different attention-getting actors, information sources and frames compared to Group 3 and the global network. This is especially interesting due to the size of Group 2, plus other notable factors such as this group containing several actors from the top 100 global network list, and being responsible for circulating content to an extent that some of it appears in the top 30 list – both indicators of their attention-getting networked power. Yet most of Group 2's connections and the information flows remain within its own subnetwork (85.3%).

Group 2's sharing of similarly-framed content with like-minded others is an indication of homophily, where individuals are drawn to others who share similar views (McPherson et al., 2001; Petray, 2010). In forming these connections and circulating content that questions the status of the GBR's health, the quality of the science used to inform GBR protection policy, and the appropriate response to climate change; the framing of content and interactions in this group are distinctly separate

from the rest of the network community. However, is it evidence of polarisation? As noted earlier in this thesis, "homophily is a pattern present both on non-polarized and polarized networks, but antagonism is expected only on the latter" (Guerra et al., 2013, p. 5). An analysis of Group 2's dominant information and frames (Table 5.9) point to antagonistic sentiment and ideological polarisation, however to definitively make this claim more analysis needs to occur. This would include the tweet content within the groups, and other information about the accounts (like description and follows) to establish attitudes, including the discursive tactics being used (Guerra et al., 2013; Dehghan, 2020). Similarly, further investigation is needed of the nature of the interactions with Group 3, including the role of influential actors (Guerra et al., 2013). Outside of Group 2 in itself, most connections are with Group 3 (as opposed to other perhaps more ideologically-aligned groups). When investigated via close reading, the connections appear oppositional, but these Tweets need to be more systematically queried to confirm if they are indeed antagonistic in nature.

Regardless, the above-mentioned findings show there is evidence of Castells' network-making power in the context of contesting and attempting to 'switch' the dominant frame, story, or reality about the health of the GBR. However, it appears that while efforts have been made by Group 2 to further this alternative 'reality', its information has not achieved enough attention at the broader network level to be able to achieve the switch. As an outcome of this power contestation, some interesting tactics were revealed, particularly concerning the role of science and scientists in enacting power in the space of 'media politics' (Castells, 2011b), and the amplification of mainstream media outlets' content by ideologically-aligned alternative news actors to bridge informational boundaries. These aspects will be discussed later in Chapter 8. Meanwhile, the analysis will now shift to the results from YouTube.

Chapter 6: YouTube Results

6.1 OVERVIEW

6.1.1 Data collected

Using the methods and parameters outlined in Chapter 4, **389 unique videos** were collected during the June 21, 2021 – August 1, 2021 timeframe for the search query "Great Barrier Reef". The dataset included **4326 YouTube channels** (user accounts), shown as nodes, and **4947 unique edges**, which represent the initial uploading of the video, comments by other nodes on videos, or replies to those comments. Table 6.1 shows a breakdown of the data that was collected and analysed using the Wakita-Tsurumi clustering algorithm.

Table 6.1

Global Network Metrics for YouTube

Graph metrics	
Graph type	Directed
Nodes – unique YouTube accounts	4326
Edges unique	4937
Edges with duplicates	2085
Edges total	7022
Self-loops	753
Connectivity metrics	
Groups	160
Isolates	148
Connected components	255
Density	0.000278408
Modularity	0.645795

Note. The graph metrics are a summary of the data collected. The connectivity metrics are some global statistics that relate to connection and disconnection, which will be discussed in Part C.

6.1.2 Time series analysis

There are two main peaks in activity, which reflect the UNESCO initial draft recommendation and the date of the WHC meeting where the decision was made

(Figure 6.1). Like Twitter, the initial recommendation received the most attention, and activity outside the two key conflict-inducing events was not sustained at the same level throughout the six weeks.

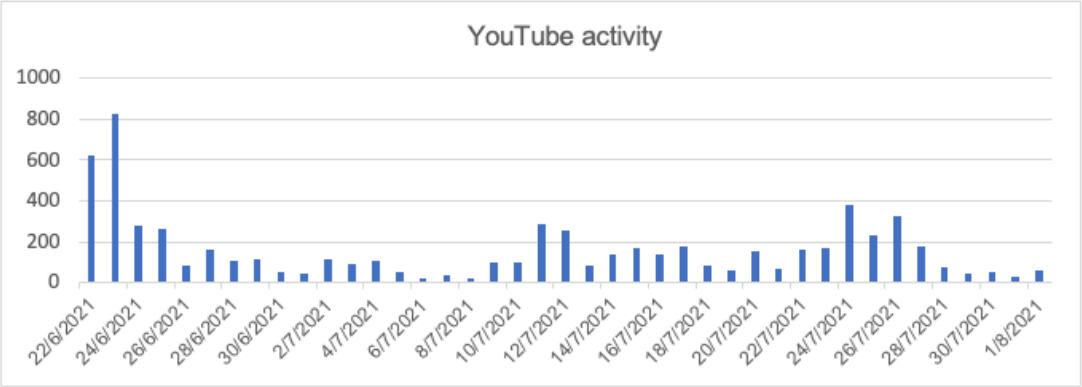

Figure 6.1. Time series bar graph showing the date (horizontal axis) and the number of edges created (vertical axis) to highlight the concentration of YouTube activity around the two MEC events.

6.2 PART A – DOMINANT ACTORS

Networking power, network power and networked power

6.2.1 Which actor types were not included, or excluded, from the network?

The top 100 actors for YouTube are quite different from those identified in GBR research to-date and compared to Twitter (Table 6.2). Notably, in the context of networking power, there are no political actors (including government agencies), industry actors are minimal (especially relating to the GBR), and there are no channels that represent science actors, yet these actors are quoted in the content. As per the findings of previous studies, there are no Indigenous actors represented. As discussed below, the Russian affiliate channel *RT DE* was an actor excluded from this network as the channel did not meet the rules of inclusion (network power).

6.2.2 Which actors received the most attention?

YouTube's logic of accounts being both individual actors that can comment on videos, and channels that can create content to draw audiences, meant it was necessary to identify another actor type that was different from the categorisations of media and individual. As such, a new category was created of 'vlogger', meaning video bloggers, which was further segmented into 'vlogger/advocacy' (n=4), 'vlogger/travel' (n=18) and 'vlogger/gamer' (n=1) to represent their interpreted objectives for seeking

audience attention. This recognises that these actors do not reflect the logic of news media, particularly in their approaches to topic selection and framing of GBR-related content. While it could be argued that they broadly sit under 'media non-news' due to their pursuit of audience attention and, often, monetisation through advertising; for the purpose of this analysis of power interplays it is useful to keep them separate.

The category of 'vlogger/travel' represented the second largest actor type (beyond individuals), with 18 accounts coded this way. This group is generally concerned with promoting adventure and travel experiences, with their content appearing in the data collection due to the keywords of "Great Barrier Reef". They do not discuss the 'media politics' (Castells, 2011b) of the GBR, or offer any views on its health or management. The 'vlogger/advocacy' group has four actors who are creating channel content with an interpreted intent to champion a particular cause, or essentially advocate a way of thinking. The *Oppenheimer Ranch Project* and *Difference Frames the World* channels will be discussed in upcoming sections. The final vlogger group is 'vlogger/gamer', which represents one account that is focused on sharing content to an audience with an interest in gaming. It appeared in the data as "Great Barrier Reef" was in the title of one of its comic reviews, and – unlike the other vloggers – there is no objective to either showcase or advocate for or against GBR protection.

As noted above, 'individual' accounts represented the largest actor type with 28 accounts. The majority of these are accounts commenting on *Sky News Australia* videos. A further 12 accounts were identified as 'inauthentic' and three as 'unknown'. The coding instrument was refined several times during this challenging process, but individuals are essentially accounts used to engage with content on other channels and appear genuine (Appendix C). Though some of these accounts could be 'sockpuppet' accounts (Kumar et al., 2017, as cited in Graham et al., 2020a), which are anonymous accounts that feature a constructed profile that are created to manipulate public opinion (Crabb et al., 2015, as cited in Graham et al., 2020a). This level of analysis is beyond the scope of this study. There were 12 accounts identified as 'inauthentic'. On the surface, these look similar to those coded as 'individual' with minimal identifying detail or content on their actual channel, but – in the case of these actors – the comments were all about Crypto currency and posted on news-related channels with larger audiences. The one exception to the Crypto-content was an account that was posting comments about the GBR: "Australia opposes this UN report recommendation

because they think the report is influenced by China. Who would have not guessed their reasons to oppose the report?". This same comment was posted on five different news videos (*Sky News Australia*, *Al Jezeera*, *France24*, *WION* and *CNA*). Considering its content, grammar and repetition across key news channels, it could be an account specifically created to counter anti-China narratives, which can be understood as a form of attempted network-making power.

Media represented the next most dominant actor group, with mainstream media outlets comprising the majority (16), followed by media alternative news (2) and non-news media (2). The centrality of the top media actors will be further discussed in the next section.

Table 6.2

The Top 100 Actors on YouTube by In-degree

	Name	In-Degree	Group number	Actor type
1	Sky News Australia	739	1	Media mainstream news
2	WION	356	2	Media mainstream news
3	Back 2 Basics Adventures	272	3	Vlogger/travel
4	Sailing La Vagabonde	204	4	Vlogger/advocacy
5	wifistudy 2.0	154	8	Industry
6	RuPaul's Drag Race	149	6	Media non-news
7	Sky News	146	7	Media mainstream news
8	Difference Frames the World	145	5	Vlogger/advocacy
9	BlueWorldTV	139	10	Media non-news
10	ABC News In-depth	134	11	Media mainstream news
11	Project Brupeg	115	12	Vlogger/travel
12	Vhal Winter	114	13	Vlogger/travel
13	Sailing Popao - Underwater Ally Productions	76	14	Vlogger/travel
14	7NEWS Australia	57	16	Media mainstream news
15	Al Jazeera English	54	18	Media mainstream news
16	Oppenheimer Ranch Project	48	19	Vlogger/advocacy
17	GT BUSTER	43	15	Industry
18	All 4 Adventure	40	17	Vlogger/travel
19				
20	Wet Mammal	32	15	Vlogger/travel
21	Coastal Chaos Adventures	31	15	Vlogger/travel
22				
23	Life in a Nutshell	24	12	Vlogger/travel
24				

25	Guardian News	23	21	Media mainstream news
26				
27				
28				
29	Drishti IAS	21	30	Industry
30	Sitalpur TV	20	31	Vlogger/travel
31	FRANCE 24 English	19	20	Media mainstream news
32	Outback Mike	19	32	Vlogger/travel
33	Sleepy Classes	19	34	Industry
34				
35				
36	No Operator	18	35	Vlogger/gamer
37				
38				
39	Quriosity কৌতূহল	15	35	Vlogger/travel
40				
41	RT DE	14	33	Media alternative news
42	Study IQ education	14	38	Industry
43	PathFinder	14	37	Industry
44	Silhouette Park Farm	14	39	Vlogger/advocacy
45				
46				
47	Tom Park	13	42	Industry
48	TRT World	12	20	Media mainstream news
49				
50				
51	Josh Norbido	12	43	Industry
52	Farell Salvador	12	44	Vlogger/travel
53				
54	Bloomberg Quicktake: Now	11	19	Media mainstream news
55	Zachary Schmidt	11	40	Vlogger/travel
56				
57				
58	The Australia Institute	11	45	Industry
59	Study Explains - Vinayak Shukla	11	46	Industry
61	CNA	9	21	Media mainstream news
62	EbbTideTV	9	15	Industry
63				
64	Fara's Adventure	9	48	Vlogger/travel
65				
66				

67	NBC News	8	21	Media mainstream news
68	Down To Earth	8	20	Media alternative news
69				
70				
71	Divers Den - Cairns	8	50	Industry
72	Sandy Sailing	8	49	Vlogger/travel
73	logic pathshala	8	51	Industry
74				
75				
76				
77				
78				
79				
80	Aliye Sara	7	29	Vlogger/travel
81	VOA News	7	52	Media mainstream news
82	Offshore Tales	7	57	Vlogger/travel
83				
84	Artorex	7	55	Industry
85	faz	7	59	Media mainstream news
86				
87				
88	10 News First	6	69	Media mainstream news
89				
90				
91				
92				
93	euronews	6	18	Media mainstream news
94				
95				
96				
97				
98				
99				
100	Idiotic Seeker	6	29	Vlogger/travel

Note. The table includes the in-degree value, the group number of each actor (modularity class via the Wakita-Tsurumi algorithm) and the actor classification. The yellow-coloured rows are media and the greyed-out rows have been deidentified for the privacy of individual users.

6.2.3 Which news media actors received the most attention?

Table 6.3 shows the top 10 news media nodes in the entire YouTube network with a description from their YouTube channel profile. Each is classified by media type and coded for their political stance using Media Bias Fact Check (MBFC). *RuPaul's Drag Race* has been removed from Table 6.3 as it is not relevant[25]. In terms of actor dominance, News Corp's *Sky News Australia* is the most central actor in the network by far, with its in-degree metric being more than double the number two actor, which is WION, World Is One News (736 and 356 respectively). *Sky News Australia* is the most central node in the largest group (Group 1), and WION is the most central in the second largest (Group 2). *Sky News* is number three in the list, but this is the UK version and has been owned by ComCast since November 2018 with this outlet no longer affiliated with News Corp (MBFC, 2022b).

With the exception of *The Guardian*, most of these media actors are broadcast outlets, which produce content that lends itself to the affordances of YouTube. In terms of the political stance of the outlets, there is a range represented with two right-wing outlets, two right-centre, three least-biased and three left-centre and with a mix of corporate and state ownership. In ninth position is alternative news outlet *RT DE* (MBFC, 2022c) – the German branch (DE) of internal broadcaster *RT*, formerly *Russia Today*[26]. *RT* is funded by the Russian state and is widely-known for its propaganda and interference in foreign politics (Crilley et al., 2022), yet has one of the highest YouTube viewership rates for a TV channel (Elswah & Howard, 2020). It broadcasts in several languages, though it was the German-based outlet only that showed up in this data collection. However, the *RT DE* YouTube channel has since been removed, and the following text shows in the place of the channel's landing page: "This account has been terminated for violating YouTube's Community Guidelines". Upon further investigation, it seems that *RT* launched a TV channel in Germany in December 2021, which – after about a week – was taken off the air by the German media regulator (Murray & Marrow, 2021). This has interesting implications for considering the interplay of media (in this case alternative news media) with social media platforms

[25] This was the one actor that appears to have no relevance at all to the keyword search – there is nothing about the GBR in the video, or the collected comments or video tags (checked via VidIQ).
[26] A check of the comments collected in the dataset confirmed the inclusion of RT DE was relevant to UNESCO and the GBR.

and government in terms of power over information flows, and can be aligned with Castells' network power.

Table 6.3

Top 10 Media Actors in the YouTube Global Network

	YouTube Channel	In-degree	Media type	Political stance	Description[27]
1	Sky News Australia	739	Media mainstream news	Right	Real news, honest views. The best award-winning journalists with unique and exclusive insights. Fearless opinions from the big names who are passionate about the country we live in.
2	WION	356	Media mainstream news	Least Biased	WION -The World is One News, examines global issues with in-depth analysis. We provide much more than the news of the day. Our aim to empower people to explore their world. With our Global headquarters in New Delhi, we bring you news on the hour, by the hour. We deliver information that is not biased. We are journalists who are neutral to the core and non-partisan when it comes to the politics of the world. People are tired of biased reportage and we stand for a globalised united world. So for us the World is truly One.
3	Sky News	146	Media mainstream news	Least Biased	The best of Sky News video from the UK and around the world. Sky News is now available in Spanish/Los video de Sky News están disponibles en español aquí: https://www.youtube.com/channel/UCzG5BnqHO8oNlrPDW9CYJog
4	ABC News In-depth	134	Media mainstream news	Left-Centre	Welcome to ABC News In-depth, where you'll find our long-form journalism and explainers to help you understand what's going on in the world around you. You'll find all your favourite ABC News programs: Four Corners, Foreign Correspondent, Australian Story, Planet America and selected 7.30 stories, as well as explainers and news features made just for you. Make sure you subscribe and hit the bell so you don't miss new episodes. ABC News In-depth helps you dig a little deeper. That means looking into the issues that affect all of us, and why it matters to you. It means going to where the people are, across Australia and the world. And it also means breaking all of that down for you, one step at a time. If you're looking for breaking news and our 24/7 ABC News live stream, subscribe to ABC News: https://www.youtube.com/user/NewsOnABC
5	7NEWS Australia	57	Media mainstream news	Right-Centre	The home of Australia's most trusted news brands - 7NEWS, Sunrise, The Morning Show, The Daily Edition and The Latest. For breaking news across the day, head to 7NEWS.com.au
6	Al Jazeera English	54	Media mainstream news	Left-Centre	#AlJazeeraEnglish, we focus on people and events that affect people's lives. We bring topics to light that often go under-reported, listening to all sides of the story and giving a 'voice to the voiceless.' Reaching more than 282 million households in over 140 countries across the globe, our viewers trust #AlJazeeraEnglish to keep them informed, inspired, and entertained.

[27] Description is from the YouTube channel's 'About' tab.

					Our impartial, fact-based reporting wins worldwide praise and respect. It is our unique brand of #journalism that the world has come to rely on. We are reshaping global media and constantly working to strengthen our reputation as one of the world's most respected #news and #CurrentAffairs channels.
7	Guardian News	23	Media mainstream news	Left-Centre	The Guardian news channel brings you live streams, breaking news and explainer videos so you can understand what's happening, as it's happening. The Guardian has been providing high-impact, independent journalism since 1821, always free from commercial and political influence. Help sustain our future by making a contribution today ► https://bit.ly/3k6jYYo The Guardian YouTube network: The Guardian ► www.youtube.com/theguardian Guardian Football ► http://is.gd/guardianfootball Guardian Sport ► http://bit.ly/GDNsport Guardian Australia ► http://bit.ly/gdnaustraliasubs Guardian Culture ► http://is.gd/guardianculture
8	FRANCE 24 English	19	Media mainstream news	Least Biased	Official FRANCE 24's YouTube channel, international news 24/7. Watch international video news from around the world !
9	RT DE	14	Media alternative news	Right-Centre	RT International is one of the most renowned media groups with a global focus and has so far broadcast in English, Spanish, Arabic, French, Russian and German. Among the presenters of RT programs were the legendary US journalist Larry King and WikiLeaks founder Julian Assange. RT documentaries and news programs have won the Monte Carlo TV Festival Award and have been nominated for the Emmy News Award several times - including for reporting on the Occupy Wall Street movement. RT DE stands for diversity of opinion and critical journalism. Thinking in black and white categories is out of place at RT DE. Even if this can be inconvenient at times. With the German-language program, RT DE offers an alternative to the mainstream: We get to the bottom of the matter and ask where others tend to remain silent.[28]
10	TRT World	12	Media mainstream news	Right	At TRT World we're building a global community focused around change. We're looking beyond the headlines to drive meaningful conversations that empower. We want to connect people across the globe to issues that matter. We explore the reality behind the hashtags and the people behind the statistics. We will seek to unpack the issues behind each story. By placing the human at the heart of each story we hope to promote a global conscience that provokes moral reactions - revealing a deeper understanding of the diversity of the lives around us. Subscribe to our channel for all our latest in-depth, on the ground reporting from around the world.

[28] This description has been translated from German to English via Google translate.

6.3 PART B – DOMINANT INFORMATION SOURCES AND FRAMES

Network power and networked power

6.3.1 What information received the most attention?

Due to the affordances of YouTube (Chapter 4), uploaded videos and their interactions were identified as the most suitable type of 'digital trace' (Freelon, 2014) to answer this research question. There were **389 unique videos** collected. The top 30 are shown in Table 6.4 below.

Top 30 videos

The video with the most interactions in the global YouTube network was posted by a channel called *Difference Frames the World* (the video had 35,104 views at 7 November, 2021). In the 'About' section on YouTube, this actor says its channel is for "anybody who likes Chinese Civilization and wants to make friends with Chinese People, and here you can find a true picture of China through my videos" (Difference Frames the World, 2021). The content features a series of still images with a narrated robotic voice, essentially transcribing the exchanges between journalists and a Chinese government minister during a press conference on 5 July, 2021 in China, which includes a discussion about the recommended 'in danger' listing. The content is further discussed in the framing section.

Not far behind in second place in the top 30 was News Corp's *Sky News Australia* (12,073 views at 7 November, 2021). Also broadcast on free-to-air television, this actor's information dominates the list with *Sky News Australia* content representing 43 per cent of the top 30 YouTube videos. Throughout the six-week data collection period, this mainstream media actor published 25 videos related to the GBR. (This makes it the second most prevalent GBR-related content creator behind *The Guardian*, which published 31 pieces of content during the six-week period). The full list of videos is in Appendix E, with 10 videos uploaded on June 22, 2021, the first day news of the recommendation began to circulate publicly. Information drops off towards the middle of the data collection range, and then ramps up again closer to the UNESCO decision coinciding with the release of AIMS' coral cover report (discussed further in Chapter 8).

New Delhi-based commercial news outlet WION is the next most prevalent source representing 10 per cent of the content. The other mainstream media news outlet

is the Australian Broadcasting Corporation's (*ABC*) *News In Depth*, which has an episode of *Media Watch* (number 16). *Media Watch* is also broadcast on free-to-air TV and describes itself as "Australia's leading forum for media analysis and critique" (ABC News, 2021). The UNESCO GBR recommendation was featured in this episode as a criticism of media outlets around the world for uncritically following the framing of the breaking story. The original framing was set by New Corp's *The Australian*, which said the recommendation was a "China-led ambush" and the federal government was "blindsided" (Packham, 2021a). Host Paul Barry criticises News Corp in particular, saying it is "bizarre that such a serious threat to one of the wonders of the world which brings in billions of dollars and thousands of jobs for Australia should be blamed on the incompetence of our scientists or on political games played by China" (ABC News In-Depth, 2021: Table 6.4, number 16). Commercial right-leaning News Corp and publicly-owned left-of-centre *ABC* have an ongoing tit-for-tat (Manne, 2011), with *Sky News Australia's* Andrew Bolt saying soon after the *ABC* "cannot be trusted" when it comes to the GBR (Sky News Australia, 2021a).

While 60 per cent of the videos are comprised of these mainstream news media actors (*Sky News Australia*, *WION* and *ABC News*), the remainder are primarily 'vloggers' that are predominantly focused on GBR-based adventures and fishing. The one exception is the *Oppenheimer Ranch Project* (Table 6.4, number 30). This has been coded 'vlogger/advocate' with the video in the data collection featuring an interview with a scientist who is affiliated with Ridd and right-wing thinktank the Institute of Public Affairs (IPA), including publicly questioning the reported health status of the GBR and the science used to inform protection policy (Marohasy, 2021; Institute of Public Affairs, 2020). There are also a handful of videos that are not relevant to this case study, which have been removed for the upcoming framing analysis (numbers 4, 6, 8, 9 and 11).

Table 6.4

The Top 30 Videos in the YouTube Network by Interactions

	Information source: Video ID	**Video title**	**N=**	**Channel**
1	xf70pntsuVE	COWA 2021-0705b: Is Australia Crazy? Even The Endangered Great Barrier Reef Is China's Fault?	309	Difference Frames the World
2	3f34Dx9PD3A	Failed push to change status of Great Barrier Reef a 'major loss' for the CCP	295	Sky News Australia
3	SzCTOzj1Wds	Australia hits back at China-chaired UNESCO over Barrier Reef's heritage status | WION World News	244	WION

4	AuTlDkw5YeE	14 DAYS OF HELL (Surviving Hotel Quarantine)	242	Sailing La Vagabonde
5	R9yeZLdJjQI	Gravitas Live With Palki Sharma Upadhyay | UNESCO downgrades great Barrier Reef | WION News	238	WION
6	q5-eQX_BbHE	Brupeg's New Engine... Nah Just Kidding! - Project Brupeg Ep. 213	234	Project Brupeg
7	Bpb6zD-ZVuk	Great Barrier Reef 'China's latest shot' in its 'victimisation of Australia'	227	Sky News Australia
8	kg32g4FMan0	The Search for Jojo the Friendly Wild Dolphin! (Family Dive Adventure!)	207	BlueWorldTV
9	LQKanrCk864	कोल्ड ड्रिंक्स शरीर पर कितना असर डालती है | जानिए अंकित सर से	200	wifistudy 2.0
10	c7Ao8sRn7rc	UNESCO strips away Liverpool's World Heritage Site status	192	Sky News
11	vyNEZvUkeuw	Jan & Jessica Wild's "Womanizer" Lip Sync 🌶🔥 RuPaul's Drag Race All Stars	179	RuPaul's Drag Race
12	2Ohfs9jipSY	DAY 89: GREAT BARRIER REEF AT IT'S BEST | Sharks Attack Fish While Fishing & Spearfishing (Ep: 30)	176	Back 2 Basics Adventures
13	vEsclklEaxM	Government 'delighted' at UNESCO Great Barrier Reef decision	174	Sky News Australia
14	OT0_EF6aT5I	Gravitas: Great Barrier Reef downgraded, Australia blames China	169	WION
15	ST6xYhFp2d8	Data 'unequivocally' shows Great Barrier Reef is in 'extremely good condition'	168	Sky News Australia
16	bglffWsgL4c	Media conned by PM's vaccine spin | Media Watch	165	ABC News In-depth
17	h5Ba3QPvX4I	DAY 91: BEST DIVE SPOT IN THE WORLD!? And We Find A Historic Shipwreck! (Ep: 31)	159	Back 2 Basics Adventures
18	wH7MC1ZkXAE	Federal government will 'strongly oppose' UNESCO's Great Barrier Reef draft decision	153	Sky News Australia
19	oOaSaxSP02I	The UN process has seen the Great Barrier Reef as a 'poster child' for climate targets	149	Sky News Australia
20	DejhDPs2QzM	China-backed UNESCO was 'politicised' to recommend listing Great Barrier Reef as 'in danger'	146	Sky News Australia
21	HqGDzJ5KlAA	GREAT BARRIER REEF | WHITSUNDAY ISLAND & WHITEHAVEN BEACH DAY TOUR + SNORKELING | AMAZING HILL INLET	146	Vhal Winter
22	Q_NFWSze-A8	Great Barrier Reef declared 'in danger' by UNESCO	130	Sky News Australia
23	j7JJMoAChYs	International ambassadors tour Great Barrier Reef ahead of UNESCO decision	126	Sky News Australia
24	BbRDuKLe-_g	UNESCO is 'wrong' to single out Great Barrier Reef: Environment Minister	122	Sky News Australia
25	kQEGfPCqt08	Spearfishing The Great Barrier Reef off the Whitsundays (Sailing Popao) Ep.52	114	Sailing Popao - Underwater Ally Productions
26	2y1oaUwj_OA	Great Barrier Reef avoids UNESCO 'in danger' listing	111	Sky News Australia
27	p_9z3r5RG2I	China-chaired UNESCO 'hasn't visited Great Barrier Reef since 2012	109	Sky News Australia
28	CATB6dgPPmQ	Snorkelling the Great Barrier Reef (Sailing Popao) Ep.53	108	Sailing Popao - Underwater Ally Productions
29	5r9rCYOCDLU	Outrageous' JobKeeper payments to Great Barrier Reef Foundation 'should be repaid'	99	Sky News Australia
30	K117DAOA4CI	Jennifer Marohasy - Finding Porites - Australia Rejects U.N. Warning over Great Barrier Reef Status	72	Oppenheimer Ranch Project

Note. 'N' is the number of interactions, or edges, associated with the video. These are in the form of posting the video, plus comments and replies on the video, which is an indicator of the video's salience to the network.

6.3.2 How was the most dominant information framed?

The top 10 items in the global network were analysed for framing, as per Nisbet's typology of frames relevant to climate change (2009). See Table 6.5 for a deductive interpretation of the framing as per Nisbet's classifications (Appendix D).

Table 6.5

The Top 10 Information Sources and Frames in the YouTube Global Network

	Information source - Video ID	N=	Headline	Frame
1	xf70pntsuVE	309	COWA 2021-0705b: Is Australia Crazy? Even The Endangered Great Barrier Reef Is China's Fault?	Public accountability and governance
2	3f34Dx9PD3A	295	Failed push to change status of Great Barrier Reef a 'major loss' for the CCP	Conflict and strategy
3	SzCTOzj1Wds	244	Australia hits back at China-chaired UNESCO over Barrier Reef's heritage status | WION World News	Conflict and strategy
4	R9yeZLdJjQI	238	Gravitas Live With Palki Sharma Upadhyay | UNESCO downgrades great Barrier Reef | WION News	Conflict and strategy
5	Bpb6zD-ZVuk	227	Great Barrier Reef 'China's latest shot' in its 'victimisation of Australia'	Conflict and strategy
6	vEsclklEaxM	174	Government 'delighted' at UNESCO Great Barrier Reef decision	Public accountability and governance
7	ST6xYhFp2d8	168	Data 'unequivocally' shows Great Barrier Reef is in 'extremely good condition'	Scientific and technical uncertainty
8	bglffWsgL4c	165	Media conned by PM's vaccine spin | Media Watch [GBR content analysed]	Public accountability and governance
9	wH7MC1ZkXAE	153	Federal government will 'strongly oppose' UNESCO's Great Barrier Reef draft decision	Public accountability and governance
10	oOaSaxSP02I	149	The UN process has seen the Great Barrier Reef as a 'poster child' for climate targets	Conflict and strategy

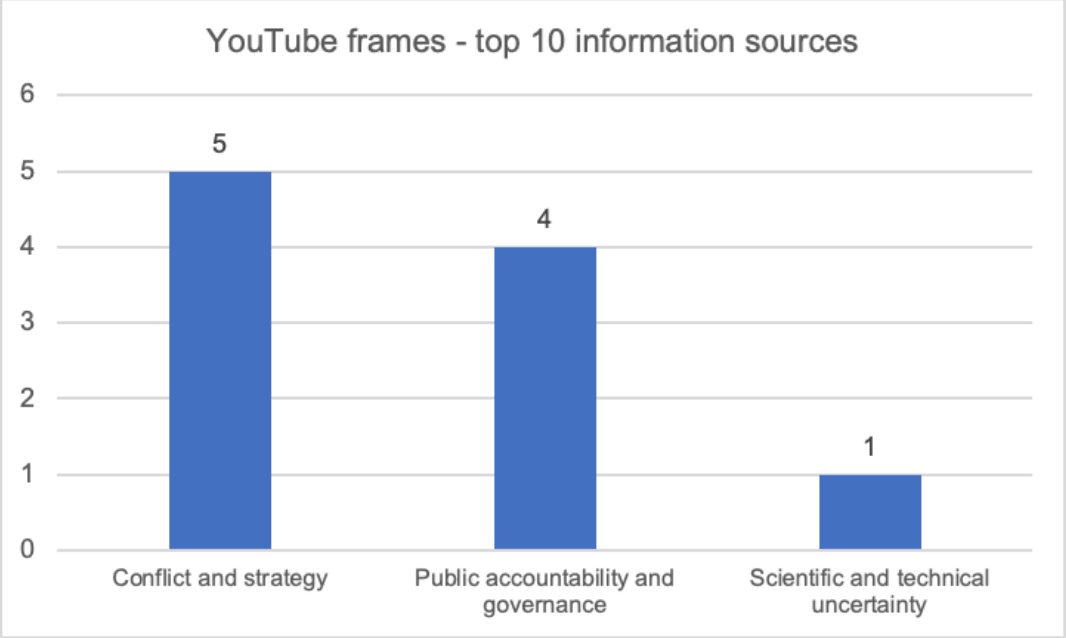

Figure 6.2. The dominant frames from the top 10 information sources in the YouTube global network.

The most common frame in the top 10 items in the YouTube global network was conflict and strategy (n=5), followed by public accountability and governance (n=4) and scientific and technical uncertainty (n=1) (Figure 6.2). These are the same frames reflected in the Twitter data, yet the narratives within them are different. For instance, the source of much of the conflict and strategy framing in this data is not a 'battle' between ENGOs and the government, or the domestic governments with the international governance of UNESCO, as was the case of Twitter's dominant content. Rather, most 'battles' of the conflict and strategy frame in the YouTube data involved Australia versus China with particular narratives about Australia being victimised by China (Table 6.5, number 3, 4), or Australia winning the battle against the Chinese Communist Party when the WHC voted against listing the GBR as 'in danger' (Table 6.5, number 2). For example, *WION World News* host Palki Sharma Upadhyay took Australia's 'side', saying China was involved in "vendetta politics": "It takes a strategic mind to weaponise trade and history, but a sinister one to weaponise nature. And that's exactly what China is doing to Australia, targeting their most iconic geographical landmark – the Great Barrier Reef" (Table 6.5, number 4). Also this from *Sky News Australia* host Chris Smith:

> We haven't had many wins against China in the last year or so, but this is one of them… It could still happen, and we need to keep fighting against these attempts…. So the scorecard stands at China 10, Australia one – we're fighting back. (Table 6.5, number 2)

There was one video that appeared in the top 10 from *Sky News Australia* that pitted the domestic government and Australian interests against "European bureaucrats and international green groups". This claimed that the Reef was being turned into a "poster child" to push for more ambitious climate targets ahead of the UN Climate Change Conference in Glasgow[29] (Table 6.5, number 10). Peta Credlin, *Sky News Australia* host, said this push formed part of "an international green conspiracy" (Table 6.5, number 10).

As the next most frequent frame, 'public accountability and governance' represented or countered the federal government's statements that the draft

[29] The UN Climate Change Conference, known as COP26, was in November, 2021: https://ukcop26.org/

recommendation was “unreasonable”, due process had not been followed, the Australian government had been “blindsided”, and the GBR was the victim of politicisation (DAWE, 2021c; Table 6.5, number 8, 9). In the case of the top video by *Difference Frames the World*, this could have also been coded conflict and strategy, however, the language is more conducive to a public accountability and governance frame in the way that it narrates and translates Chinese minister Wang Wenbin responding to a question from a journalist from *The Paper*. For context, this media outlet is owned by the Shanghai United Media Group, which is a state media company of the People's Republic of China (Wikipedia, 2021).

Part of the response is provided below:

> Australia should lead by example and respect the opinion of the professional evaluation institution. It should face up to its severe failings in world heritage protection and earnestly step up preservation efforts instead of politicising technical issues, wantonly hurling unfounded accusations at UNESCO and its professional evaluation body and shifting the blame to others. Moreover, it should exert less pressure on the World Heritage Committee through innuendo and sensational media reports to sway the Committee's impartial and just decision. (Table 6.5, number 1: narrated comments attributed to Chinese minister Wang Wenbin)

The final frame identified was scientific and technical uncertainty. This accounts for an interview *Sky News Australia* conducted with Ridd following the public release of AIMS’ coral cover report ahead of the WHC decision in July 2021 (Table 6.5, number 7). In this video the marine geophysicist discusses the how the report’s data show “unequivocally” that the GBR is in “extremely good condition”, going on to question the credibility of scientific organisations:

> There's been some very spurious figures they've been throwing around, some of the scientific organisations over the last couple of years, saying there’s been three bleaching events in the last five years now this is completely inaccurate.... there were three bleaching events, but they only impacted certain sections of the Reef. (Table 6.5, number 7: interview with Peter Ridd)

In summary, the dominance of the ‘conflict and strategy’ and ‘public accountability and governance’ frames in the global YouTube network suggest that the GBR and its protection is politicised, and has the potential to be polarising in the

sense that half of the most widely circulated information focuses on the issue as a "game amongst elites" (Nisbet, 2009) who are seeking to win an argument, rather than focusing on the issue at hand. This is a strategy that has been used by partisan media to invoke "partisan social identities" (Levendusky, 2013, p. 567) and help advertisers to target certain audiences (Arsenault & Castells, 2008). The politicisation of the GBR via the 'public accountability and governance' frame also avoids a genuine discussion about the state of the Reef's health and impacts from climate change by focusing instead on the "unfair" process involved. These findings and the potential implications will be discussed further in Chapter 8.

6.4 PART C – CONNECTION AND DISCONNECTION

Networked power and network-making power

The section below outlines how connection and disconnection were considered at the global network level using metrics like modularity, density and isolates to give an overview of the connectivity and information flows in this network. Visualisations mapped in NodeXL and Gephi were used to further interpret these interactions. Then, guided by the data, Group 1 and Group 5 were more closely examined to understand connection, disconnection and power interplays (Chapter 4).

6.4.1 How connected, or disconnected, is the global network?

Using the Wakita-Tsurumi algorithm, modularity is 0.64 for the global YouTube network, which is evidence of a high level of community division or quality of clustering (Himelboim et al., 2013b). This could be an indication of both connection (partitioning within the graph as users connect with each other in the clusters to create and share information: homophily) and disconnection – the extent that these clusters are separate from other actors in the graph. In the case of the YouTube data, it is expected that this value would be higher than interactions on Twitter, for example, because of the nature of the information collected where users are often clustered around a single, or handful, of videos, essentially creating hubs. This behaviour is also reflected in the low density value of 0.000278, suggesting that there are relatively low connections in the graph, which also impacts the ability of information to flow within it (Himelboim et al., 2017).

The nature of the centralisation of information flow is reflected in Figure 6.3, which shows many of the top actors are at the centre of the 'hubs'. While Smith et al.'s (2014) conversational archetypes were applied to examine Twitter networks only in their study, by employing similar principles, this network could be considered a hub and spoke-style broadcast network due to the media outlets and vloggers being central attention-getting actors in most of the larger community clusters.

Finally, there are 148 isolates in the global network (represented by Group 9), which make up about 3.4% of the nodes. As noted earlier in this thesis, isolates are unconnected actors, and can pose blockages to information flow. However, to enhance this understanding about information flows, the network needs to be explored at the subnetwork level.

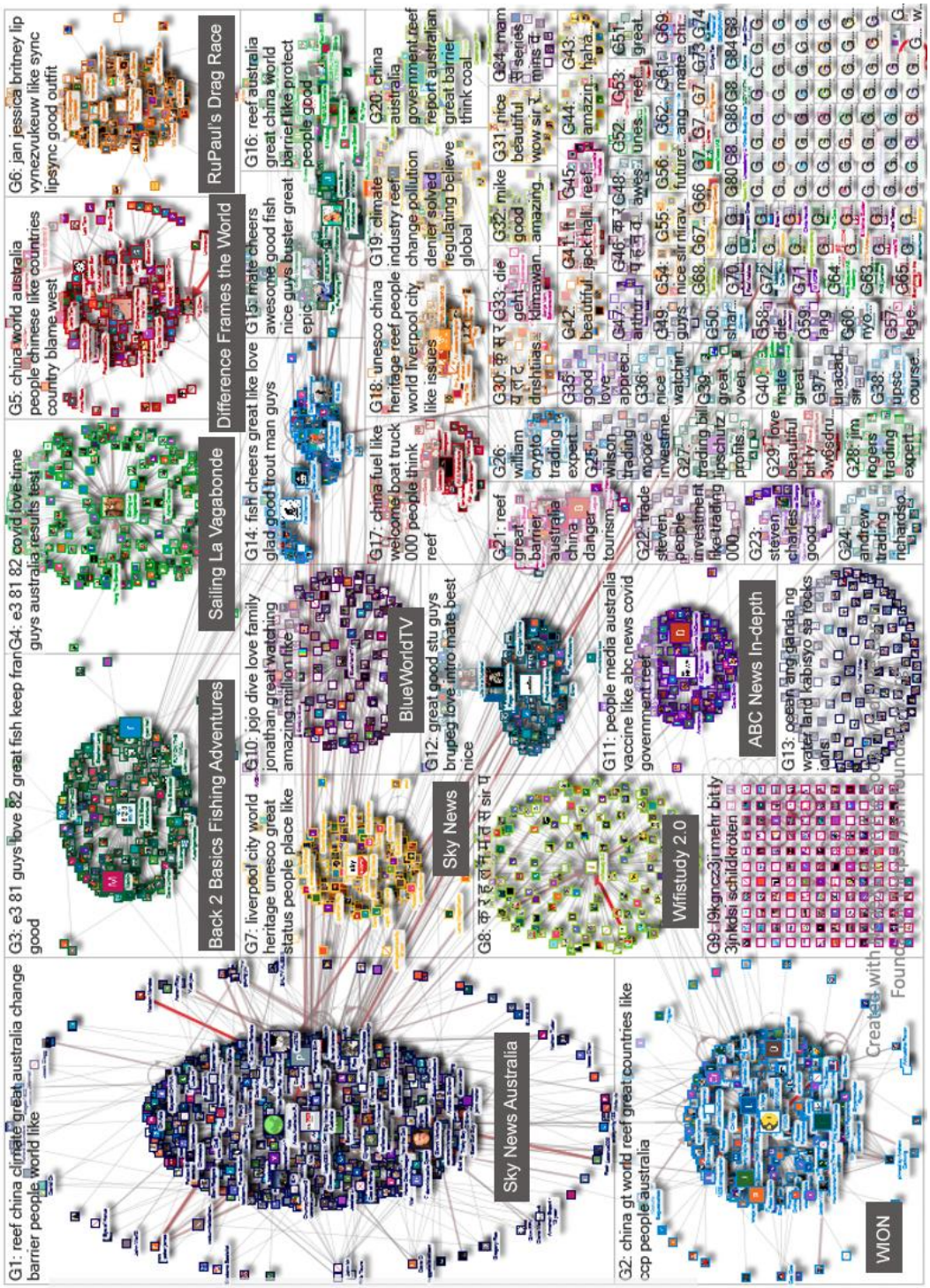

Figure 6.3. Network visualisation using NodeXL and the Harel-Koren tree-map layout. The top 10 actors in the global network are marked on the subnetworks.

6.4.2 How does connection and disconnection at the subnetwork level relate to attention, information flows and frames?

Given that the largest cluster in the global YouTube network is Group 1 (*Sky News Australia*) and the video with the most interactions is in Group 5 (*Difference Frames the World*), these two clusters were selected to further explore information flows, noting their network dominance and significance. This decision was also guided by the data analysis, noting that these two groups share oppositional views, as identified in Part B. Also, mapping the data in Gephi using the Louvain clustering algorithm and ForceAtlas2 force-directed layout algorithm (Chapter 4) highlighted a single-account bridge between Group 1 and Group 5 (Figure 6.4). This provided a useful opportunity to explore connection, disconnection and power.

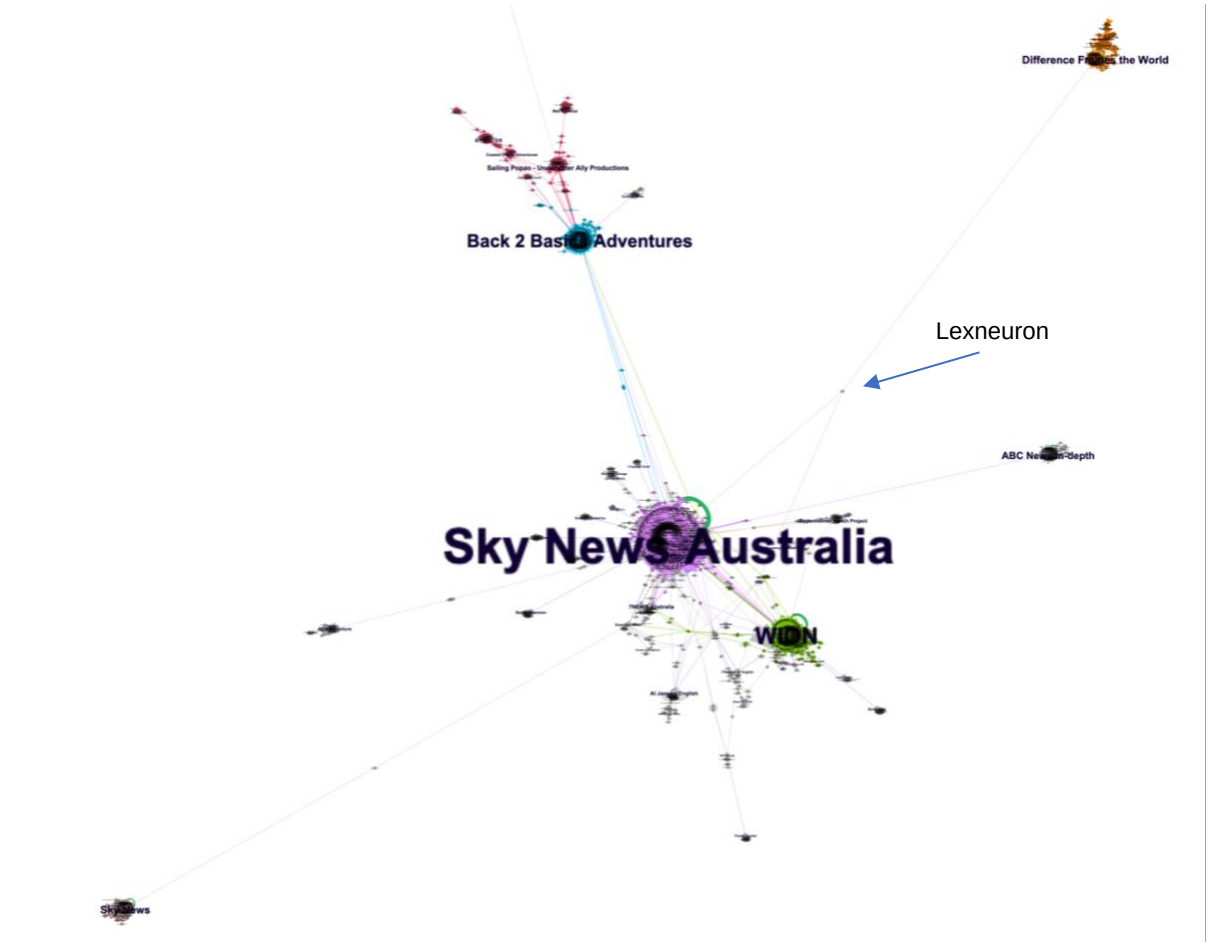

Figure 6.4. The 'giant component' of the global YouTube network using ForceAtlas2 in Gephi. *Sky News Australia* is at the centre and *Difference Frames the World* is at the top right. The fishing and GBR-related vloggers are situated away from the news-focused cluster (top).

6.4.3 Who are the dominant actors in the subnetworks?

An analysis of the top 10 actors was completed for each of the clusters, but there is little value in including a table as provided in Chapter 5 as the top actor is the information source (*Sky News Australia* and *Difference Frames the World*) and the remaining nine actors are all individuals or unknown actors, who are de-identified. These actors are engaging with the content published by the top actor.

6.4.4 What information is being shared in both groups and how is it being framed?

The top 10 information sources (videos), number of interactions, and the dominant frame of the content is shown in the tables and figures below. While there were videos from other news sources in Group 1, the top 10 items are all from *Sky News Australia* (Table 6.6). Group 5 had a single piece of content, which was the *Difference Frames the World* video.

Dominant information and frames – Group 1

Table 6.6

Dominant Information Shared and its Framing in Group 1

	Information source - Video ID	N=	Title	Frame
1	3f34Dx9PD3A	262	Failed push to change status of Great Barrier Reef a 'major loss' for the CCP	Conflict and strategy
2	Bpb6zD-ZVuk	189	Great Barrier Reef 'China's latest shot' in its 'victimisation of Australia'	Conflict and strategy
3	vEsclklEaxM	170	Government 'delighted' at UNESCO Great Barrier Reef decision	Public accountability and governance
4	oOaSaxSP02I	145	The UN process has seen the Great Barrier Reef as a 'poster child' for climate targets	Conflict and strategy
5	ST6xYhFp2d8	137	Data 'unequivocally' shows Great Barrier Reef is in 'extremely good condition'	Scientific and technical uncertainty
6	j7JJMoAChYs	116	International ambassadors tour Great Barrier Reef ahead of UNESCO decision	Conflict and strategy
7	2y1oaUwj_OA	102	Great Barrier Reef avoids UNESCO 'in danger' listing	Conflict and strategy
8	p_9z3r5RG2I	98	China-chaired UNESCO 'hasn't visited Great Barrier Reef since 2012'	Conflict and strategy
9	5r9rCYOCDLU	95	Outrageous' JobKeeper payments to Great Barrier Reef Foundation 'should be repaid'	Public accountability and governance
10	DejhDPs2QzM	88	China-backed UNESCO was 'politicised' to recommend listing Great Barrier Reef as 'in danger'	Public accountability and governance

Note. N is the number of interactions on the video in the form of comments, or comment replies.

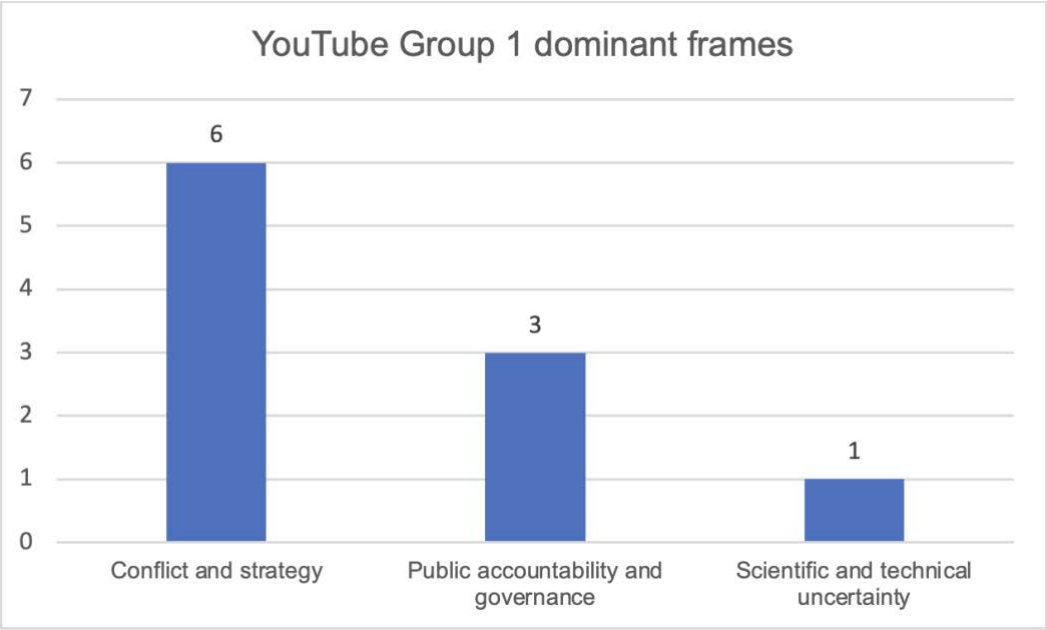

Figure 6.5. The dominant frames in Group 1 expressed as a bar chart. The horizontal axis is the frame and the vertical axis is the frequency it appeared.

The interactions in Group 1 related to 25 videos in total, with the most prevalent 14 being published by *Sky News Australia*. The remaining videos are from mainstream news media outlets and vloggers (travel and advocacy). The frames represented in the top 10 information sources in Group 1 (Figure 6.5) largely reflect the most dominant frames of the global network, which is to be expected given the dominance of *Sky News Australia* as an actor.

The top 10 most dominant videos – all by *Sky News Australia* – had a mix of frames, and generally featured elements of all three highlighted in the graph, with the most dominant frame indicated. For instance, in the case of number 9, the bulk of this story was about the Jobkeeper payments claimed by the Great Barrier Reef Foundation, but the last part involved host Chris Kenny asking guest Nationals Senator Matthew Canavan about the outcome of the WHC decision. Canavan says it was a "bittersweet victory", going on to say that the Reef had fully recovered and UNESCO's recent attention was the fault of problematic scientific reports, implying ulterior motives were at play:

> UNESCO, to give them their due, they were just quoting from the Queensland and federal government reports that have been written in recent years with the most doomsaying, exaggerated threats about the Reef so when they read these reports of course they're going think it's in danger. When, apparently, surprise,

> surprise, wasn't it such a coincidence Chris that last week just before it came up on the agenda, one of these organisations – the Australian Institute of Marine Science – released a report, saying it's all OK. The coral is back to record levels! [laughs]. It's all fine. That needs to be investigated too Chris: How come that report just popped up last week when we've been saying that for years and ignored and ridiculed. (Table 6.6, number 9)

There are other snippets that relate to scientific reports and agencies being presented as problematic or inaccurate within the top 10 information sources. This includes the Cairns Tourism Association president saying in a *Sky News Australia* interview that GBR science and management agencies AIMS and GBRMPA need to have "nuancing" in their reports to ensure the "factual portrayal" of the health of the GBR (Table 6.6, number 1). Also, this comment from a *Sky News Australia* host narrating a story following the WHC decision: "Environment minister Sussan Ley says the outcome is an opportunity for site managers and marine scientists to display the success of the outstanding work across the Reef" (Table 6.6, number 7), which hints at a desire to counter the 'bad news' of the science with the 'good news' of the investment being made, thus mixing media and politics with science. Of interest too, in this same story, the host in the broadcast version says this of the progress report that was requested to be provided to the WHC by February 2022: "The proposal was based on concerns about water quality and claims not enough has been done to combat climate change", yet in the YouTube version, the text has been edited from the less doubt-inducing "claims" to "fears" (Table 6.6, number 7). This is consistent with Grien and Macneil's (2022) findings about conservative media outlets, namely *The Australian*, using selective language to convey climate "denialist undertones" (p. 7). The role of science in mediatised environmental conflict and its politicisation will be further discussed in Chapter 8.

Dominant information and frames – Group 5

Table 6.7

Dominant Information Shared and its Framing in Group 5

	Information source - Video ID	N=	Title	Frame
1	xf70pntsuVE	309	COWA 2021-0705b: Is Australia Crazy? Even The Endangered Great Barrier Reef Is China's Fault?	Public accountability and governance

Note. N is the number of interactions on the video in the form of comments, or comment replies.

Group 5 had a single information source, which was the video by *Difference Frames the World* that was the most dominant across the global YouTube network. The other edges in this cluster are comments on the video. While they require a systematic analysis that is outside the scope of this project, there are recurring themes that include the Australia/China tensions (comments about the victimisation of China), discussions about the GBR's health status, and other broader environmental threats. While the frame of public accountability and governance ranks highly in the global network's information sources, this narrative is from the opposing perspective of *Sky News Australia*'s 'reality', questioning the Australian government's politicisation of the GBR.

6.4.5 How connected or disconnected are the groups?

Consideration of the number of shared connections between the groups supports the earlier premise that most connections stay within the same group, with a hub at the centre acting as an information authority, and the other users having few interconnections between them. Table 6.8 shows the intra and inter-cluster sharing mainly with Group 1 and Group 5. There were no direct connections between these two groups. Evaluating inter-cluster connections more broadly, Group 16 was the only group with 10 or more relationships with the network's largest subnetwork of Group 1. While Group 1 had connections with other groups, this small quantity shows that most of the interactions remain within the cluster. Group 5 was even more insular, with all of the edges that started in this group remaining there.

Table 6.8

Intra and Inter-cluster Connections

Source group	Target group	Relationships, N=
G1	G1	1610
G1	G16	10
G1	G5	0
G5	G5	309
G5	G1	0

Note. The number of intra and inter-cluster connections that started in Group 1 and 5. Group 5 did not have any connections with G1. G16 is the only group that has 10 or more connections with G1.

Interestingly from a networked power and network-making power perspective, 'Lexneuron' is a single node that acts as a bridge between Group 1 and Group 5.

Classified by the Wakita-Tsurumi algorithm as Group 21 and interacting with content in groups 1 and 5, it forms a single tie between the otherwise disconnected clusters. This node is either an individual or a 'sockpuppet' account. It has two subscribers to its channel and a generic image, yet it has a diversity of channel subscriptions. Lexneuron posted the same comment on three different videos that are located in groups 1, 5 and 21. The comment consists of a series of five links explaining the GBR's ailing health, the impact of climate change and action that can be taken to protect it. While a framing analysis was not conducted on each link, a high-level content analysis suggests they can be broadly classified as having 'morality and ethics' framing. The list of links and the channel names are shown in Appendix H. It should be noted that these three comments are no longer visible on the videos.

Two of the videos that Lexneuron commented on are mainstream commercial news outlets: *Sky News Australia* (G1) and Singapore-government owned *Channel News Asia* (G21), which MBFC classifies as 'least biased' and credible (MBFC, 2021a). The third is *Difference Frames the World's* video (G5), which was coded vlogger/advocate, and has a donation-based business model. These videos present three views about China's level of involvement in the 'in danger' recommendation and whether or not it was politically motivated or legitimate. This is relevant as blaming China is a delegitimising tactic to contest concerns about the health and the management of the international icon and, by extension, defend 'productivism', essentially economic growth. The headline of the *Sky News Australia* video that the Lexneuron comment appears on is "Great Barrier Reef 'China's latest shot' in its 'victimisation of Australia'". This was discussed earlier, but briefly, it is extremely critical of China, was coded 'conflict and strategy' and uses two Liberal National Party politicians as the only spokespeople. *CNA*'s headline is "Australia to challenge UNESCO downgrade of Great Barrier Reef" and is journalistically balanced, presenting Australia's claims, China's rejection of those claims, and quotes Environment Minister Ley and the World Wildlife Fund (WWF) as spokespeople. As noted earlier, The *Difference Frames the World* video's headline is "COWA 2021-0705b: Is Australia Crazy? Even The Endangered Great Barrier Reef Is China's Fault?". It is extremely critical of Australia and quotes a Chinese minister at a press conference.

While it can be said that Lexneuron does not have a large 'switching' impact (for instance, the actor has an in-degree score of 0, meaning it had no reactions to its comments), its role as a bridge between these three information sources with diverse frames – and the nature of the information it shares – is interesting in the context of network-making power and attempts to reframe narratives, albeit unsuccessfully. While it is outside the scope of this research, the next step would be to look at the comments on these three videos for a 'below the line' analysis (Graham & Wright, 2015) to see how other actors are responding, including examining the discursive tactics used to reinforce or contest frames and narratives circulated by the more attention-getting actors in the network, including mainstream media outlets.

6.5 CONCLUSION

Through the analysis in Parts A and B and examining the Group 1 cluster further in Part C, *Sky News Australia* is a super-node in relation to its dominance and ability to exercise networked power during the data collection period. It has the highest in-degree value by far and its information features in 13 out of the 30 most attention-getting content. As noted by Himelboim et al., (2017), the hierarchical structure of networks can impact information flow. Namely, a network where one or a few actors attract a large and disproportionate number of connections depends heavily on these actors for information flow and sharing (p. 4). This high level of network centralisation is referred to as 'hub and spoke typology' (Hsu & Park, 2011, as cited in Himelboim et al., 2017) with one influential actor at the 'hub', surrounded by several unconnected actors. This style of network is evident on YouTube where the central nodes are often the content producers, with other accounts (whether authentic individuals or not), commenting on the information, or replying to each other. This creates in-coming ties to these 'hubs', making these central actors information authorities. This is particularly the case with *Sky News Australia*: it has 739 in-coming interactions, and just one outgoing (N=1). The networked and network-making power of *Sky News Australia* is significant in this network in terms of the framing of GBR protection, use of tactics like sowing scientific doubt to contest narratives, and for considering the power of mainstream media actors in hybrid news-sharing spaces. This will be further explored in Chapter 8. The next chapter will cover the results from Facebook.

Chapter 7: Facebook Results

7.1 OVERVIEW

7.1.1 Data collected

Using the methods and parameters outlined in Chapter 4, **4663 posts** from **2430 public Facebook pages** and **groups** were collected during the June 21, 2021 – August 1, 2021 timeframe for the search query "Great Barrier Reef". The term 'Facebook spaces' will be used hereafter to refer to Facebook pages, groups and verified profiles (Bruns et al., 2020). These posts had a total of 464,886 interactions (reactions, comments and shares). Table 7.1 shows a breakdown of the data that was collected (note: there were no verified profile accounts[30] detected for this data collection).

Table 7.1

Summary of the Data Collected from Facebook

Facebook data collection	
Total number of posts (pages and groups)	4663
Total number of interactions	464,886
Total number of unique Facebook spaces	2430 (1862 pages, 568 groups)
Total number of links (including internal)	4563
Total number of unique links	3074
Total number of unique domains	619

7.1.2 Time series analysis

There is a distinct activity peak at the point where the World Heritage Committee's draft recommendation was publicly reported, with the story broken as an exclusive by *The Australian* at about 21.30 on Monday, June 21 (Figure 7.1). The first Facebook post on the topic appeared in the results is from Flora 4 Fauna – Australia, an environmental conservation organisation, which shared the story from *The Australian* around 07.00 on Tuesday, June 22, 2021. There is a sharp spike in activity

[30] An example of this type of account would be a celebrity, or someone with a high public profile.

over the next 24 hours, which gradually peters off. A much smaller spike around July 10, 2021 aligns with the news that Australian Environment Minister Sussan Ley was flying to Europe to "lobby World Heritage Council members" against the proposed downgrade (Ore, 2021), followed by another activity increase on July 21, 2021, which is the lead-up into the World Heritage Committee's decision on Friday, July 23, 2021. Like the other platforms, the initial draft recommendation received much more attention than the final decision. It is also of note that the initial activity was not sustained throughout the month for this issue.

Figure 7.1. Activity for the search term "Great Barrier Reef" across Facebook spaces from June 21, 2021 to August 1, 2021.

7.1.3 Two-mode network metrics

Due to the nature of the data available through CrowdTangle, bipartite – or two-mode – networks were created to analyse these data. In the case of this study, one of the networks was to explore the relationship between Facebook spaces and URLs and the other was to study Facebook spaces and domains. The network statistics from each of these are shown below in Table 7.2 and Table 7.3 respectively.

Facebook Spaces and URLs

Table 7.2

Global Network Metrics for Facebook

Graph metrics	
Graph type	Directed
Nodes – unique Facebook spaces	2430
Nodes – unique URLs	3074
Edges (URLs)	4563
Number of edge types	1 (URLs)
Connected components	Weakly connected (1499), strongly connected (5505)
Density	0.000[31]

[31] Density returned a '0' value in Gephi, however, the software shows values up to three decimal places. I used Datta (2021) and referred to Peng et al. (2021) to manually calculate the density with a

Modularity	0.933

Note. Nodes are unique Facebook spaces and unique URLs, and edges are the connections between these node sets (as hyperlinks).

Facebook Spaces and domains

Table 7.3

Global Network Metrics for Facebook

Graph metrics	
Graph type	Directed
Nodes – unique Facebook spaces	2430
Nodes – unique domains	619
Edges (domains)	4563
Number of edge types	1 (Domains)
Connected components	Weakly connected (486), strongly connected (3052)
Density	0.000[32]
Modularity	0.666

Note. Nodes are unique Facebook spaces and unique domains, and edges are the connections between these node sets (as hyperlinks).

7.2 PART A – DOMINANT ACTORS

Networking power, network power and networked power

Top 100 Facebook spaces

7.2.1 Which actor types were not included, or excluded, from the network?

In terms of networking power, there are no international organisations like UNESCO or science-related actors in the top 100 list, noting these actors were prominent on Twitter. Like the other networks, there are also no identifiable

result of 0.000147. However, I cannot be sure it is correct as the bipartite calculation is more complex. Given the lack of importance to this specific value to this research inquiry and inability to compare it to the one-mode networks, it is sufficient to say density is low.

[32] See footnote on Table 7.2. The result manually calculated was 0.00031, which is low.

Indigenous actors. In terms of network power, Facebook flagged content as problematic, which will be discussed in Part B.

7.2.2 Which actors received the most attention?

Only 22 per cent of the top 100 Facebook spaces are media outlets, with 16 being mainstream news and six alternative news. Scott Trust Limited-owned *The Guardian Australia* and New Corp's *Sky News Australia* are in fifth and sixth places respectively. This is discussed further in the top 10 media actors section below. The majority of actors in the top 100 were coded 'advocacy', but this group is diverse representing GBR health and climate action advocates, as well as those advocating for GBR health and climate scepticism. Some examples include 'Fight For Our Reef', 'Climate Action Australia' and 'Rise Up for Climate Change Action', along with the 'Australian Climate Sceptics Group', 'Climate change is natural', 'Green Shirts Movement QLD', and 'Property Rights Australia'. The last two have been critics of the Queensland Government's Reef Regulations mentioned in Chapter 1. There were also Facebook spaces coded as advocacy that are politically-motivated yet sharing diverse political stances. For example pro-conservative spaces including 'I'll stand by Tony Abbott'[33] and 'Tony Abbott's Support Page', along with spaces critical of the incumbent Liberal-National Coalition government (LNP) including 'The Fiberal Party of Australia – Lies & Misdemeanours', 'We Loathe Dutton & Morrison', and '1,000,000 Strong Against The Liberal National Party'. Other political groups are also reflected, like 'Australian Greens politics, news and discussion' and 'The Greens Little Bag of Stupidity'. Other types of advocacy groups are also active, including one that is pro-free speech and critical of COVID-19 restrictions (Wake Up Aussies & Stay Safe), and another that is critical of publisher News Corp (Stop Evil Murdoch's Monopoly).

The next most dominant actor type was 'industry', comprising mainly tourism (21). This is a much larger representation compared to Twitter and YouTube. Next is 'political' (10), which are mainly politicians with a range of stances from the Greens and Labor to more conservative politicians like Bob Katter and George Christensen. Christensen has been associated with spreading disinformation about vaccinations via his social media accounts (Williams, 2021). Within this are two government agencies,

[33] Tony Abbott is a previous Australian LNP prime minister who is known for his scepticm towards the threat of climate change, and for his repeals to climate-related policy (Hudson, 2017).

including the federal agency for managing the Great Barrier Reef, the Great Barrier Reef Marine Park Authority (GBRMPA), and a local council. The remaining actors have been classified as 'community' (3) representing grassroots groups that do not meet the criteria of the other categories, and two are unknown.

Focusing on the top 10 in the list, the most central actor is the 'Fight for Our Reef' page. This movement has a long association with Great Barrier Reef protection campaigning. In its previous form it was 'Fight for the Reef' – a partnership between the Australian Marine Conservation Society (AMCS) and the World Wildlife Fund (WWF) that formed in 2012 in response to a previous 'in danger' recommendation (Foxwell-Norton & Lester, 2017; WWF, 2018)[34]. However, it seems the recent campaign activities are being led by the AMCS (AMCS, 2022). In second position, the centrality of the 'Federal ICAC Now !!!' Facebook group is perhaps unexpected in this environmental context, but it can be linked to a 'federal government corruption' and 'politics over protection' narratives that were later detected in the framing analysis. ICAC is the Independent Commission Against Corruption, which is responsible for "fighting corruption in the NSW public sector" (NSW Independent Commission Against Corruption, 2019) – it does not currently exist at the federal government level. The title of this group implies that an anti-corruption watchdog is required for federal politics. Looking at the information this Facebook group shared via URLs, its presence in the data collection relates to its view that the government lobbied against the 'in danger' listing, with the group sharing *The Guardian* story about how the Coalition believes it has "the numbers" to stop the listing (Table 7.9, number 1). However, the strongest edge relates to the federal government allowing the Great Barrier Reef Foundation to receive the COVID-induced Jobseeker payments (Table 7.9, number 10). The context here relates to an ongoing corruption narrative as the federal government faced heavy criticism in 2018 after awarding the same Great Barrier Reef-focused charity $443 million without following the grant-awarding process (Australian National Audit Office, 2019). This thread was also seen across YouTube and Twitter.

[34] Of note, the original campaign to advocate for the protection of the Great Barrier Reef against industry interests began in 1967 and was called 'Save the Reef' (Lloyd et al., 2016; Foxwell-Norton & Lester, 2017).

The strong presence of two climate change advocacy groups – 'Climate Action Australia' and 'Climate Action Launceston' – shows how the protection of the GBR is strongly connected to the broader issue of climate change and Australian climate change policy. This theme is reflected throughout the data for all networks. 'Great Barrier Reef Legacy', 'Reef Ecologic' and 'Master Reef Guides' are all groups that are actively involved in conducting Reef protection work within the World Heritage area in various forms, with the latter being associated with GBRMPA, the Association of Marine Park Tourism Operators and Tourism and Events QLD (GBRMPA, 2022b).

Table 7.4

Top 100 Facebook Spaces by Degree

	Facebook space	Degree	Type	Group	Actor type
1	Fight For Our Reef	36	Page	115	Advocacy
2	Federal ICAC Now !!!	31	Group	135	Advocacy
3	Great Barrier Reef Legacy	30	Page	115	Advocacy
4	Climate Action Australia	25	Group	831	Advocacy
5	Guardian Australia	24	Page	115	Media mainstream news
6	Sky News Australia	22	Page	372	Media mainstream news
7	Climate Action Launceston	22	Group	115	Advocacy
8	Australian Marine Conservation Society	21	Page	115	Advocacy
9	Reef Ecologic	21	Page	137	Industry
10	Master Reef Guides	20	Page	450	Advocacy
11	Movies Change People	18	Page	1212	Advocacy
12	Iowa Climate Science Education	18	Page	1499	Advocacy
13	Senator Peter Whish-Wilson	17	Page	115	Political
14	The Bulletin	16	Page	115	Media alternative news
15	The National Tribune	16	Page	1317	Media alternative news
16	Great Barrier Reef Foundation	15	Page	831	Industry
17	Australian Greens politics, news and discussion	15	Group	268	Advocacy
18	Fridays For Future Greta Thunberg #Climatestrike #FFF	15	Group	135	Advocacy
19	Protest Australia - Australians for Change	15	Page	135	Advocacy
20	Rise Up for Climate Change Action	15	Page	137	Advocacy
21	Lady Elliot Island Eco Resort	13	Page	450	Industry
22	Tony Abbott's Support Page	13	Page	372	Advocacy
23	The Greens Little Bag of Stupidity	13	Page	393	Advocacy
24	Cairns Post	13	Page	242	Media mainstream news
25	Raving Inner-City Lunatics	13	Group	115	Advocacy
26	Australian Climate Sceptics Group	12	Group	178	Advocacy
27	Coral Sea Foundation	12	Page	162	Advocacy
28	NQ Dry Tropics NRM	12	Page	963	Industry

29	Divers Den	12	Page	258	Industry
30	Calypso Reef Cruises	12	Page	418	Industry
31	InQueensland	12	Page	563	Industry
32	Great Barrier Reef Marine Park	11	Page	146	Political
33	Lady Musgrave Experience	11	Page	42	Industry
34	We Loathe Dutton & Morrison	11	Group	135	Advocacy
35	I'll stand by Tony Abbott	11	Page	372	Advocacy
36	Red Cat Adventures	11	Page	294	Industry
37	Citizens of the Great Barrier Reef	11	Page	146	Advocacy
38	Great Barrier Reef Dive Industry Staff	11	Group	115	Industry
39	Senator Sarah Hanson-Young	10	Page	115	Political
40	Larissa Waters	10	Page	115	Political
41	Green Shirts Movement QLD	10	Page	393	Advocacy
42	Explore Tropical North Queensland	10	Page	41	Industry
43	National Times	10	Page	179	Media alternative news
44	The Fiberal Party of Australia - Lies & Misdemeanours	10	Page	137	Advocacy
45	EPBC (Environment Protection & Biodiversity Conservation) Referral Notices	10	Page	137	Community
46	MarineBio.org	10	Group	115	Advocacy
47	Flora 4 Fauna - Australia	10	Page	137	Advocacy
48	LEAN Townsville - Labor Environment Action Network	10	Page	135	Advocacy
49	George Christensen	9	Page	393	Political
50	The Australian	9	Page	372	Media mainstream news
51	WION	9	Page	50	Media mainstream news
52	Ocean Rafting	9	Page	450	Industry
53	Cassowary Coast Regional Council	9	Page	152	Political
54	Connect 2 wildlife 4 environment	9	Page	115	Advocacy
55	Reef Restoration Foundation	9	Page	146	Advocacy
56	7NEWS Townsville	9	Page	488	Media mainstream news
57	7NEWS Cairns	9	Page	488	Media mainstream news
58	Whitsunday Chat*	9	Group	460	Community
59	7NEWS Central Queensland	9	Page	488	Media mainstream news
60	The Conversation	8	Page	137	Media alternative news
61	The Climate Council	8	Page	135	Advocacy
62	7NEWS Brisbane	8	Page	488	Media mainstream news
63	Tangaroa Blue	8	Page	115	Advocacy
64	TravelOnline.com	8	Page	339	Industry
65	LNP - THE GREAT AUSTRALIAN MISTAKE	8	Group	135	Advocacy
66	Coral Sea Marina	8	Page	259	Industry
67	Wake Up Aussies & Stay Safe	8	Page	372	Advocacy
68	Stop Evil Murdoch's Monopoly	8	Group	135	Advocacy
69	Concerned, unquiet Australians	8	Group	135	Advocacy
70	7NEWS Mackay	8	Page	488	Media mainstream news

71	Tourism Whitsundays	8	Page	488	Industry
72	7NEWS Wide Bay	8	Page	488	Media mainstream news
73	Classic Hits 4CA	8	Page	115	Media mainstream news
74	Ëè≤ËèØÊñ∞ËÅû newsinph	8	Page	305	Media alternative news
75	Yours choice & offers	8	Page	50	Media alternative news
76	Visit Queensland, Australia	7	Page	9	Industry
77	Back 2 Basics Adventures	7	Page	26	Industry
78	Climate change is natural	7	Page	178	Advocacy
79	Meaghan Scanlon MP	7	Page	135	Political
80	sea turtles lovers	7	Group	46	Advocacy
81	The Sydney Morning Herald	7	Page	378	Media mainstream news
82	Southern Great Barrier Reef	7	Page	88	Industry
83	1 Million Women	7	Page	86	Advocacy
84	1,000,000 Strong Against The Liberal National Party	7	Group	135	Advocacy
85	Whitsundays Chat*	7	Group	460	Community
86	Property Rights Australia	7	Page	372	Advocacy
87	Reef HQ Great Barrier Reef Aquarium	7	Page	234	Industry
88	Daniel Andrews for PM	7	Group	135	Advocacy
89	Terrain NRM	7	Page	546	Industry
90	Yahoo News Australia	7	Page	268	Media mainstream news
91	Blue Mountains Political Forum	7	Group	831	Advocacy
92	Cairns Local News	7	Page	115	Media mainstream news
93	Reef Magic Cruises	7	Page	595	Industry
94	Global Marine Conservation	7	Group	115	Advocacy
95	Capricorn Conservation Council	7	Page	135	Advocacy
96	Townsville Greens	7	Page	115	Political
97	Ôº¨ ÔºØ Ôº≥ Ôº¥ Ôº≥ ÔºØ Ôºµ Ôº¨	7	Page	1296	Unknown
98	Wonder how liveable is Kuala Lumpur?	7	Page	115	Unknown
99	Mackay Local News	7	Page	1377	Media mainstream news
100	Katter's Australian Party	6	Page	372	Political

Note. The top 100 actors for Facebook spaces were defined in terms of 'degree'. This table also identifies if the Facebook space is a page or a group ('type'), the modularity class it belongs to ('group') and the type of actor. Media actors are highlighted in yellow.

* While similarly named, 'Whitsunday Chat' and 'Whitsundays Chat' are two different spaces.

7.2.3 Which news media actors received the most attention?

The top 10 news media actors were isolated from the list and are shown in Table 7.5. All these actors are Facebook pages (nil are Facebook groups). The table also shows their group (modularity class), their media type classification, and their political stance. This stance was coded by using Media Bias Fact Checker (MBFC) (Chapter

4). The dominance of *The Guardian Australia* and *Sky News Australia* is interesting in the context of the extreme difference in political stance and environmental attitudes shared by these two mainstream news outlets. Further, its significant noting *The Guardian's* dominance in the Twitter results (Chapter 5) and *Sky News Australia's* super-node status in the YouTube results (Chapter 6). As previously stated, both outlets circulated the most GBR-related content of any media node throughout the data collection period with *The Guardian Australia* publishing 31 pieces of content and *Sky News Australia* 25 pieces in the six-week period (Appendix E).

There are three News Corp-owned outlets in the top 10 list: *Sky News Australia*, the national daily *The Australian* and the *Cairns Post*, which is the local paper for one of the largest GBR tourism hubs (GBRMPA, 2022c). *The Bulletin* and *The National Tribune* are independent outlets. They are not included in MBFC's database, but further research shows that *The Bulletin* is actually the '*Auspoll Bulletin*' and based in Western Australia, saying on its website: "a trusted news service that reports the truth and the stories the Murdoch press wont [sic]" (The Auspoll Bulletin, 2021). A high-level look at the content shows it is extremely critical of the federal government. *The National Tribune* is based in southern Queensland, and its website advocates for greater transparency and access to information that is "free from encroaching corporate, ideological or any other interests/influences" (The National Tribune Australia, 2021). The *National Times* is another independent outlet that says publishes its own original content as well as Australian and international news articles (The National Times, 2022). It publishes these stories directly to Facebook, rather than linking to a website. As noted in Chapter 6, *WION* stands for 'World Is One News' is based in New Delhi, India, and says it examines, "global issues with in-depth analysis" (WION, 2022). MBFC lists the outlet as 'least biased', although it was found in Chapter 6 that this outlet positioned its coverage in 'conflict and strategy' terms. Commercial television news station *7News* features strongly, with two local stations' Facebook pages in the top 10, but a total of six Facebook pages in the top 100 reflecting the relevance of this issue to its local audience in the GBR catchment area.

Of these top 10 media actors, 70 per cent are mainstream news outlets, showing that while there is a presence from other media actors, mainstream media still has dominance, especially noting the centrality of *The Guardian Australia* and *Sky News Australia*, which both have substantially higher degree scores than the other outlets.

Table 7.5

Top 10 Media Outlets by Facebook Space and Degree

	Facebook space	Degree	Group	Media type	Political stance	About
1	Guardian Australia	24	115	Media mainstream news	Left-Centre	All the latest news, comment, culture and sport from Guardian Australia: theguardian.com/au
2	Sky News Australia	22	372	Media mainstream news	Right	Real news, honest views. Stream Sky News Australia at http://SkyNews.com.au/Flash. Watch on Foxtel, Sky News Regional or listen live on iHeartRadio.
3	The Bulletin	16	115	Media alternative news	Data not available	Welcome to the Auspol Bulletin , a trusted news service that reports the truth and the stories the Murdoch press won't.
4	The National Tribune	16	1317	Media alternative news	Data not available	Based in Toowoomba, The National Tribune provides 24/7 free live coverage of important events and developments in Australia and the Pacific region. Learn more at https://www.nationaltribune.com.au/about-us/
5	Cairns Post	13	242	Media mainstream news	Data not available	www.cairnspost.com.au, with Cairns Post in print, gives you the latest news, photos and information. Twitter: @TheCairnsPost. Instagram: @thecairnspost. See our latest subscription officers: www.cairnspost.com.au/subscribe
6	National Times	10	179	Media alternative news	Data not available	The National Times is a 5th Estate news and current affairs platform posting it's own 'Original' content as well as Australian and International News articles. The National Times reserves the right to delete any abusive or insulting comments
7	The Australian	9	372	Media mainstream news	Right-Centre	Follow us on Instagram: https://www.instagram.com/the.australian/ Follow us on LinkedIn: https://www.linkedin.com/company/the-australian/ Go directly to our website here: https://www.theaustralian.com.au/
8	WION	9	50	Media mainstream news	Least Biased	WION | World Is One Welcome to India's first global news network. We present global stories with an Indian perspective. Download App - https://bit.ly/39tJwub
9	7NEWS Townsville	9	488	Media mainstream news	Right-Centre	7NEWS Townsville brings you the latest in local news, sport and weather weeknights at 6pm. We want your story. Email: newstsv@seven.com.au
10	7NEWS Cairns	9	488	Media mainstream news	Right-Centre	7NEWS Cairns brings you the latest in local news, sport and weather weeknights at 6pm. We want your story. Email: newscns@seven.com.au.

Note. This table includes the group the actor belongs to, media type classification, political stance, and a description from the 'About' section of their pages.

Top 100 domains

The top 100 domains are shown in Table 7.6 using the Facebook spaces and domains dataset. Media actors are highlighted in yellow. The Facebook domain has been segmented from the top 100 list due to it being the platform in question, though is further discussed below.

Table 7.6

Top 100 Actors by Domain

	Domain	Indegree	Group	Actor type
	facebook.com	1269	185	Platform
1	theguardian.com	200	188	Media mainstream news
2	youtube.com	113	327	Platform
3	abc.net.au	69	192	Media mainstream news
4	theconversation.com	29	188	Media alternative news
5	smh.com.au	25	188	Media mainstream news
6	thenewdaily.com.au	22	188	Media alternative news
7	theaustralian.com.au	21	212	Media mainstream news
8	bbc.co.uk	20	367	Media mainstream news
9	sbs.com.au	19	188	Media mainstream news
10	marineconservation.org.au	17	346	Advocacy
11	7news.com.au	16	234	Media mainstream news
12	afr.com	16	212	Media mainstream news
13	sciencemag.org	16	204	Media alternative news
14	advanceaustralia.org.au	15	192	Advocacy
15	theage.com.au	13	188	Media mainstream news
16	johnmenadue.com	13	188	Media alternative news
17	theaimn.com	13	188	Media alternative news
18	earth.org	13	387	Media alternative news
19	change.org	12	327	Advocacy
20	bloomberg.com	11	226	Media mainstream news
21	wattsupwiththat.com	11	192	Media alternative news
22	commondreams.org	11	367	Media alternative news
23	therainforestsite.greatergood.com	11	346	Advocacy
24	msn.com	10	343	Media mainstream news
25	businessinsider.com	10	296	Media mainstream news
26	couriermail.com.au	9	212	Media mainstream news
27	news.mongabay.com	8	188	Media alternative news
28	greens.org.au	8	188	Political
29	nytimes.com	8	211	Media mainstream news
30	news.com.au	8	188	Media mainstream news
31	cbc.ca	8	223	Media mainstream news
32	imgflip.com	8	188	Service

33	action.hsi.org.au	8	346	Advocacy
34	nbcnews.com	7	230	Media mainstream news
35	9news.com.au	7	214	Media mainstream news
36	spectator.com.au	7	212	Media mainstream news
37	scmp.com	7	216	Media mainstream news
38	cbsnews.com	7	203	Media mainstream news
39	cnn.com	7	343	Media mainstream news
40	queenslandconservation.org.au	7	346	Advocacy
41	skynews.com.au	6	185	Media mainstream news
42	au.news.yahoo.com	6	201	Media mainstream news
43	bbc.com	6	327	Media mainstream news
44	thegwpf.com	6	192	Advocacy
45	washingtonpost.com	6	206	Media mainstream news
46	canberratimes.com.au	6	188	Media mainstream news
47	theepochtimes.com	5	212	Media alternative news
48	ecowatch.com	5	367	Media alternative news
49	news.trust.org	5	192	Advocacy
50	richardsonpost.com	5	199	Media alternative news
51	wired.com	5	318	Media mainstream news
52	shortstorytown.com	5	380	Community
53	journals.aom.org	5	188	Industry
54	cairnslocalnews.com.au	4	288	Media alternative news
55	brisbanetimes.com.au	4	212	Media mainstream news
56	local10.com	4	97	Media mainstream news
57	rappler.com	4	187	Media alternative news
58	smithsonianmag.com	4	218	Media alternative news
59	rigobertotiglao.com	4	190	Media alternative news
60	livekindly.co	4	197	Media alternative news
61	seashepherdglobal.org	4	198	Advocacy
62	greenpeace.org.au	4	188	Advocacy
63	womensagenda.com.au	4	313	Media alternative news
64	mailchimp.com	4	338	Service
65	concreteplayground.com	4	376	Media alternative news
66	truenaturefoundation.org	4	327	Advocacy
67	infotel.ca	4	461	Media alternative news
68	survey.confirmit.com.au	4	343	Service
69	eventbrite.com	4	539	Service
70	climateactionaustralia.wordpress.com	3	313	Advocacy
71	tropicalnorthqueensland.org.au	3	209	Industry
72	timesofindia.indiatimes.com	3	385	Media mainstream news
73	abcnews.go.com	3	253	Media mainstream news
74	caldronpool.com	3	195	Media alternative news
75	2gb.com	3	212	Media mainstream news

76	newsinfo.inquirer.net	3	343	Media mainstream news
77	australiangeographic.com.au	3	189	Media alternative news
78	iflscience.com	3	194	Media alternative news
79	aljazeera.com	3	188	Media mainstream news
80	news.abs-cbn.com	3	210	Media mainstream news
81	thehill.com	3	188	Media mainstream news
82	intelligentliving.co	3	250	Media alternative news
83	watoday.com.au	3	188	Media mainstream news
84	climatecouncil.org.au	3	188	Advocacy
85	eventbrite.com.au	3	327	Service
86	qldeducationexperiences.org.au	3	524	Industry
87	reneweconomy.com.au	3	188	Media alternative news
88	ntnews.com.au	3	188	Media mainstream news
89	iucn.org	3	226	International
90	time.com	3	188	Media mainstream news
91	hawaiipublicradio.org	3	188	Media mainstream news
92	reuters.com	3	367	Media mainstream news
93	weareexplorers.co	3	185	Media alternative news
94	attenboroughsreef.com	3	389	Media non-news
95	kfyrtv.com	3	470	Media mainstream news
96	aims.gov.au	3	192	Science
97	betootaadvocate.com	2	186	Media alternative news
98	upi.com	2	226	Media mainstream news
99	theshovel.com.au	2	188	Media alternative news
100	tourismwhitsundays.com.au	2	185	Industry

Note. The top 100 actors for domains was defined in terms of 'in degree'. This table also identifies the modularity class it belongs to ('group') and the type of actor ('actor type'). Media actors are highlighted in yellow.

7.2.4 Which actor types were not included, or excluded, from the network?

While there was a more diverse range of actors in the domains data, identifiable Indigenous actors were still missing from the communications space.

7.2.5 Which actors received the most attention?

The domain 'facebook.com' was by far the most dominant in the data. It has a much higher representation due to the internal links created when a native video, photo or status post is made as the content is housed at the facebook.com domain; for example, when Facebook space nodes upload content to their page. This is the case with *Sky News Australia*'s videos – some link to a facebook.com domain, while others

link to the outlet's actual website. Some of the *Sky News Australia* content also contains links to its YouTube channel. Regardless of this potential skew to the data, seventy-three of the top 100 domains shared belong to media outlets. Of this, 44 are mainstream news and 28 are alternative news. Eight of the top 10 overall actors are media outlets, with one of the remaining two being YouTube, noting that media content could also be uploaded here, yet is not identifiable without further analysis. This shows that the content provided by media is attracting the most attention in this network and it is likely that advocacy, industry and political actors identified in Table 7.1, are sharing this information to their Facebook spaces to further their particular GBR-related 'reality' (noting that there could be cases of oppositional sharing).

Independent climate change denial blog *Watts Up With That* is ranked 21 by in-degree (Table 7.6). Also appearing in Chapter 5, this alternative news outlet is ranked by MBFC as "conspiracy-pseudoscience" with "low" factual reporting, which includes "promoting consistent human-influenced climate denialism propaganda" (MBFC, 2022d)[35]. *Watts Up With That* has also featured in other studies as a problematic information source (Bloomfield & Tillery; Dunlap & McCright, 2011; Kirilenko and Stepchenkova's, 2014). It has a total of 6313 interactions (across four posts), which is nearly double the interactions of mainstream news outlets like the *BBC* (3675), and more than double Nine Publishing's *Sydney Morning Herald* and Australian public service TV station *SBS*. Other independent blog-style news outlets that had higher instances of their domain occurring were the *Australian Independent Media Network* (theaimn.com), *Pearls and Irritations Public Policy Journal* (johnmenadue.com), and *Earth.org*. This continues to raise interesting questions about how these independent outlets engage with the more mainstream outlets in terms of amplification and dissemination of information flows.

The other prominent nodes that are non-media actors are made up of a mix of environmental non-government organisations and advocacy groups like AMCS, Sea Shepherd, Global Warming Policy Forum, True Nature Foundation, Climate Council, Climate Action Australia, and Advance Australia (number 14) – an independent lobby group that champions "mainstream Australian values" to "restore the balance from

[35] In the examples MBFC cites of failed fact checks, the information about record high coral cover on the Great Barrier Reef is included, with this information featuring strongly throughout all three platforms (https://mediabiasfactcheck.com/watts-up-with-that/)

"woke politicians and elitist activist groups" (Advance, 2022). Industry organisations include Academy of Management (journals.aom.org), Tourism Tropical North Queensland, Queensland Education Experiences, and Tourism Whitsundays. There are also political actors (greens.org.au), science in the form of AIMS (aims.gov.au), charities or charitable platforms (petition website change.org, therainforestsite.greatergood.com, action.hsi.org.au) and online service providers (imgflip.com, mailchimp.com, survey.confirmit.com.au, eventbrite.com), and a website that publishes short stories (shortstorytown.com). In the mix is also the IUCN (iucn.org), which is the official advisor on nature to the UNESCO World Heritage Committee (IUCN, 2022).

7.2.6 Which news media actors received the most attention?

In terms of media actors, freely available news outlet *The Guardian's* domain has the highest in-degree of all media outlets (200) and its links to its stories have significantly more interactions than the other domains at 24,111. When the overall actor list is condensed to show the top 10 media outlets (Table 7.7) it is evident that it is largely dominated by Australian outlets (aside from the UK's *BBC*). These have a relatively broad range of ownership by Australian standards, noting the country's significant news market concentration (Papandrea & Tiffen, 2016; Lidberg, 2019; Bacon & Jegan, 2020).

In terms of the political stance of these media actors, 50 per cent of top 10 outlets are left-centre, according to MBFC. This includes theguardian.com, Australian public broadcaster abc.net.au, Nine Publishing-owned smh.com.au (*Sydney Morning Herald*), British public service broadcaster bbc.co.uk (*BBC*), and Australian multicultural public broadcaster sbs.com.au (*SBS*). Thirty-per-cent of the outlets are classified as right-centre, including New Corp's *The Australian*, which is Australia's national daily newspaper with most of its content behind a paywall; the *Australian Financial Review*, predominantly a newspaper owned by Nine Publishing; and *7News*, a commercial TV station owned by *Seven West Media*. There was no data available for *The New Daily* on MBFC, but it is an independent free online news provider (The New Daily, 2022). *The Conversation* – a platform featuring academic content that is free to read and republish under creative commons – has been classified as 'least biased', which reflects its aim to "to provide access to quality explanatory journalism for healthy democracy" (The Conversation, 2022).

Table 7.7

Top 10 Domains – Media Only

	Domain name	In-degree	Group	Media actor type	Political stance
1	theguardian.com	200	188	Media mainstream news	Left-Centre
2	abc.net.au	69	192	Media mainstream news	Left-Centre
3	theconversation.com	29	188	Media alternative news	Least Biased
4	smh.com.au	25	188	Media mainstream news	Left-Centre
5	thenewdaily.com.au	22	188	Media alternative news	*Data not available*
6	theaustralian.com.au	21	212	Media mainstream news	Right-Centre
7	bbc.co.uk	20	367	Media mainstream news	Centre-Left
8	sbs.com.au	19	188	Media mainstream news	Left-Centre
9	afr.com	16	212	Media mainstream news	Right-Centre
10	7news.com.au	16	234	Media mainstream news	Right-centre

Note. Top 10 media outlets by domain, including 'in-degree' value, the actor's clustering group, the media actor type and political stance. Facebook.com (1) and youtube.com (3) have been removed as they do not offer any analytical insights in this context.

7.3 PART B – DOMINANT INFORMATION SOURCES AND FRAMES

Network power and networked power

7.3.1 What information received the most attention?

Due to the varied ways to share information on the Facebook platform and in the interests of making comparisons, dominant information sources were evaluated several different ways. To obtain a broad picture, it was necessary to look at information shared via hyperlinks, plus the content directly posted or uploaded to the platform itself to understand the prevalence of information circulated in Facebook's social news media network. Table 7.8 provides an overview about the nature of the content.

Table 7.8

Facebook Data Collection and Information Type Summary

Facebook data collection	
Total number of posts (pages and groups)	4663
Total number of interactions	464,886
Total number of unique Facebook spaces	2430 (1862 pages, 568 groups)
Total number of links (including internal)	4563
Posts without links	100
Post type: “Links” (external)	2354
Post type: “Photos”	1558
Post type: “Native Video”	493
Post type: “Status”	95
Post type: “Video”	87
Post type: “YouTube”	64
Post type: “Live Video Complete”	12
Total number of unique links	3074
Total number of unique domains	619

Note. The top section of this table is repeated from Table 7.1 for ease.

A total of 4563 links were posted and, of these, 3074 were unique. There were a total of 2354 external links. All but 100 of the 4663 posts had a hyperlink included, which captures both internal and external links. An example of an internal link is if a page or group uploaded a video (‘Native Video’) or included an image in the post, while external links are to sources of information outside of Facebook itself, for example, to a news story on another website. This metric is relevant for this study, noting that 51.5% – about half – of the posts contained external links.

Top 30 URLs

The top 30 URLs shared by in-degree are shown in Table 7.9. Media actors are marked in yellow. This data is from the Facebook spaces and URLs dataset and includes the number of incoming ties to the link and the number of total interactions it received. Twenty out of the 30 links (66.6%) are to content from media actors. In terms of the most frequently occurring links, stories from *The Guardian* rank one, two and three, and this source represents 40% of all URLs in the top 30. This could be for a range of reasons, including the fact the content is free to access and *The Guardian* was the leading GBR-focused news content producer over this period.

Table 7.9

Top 30 URLs by In-degree

	URL	In-degree	Total interactions
1	https://www.theguardian.com/environment/2021/jul/21/coalition-believes-it-has-numbers-to-stop-great-barrier-reef-being-listed-as-in-danger	46	4443
2	https://www.theguardian.com/environment/2021/jun/22/great-barrier-reef-should-be-listed-as-in-danger-unesco-recommends	38	4932
3	https://www.theguardian.com/environment/2021/jul/23/world-heritage-committee-agrees-not-to-place-great-barrier-reef-on-in-danger-list	37	1110
4	https://www.youtube.com/watch?v=fL2We8rMC-Y [Team Jaws Australia]	23	31
5	https://www.theguardian.com/environment/2021/jul/14/australia-to-fly-ambassadors-to-great-barrier-reef-ahead-of-in-danger-list-vote	20	1130
6	https://www.theguardian.com/environment/2021/jul/14/fossil-fuel-friends-saudi-arabia-and-bahrain-back-australias-lobbying-on-great-barrier-reef-unesco	18	353
7	https://www.theguardian.com/environment/2021/jul/23/whether-or-not-the-great-barrier-reef-is-listed-as-in-danger-wont-alter-the-fact-it-is-at-risk-from-climate-change	17	504
8	https://www.bbc.co.uk/news/world-australia-57562685	16	2524
9	https://www.abc.net.au/news/2021-07-23/great-barrier-reef-avoids-in-danger-unesco-tag/100319652	16	1591
10	https://www.theguardian.com/environment/2021/jul/30/coalition-criticised-after-great-barrier-reef-foundation-receives-351000-in-jobkeeper-payments	16	687
11	https://www.youtube.com/watch?v=Nu04lo1ofKI [The Incredible GREAT BARRIER REEF | Cinematic Film]	16	32
12	https://www.theguardian.com/environment/2021/jun/23/un-official-rejects-australias-claim-it-was-told-great-barrier-reef-wouldnt-be-listed-as-in-danger	15	1127
13	https://7news.com.au/weather/environment/great-barrier-reef-in-danger-unesco-says-c-3183891	15	149
14	https://www.facebook.com/climatecouncil/photos/a.346044238865509/2360716054064974/	14	459
15	https://www.marineconservation.org.au/actions/world-heritage-committee-draft-decision-in-danger/	14	83
16	https://www.sciencemag.org/news/2021/06/australias-inaction-climate-puts-great-barrier-reef-danger-unesco-report-says	14	77
17	https://www.youtube.com/watch?v=uvUTIW-pG1U [Team Jaws Australia]	14	43
18	https://www.theguardian.com/environment/commentisfree/2021/jul/26/the-great-barrier-reef-is-a-victim-of-climate-change-but-it-could-be-part-of-the-solution	13	347
19	https://earth.org/great-barrier-reef-should-be-listed-as-endangered-un-says/	13	20
20	https://www.advanceaustralia.org.au/new_data_shows_great_barrier_reef_coral_cover_is_at_a_record_high	12	4375
21	https://www.theguardian.com/business/commentisfree/2021/jun/27/from-barnaby-joyce-to-the-great-barrier-reef-coalition-climate-inadequacy-is-on-parade	12	392
22	https://theconversation.com/not-declaring-the-great-barrier-reef-as-in-danger-only-postpones-the-inevitable-164867	12	777
23	https://theaimn.com/the-great-barrier-reef-wars/	12	110
24	https://www.theguardian.com/environment/2021/jul/20/joanna-lumley-and-jason-momoa-join-prominent-group-backing-great-barrier-reef-in-danger-listing	11	2605
25	https://www.theguardian.com/environment/2021/jun/24/great-barrier-reef-labor-calls-on-sussan-ley-to-back-up-claim-unesco-bowed-to-political-pressure	11	694
26	https://www.facebook.com/Discover365au/videos/493390051728087/	10	353
27	https://www.theguardian.com/environment/2021/jul/13/australian-environment-groups-urge-un-to-put-great-barrier-reef-on-in-danger-list	10	222
28	https://www.facebook.com/globalactionagainst107/photos/a.3249070991831156/3249071151831140/	10	226
29	https://theconversation.com/almost-60-coral-species-around-lizard-island-are-missing-and-a-great-barrier-reef-extinction-crisis-could-be-next-163714	9	8484
30	https://www.facebook.com/photo.php?fbid=259639669293916&set=a.192641669327050&type=3	9	6654

Note. Media sources are highlighted in yellow.

Top posts by interactions

Noting Facebook's differing affordances as a platform, it is also relevant to study interactions on posts as an indicator of the dominance of information sources. This means that all content is considered, rather than just the sources that contain hyperlinks, which can be analytically limited in the case of internal links. Table 7.10 shows the top 30 Facebook posts by total interactions.

Table 7.10

The Top 30 Posts in the Global Facebook Spaces-URLs Network by Interactions

	Page Name	Type	Total Interactions	Post message text (first three sentences)
1	Australia.com	Native Video	9,940	Just when you thought your bucket list couldn't get any longer ✍ 😍 Thanks to Mark Fitz Photography for capturing this epic view of Visit Queensland, Australia's Heron Island, Queensland, Australia, located on the Southern Great Barrier Reef.
2	The Conversation	Link	8,212	Researchers found 16% of the island's coral species have not been seen for many years. 😢
3	Australia.com	Native Video	7,969	Who wants to swim with Manta Rays? 🙋 Haylsa & Kyle & Elliot Grafton had this simply unforgettable experience at Lady Elliot Island Eco Resort on the Southern Great Barrier Reef in Visit Queensland, Australia.
4	Love Nature	Native Video	6,189	The crown-of-thorns #starfish is a major cause of coral loss on the Great Barrier Reef of Australia. Thankfully, the Giant Triton #snails have a great appetite for these nature vandalists 🐌
5	Tropic Skincare	Native Video	6,086	BRAND NEW: Ocean Dive Pore-Clearing Serum is the 100% naturally derived serum that dives deep into pores to… 🤓 Unclog them and refine their appearance 🤓 … 10% of profits donated – this will go towards the Reef Restoration Foundation in Cairns, Australia (where Susie grew up) supporting their work creating ocean-based coral nurseries to help regenerate the Great Barrier Reef…
6	Mike Huckabee	Link	5,016	Say, environmental apocalypse fans, remember how we heard that all the coral on the Great Barrier Reef in Australia was dying, and because of that, we were ALL GOING TO DIE!!? Well, the coral cover did drop from the mid-'80s through 2010s, but has since been resurgent, and it's now at a record high.
7	Costa Georgiadis Official	Link	4,886	July 2021 What a month it has been and what a perfect time to take the helm. The Betoota Advocate have paved the way and I am up for this. Ok Chillerz. The status of the Great Barrier Reef has been flip'n like a two up throw…
8	Animal Matters	Link	4,860	"The United Nations on Tuesday warned in a report that the Great Barrier Reef should be designated an endangered World Heritage site...The recommendation comes from UNESCO's World Heritage Committee and cites a deterioration of the world's largest coral reef due to climate change."
9	Tim Faulkner	Native Video	4,279	🐢 How amazing is this?! Researchers say this is the largest aggregation of turtles they've filmed at Raine Island off the tip of Cape York. Drones helped them estimate there were about 64,000 green turtles waiting to nest on the island last December…
10	Katter's Australian Party	Photo	4,208	KAP's Bob Katter has called on the Federal Government to cancel its membership with the United Nations Educational, Scientific and Cultural Organization (UNESCO) which he says has become controlled by the dictatorial Chinese regime. Mr Katter's comments follows a push by a China-chaired UN committee to declare the Great Barrier Reef "in danger". Mr Katter says the move by UNESCO is not related to environmental concerns but a further bullying move by the Chinese regime…

11	Dr Peter Ridd	Photo	3,917	Just letting you know that we have arrived in Canberra in preparation for the High Court hearing tomorrow. The hearing will likely be over by mid-afternoon… Should a scientist with 30 years working on the Great Barrier Reef be able to say that work coming from other reef science organisations had insufficient quality assurance, and was thus not trustworthy?...
12	Advance Australia	Link	3,739	As Peter Ridd said in response: 'tell everybody, especially the children – the Reef is fine. Don't let them scare you with continuous doom and gloom.'
13	The Shovel	Link	3,478	"Australians are sick and tired of all these coloured corals taking over our reef"[36]
14	The Betoota Advocate	Link	3,461	"We blame China for the rest of the world realising that we have ignored scientists for the better part of a decade" said the Environment Minister.
15	The Betoota Advocate	Link	3,437	Sussan Ley has today sneered at the global pressure Australia is facing in regards to our pitiful disregard for the environment.
16	Pauline Hanson's Please Explain	Native Video	3,344	EXPERTS EXPOSE DODGY SCIENCE BEHIND GREAT BARRIER REEF EXTINCTION ALARMISM Many of you would be familiar with former James Cook University Professor Peter Ridd and the persecution he has faced for speaking out about some of the bad science behind some of the more bizarre claims about the health of the Great Barrier Reef. A recent scientific scandal shows how right he was for raising his concerns, with serious allegations of fraud being levelled at some Jame Cook University researchers. It turns out that many of the claims that have been made about the effects of global warming on the Great Barrier Reef and its ecosystem simply cannot be reproduced…
17	Katter's Australian Party	Photo	3,329	We've said it before and we'll say it again: It's time we left China-controlled UNESCO. Bob Katter has previously called on the Federal Government to cancel its membership with the United Nations Educational, Scientific and Cultural Organization (UNESCO) which he says has become controlled by the dictatorial Chinese regime. Mr Katter's comments came after a push by a China-chaired UN committee to declare the Great Barrier Reef "in danger"…
18	Rappler	Link	3,132	#FactCheck: GMA News initially released a graphic that mistakenly used an image of the Great Barrier Reef that has been on the internet since 2014. However, the report on Chinese ships dumping human waste in the West PH Sea was a recent analysis by a US-based expert.
19	George Christensen	Photo	3,009	A UN committee led by Communist China has decided to target Australia claiming the Great Barrier Reef is in danger when in fact the health of the reef is improving. I wonder what environmental assessments Communist China undertook when it built its illegal military islands in the maritime territory of other nations? Story: https://www.theaustralian.com.au/nation/chinaled-ambush-on-health-of-the-great-barrier-reef/news-story/b99813fe30fbc1919325058327980ce6
20	The Juice Media	YouTube	2,935	"Yay the Great Barrier Reef is no longer on the endangered list we fixed it!" - Australien Government Our very first Honest Government Ad (2016) sadly still being relevant in 2021. New HGA coming soon
21	Dr Peter Ridd	Photo	2,893	Reef-scientists often claim that coral bleaching is a new phenomenon that only started in the 1970's due to climate change. But a remarkable new paper published by Tomas Cedhagen, of Aarhus University in Denmark has uncovered a very early lithograph showing bleaching in 1862. Before I go on, the High Court hearing went reasonably well but it is impossible to predict the result which could take three months…
22	Senator Matthew Canavan	Photo	2,777	A new report shows that coral cover in the reef has completely recovered from the cyclone and bleaching events of the last decade. What great news! We can remove all the ridiculous regulations on our farmers now right?

[36] Not relevant as, while relevant to GBR health, analytically limited in the context of this study.

				https://www.theaustralian.com.au/science/great-barrier-reef-gets-a-breather-but-its-not-out-of-climate-danger-yet/news-story/e378a6db3862b836eadafc51c19e084b
23	Ocean Conservation Research - OCR	Native Video	2,766	Eastern shovelnose rays are a species of guitarfish, endemic to the east coast of Australia. Guitarfish are a family of rays (Rhinobatidae), with heads shaped similarly to a guitar, and bodies that resemble a cross between a shark and a ray. Eastern shovelnose rays don't have barbs or stingers like some other rays, and are harmless to people! 🎥: Jacinta Shackleton Videography and Photography
24	Kevin Rudd	Link	2,762	This says everything about Morrison's priorities whether it's climate, the virus or the treatment of women. It's all about political spin to avoid political embarrassment in elections. It's never about scientific fact, substantive policy or measurable effect[37]
25	Bob Katter	Photo	2,671	It's time we left UNESCO - it has been compromised by the Chinese regime!
26	Richard Poon	Photo	2,394	Chinese Embassy: "Fake news! Just wonder their intention this time. Fanning anti-China sentiments for their own selfish interests!" —— Me: For May 2022?
27	The Australian Greens	Photo	2,357	This government is being wilfully ignorant. Ignoring the science. Ignoring that burning coal, oil and gas fuels the climate crisis. Ignoring that the reef is dying on their watch. It's time to kick them out.
28	Australian Geographic	Link	2,335	"You see this huge, dark shape moving towards you and it's very exciting." ❤
29	MARK MY WORD by Mark Lopez	Link	2,300	Told ya Peeps… Former Amba @Bobi Tiglao writes: PETER Anthony Abaya, the brother of the late former president Benigno Simeon "Noynoy" Aquino 3rd's transport and communications secretary Joseph Abaya, should explain his role in transforming the small tech firm Simularity Inc. into a clever generator of fake news against China in its territorial dispute with the Philippines. This is important to us as a nation, as I hope everyone will realize after reading this column… The photo, however, was immediately tracked down by an alert netizen as one appearing in Australia's Daily Mail in 2014 in the Great Barrier Reef in Cairns…
30	Kevin Rudd	Link	2,275	The Barrier Reef-a priceless natural asset and our responsibility to protect. It's being destroyed by climate change & that's before Barnaby the denialist steps in. And Morrison's only worry? Being politically embarrassed because the UN has called him out!

Note. Media actors are marked in yellow and content that is not relevant to this study is highlighted in grey. Due to space constraints, the first three sentences are included, and/or the part that relates to the search query "Great Barrier Reef". The full post text is in Appendix I.

The most engaged with top 30 posts show a high representation of political actors (30%), including former Australian Labor prime minister Kevin Rudd with two posts that are largely critical of the incumbent Liberal-National government. Other political actors include The Australian Greens, who are critical of the government for "ignoring the science" and saying it is fuelling the climate crisis with its dependence on fossil fuels. Right-wing Katter's Australian Party has two posts in the top 30, and party leader Bob Katter has another to himself. These all adopt the 'China is to blame' narrative and call for Australia to leave UNESCO as it has been "compromised by the Chinese

[37] While "Great Barrier Reef" is not in the post text, this was captured in data as the link is to: https://www.theguardian.com/environment/2021/jul/21/coalition-believes-it-has-numbers-to-stop-great-barrier-reef-being-listed-as-in-danger

regime". Fellow conservative politician George Christensen, discussed earlier in this chapter, adopts the same stance, linking to the story broken by *The Australian*: 'China-led ambush on the health of the Great Barrier Reef'. National party deputy leader Senator Matthew Canavan also shares a link to *The Australian's* content in his post, which relates to AIMS' coral cover report. Canavan says the report shows that coral cover has "completely recovered from the cyclone and bleaching events of the last decade". These are sentiments he also shared on News Corp's *Sky News Australia* (Chapter 6).

Ridd also has two posts in the top 30, one I have ruled out for irrelevance to the UNESCO case study (although it is relevant to the uncertain science frame). Ridd is also mentioned specifically by two actors in their post content: conservative thinktank Advance Australia and right-wing politician Pauline Hanson. They are both supportive of the scientist's claims that "the Reef is fine", with Hanson calling it "dodgy science" and "extinction alarmism". In this top 30 list, there is an interplay evident between Australian right-wing politicians, conservative media and thinktanks and sceptical science. The other relevant actors include alternative news outlets *The Conversation*, satirical online publication *The Betoota Advocate*, the *Rappler* and *Juice Media*, with Mike Huckabee representing US right-wing mainstream media, further discussed below.

7.3.2 How was the most dominant information framed?

The top 10 pieces of content in the global Facebook spaces and URLs network were analysed for framing (Table 7.11) This was as per Nisbet's (2009) typology of frames relevant to climate change (Chapter 4).

Table 7.11

The Top 10 Information Sources and Dominant Frames in the Facebook Spaces-URLs Network

	Information source - Post Text	Interactions	Post type	Link in post	Frame
1	Researchers found 16% of the island's coral species have not been seen for many years. 😟	8,212	Link	https://theconversation.com/almost-60-coral-species-around-lizard-island-are-missing-and-a-great-barrier-reef-extinction-crisis-could-be-next-163714	Morality and ethics
2	The crown-of-thorns #starfish is a major cause of coral loss on the Great Barrier Reef of Australia. Thankfully, the Giant Triton #snails have a great appetite for these nature vandalists 🐌	6,189	Native Video	https://www.facebook.com/LoveNatureTV/videos/365049725049604/	Hope or solutions

3	Say, environmental apocalypse fans, remember how we heard that all the coral on the Great Barrier Reef in Australia was dying, and because of that, we were ALL GOING TO DIE!!? Well, the coral cover did drop from the mid-'80s through 2010s, but has since been resurgent, and it's now at a record high.	5,016	Link	https://wattsupwiththat.com/2021/07/25/record-coral-cover-of-great-barrier-reef-shames-climate-alarmists-media/	Scientific and technical uncertainty
4	"The United Nations on Tuesday warned in a report that the Great Barrier Reef should be designated an endangered World Heritage site...The recommendation comes from UNESCO's World Heritage Committee and cites a deterioration of the world's largest coral reef due to climate change."	4,860	Link	https://www.upi.com/Top_News/World-News/2021/06/22/un-australia-great-barrier-reef-endangered/4151624360439/	Public accountability and governance
5	🐢 How amazing is this?! Researchers say this is the largest aggregation of turtles they've filmed at Raine Island off the tip of Cape York. Drones helped them estimate there were about 64,000 green turtles waiting to nest on the island last December. They published research this week in the PLOS ONE scientific journal finding drones were a much easier, safer and more accurate way of surveying turtles than counting them from boats. 📷: Great Barrier Reef Foundation | Queensland Environment Department | ABC Kimberley	4,279	Native Video	https://www.facebook.com/timswildlife/videos/1441052999592826/	Hope or solutions
6	KAP's Bob Katter has called on the Federal Government to cancel its membership with the United Nations Educational, Scientific and Cultural Organization (UNESCO) which he says has become controlled by the dictatorial Chinese regime. Mr Katter's comments follows a push by a China-chaired UN committee to declare the Great Barrier Reef "in danger". Mr Katter says the move by UNESCO is not related to environmental concerns but a further bullying move by the Chinese regime. "UNESCO has moved to classify one quarter of Australia's oceans endangered, well how come only five years ago the leading world authority on nature, David Attenborough, said the reef was 'the most magical place on earth'," Mr Katter said. "Just last October myself and the other Members of the KAP (Robbie Katter MP, Nick Dametto MP and Shane Knuth MP) went diving on the Great Barrier Reef off Mission Beach, and I would describe it as magnificent. "My office was on the phone just this morning with Daniel McCarthy one of the biggest tourism operators in Cairns; he's been at Lizard Island for two months and he said the areas that were thought to be dead or destroyed two years ago are now thriving." Mr Katter said Australia had to stand up to the bully that is China, and fight this move to classify the Great Barrier Reef as endangered. "China has come after our coal industry, they've halted trade on our beef, grain and wine; well we must say enough is enough," he said. "When are we going to stand up? China is still in control of the Darwin Port; they still have their tentacles in our universities with the Confucius Institutes and they're still in control of our sensitive defence data through the China-owned Global Switch data centre in Sydney. "The Federal Government has made the right noises, but I don't see them acting." #KAP #KAPteam #Australia #UNESCO	4,208	Photo	https://www.facebook.com/photo.php?fbid=3448358863867351&set=a.341426900874914&type=3	Conflict and strategy
7	As Peter Ridd said in response: 'tell everybody, especially the children – the Reef is fine. Don't let them scare you with continuous doom and gloom.'	3,739	Link	https://www.advanceaustralia.org.au/new_data_shows_great_barrier_reef_coral_cover_is_at_a_record_high	Scientific and technical uncertainty
8	"We blame China for the rest of the world realising that we have ignored scientists for the better part of a decade" said the Environment Minister.	3,461	Link	https://www.betootaadvocate.com/headlines/government-horribly-offended-rest-of-world-now-aware-of-how-few-	Public accountability and governance

				fucks-they-give-about-the-reef2/	
9	Sussan Ley has today sneered at the global pressure Australia is facing in regards to our pitiful disregard for the environment.	3,437	Link	https://www.betootaadvocate.com/headlines/haha-fuck-imagine-if-unesco-find-out-about-the-murray-darling-chuckles-environment-minister/	Public accountability and governance
10	EXPERTS EXPOSE DODGY SCIENCE BEHIND GREAT BARRIER REEF EXTINCTION ALARMISM Many of you would be familiar with former James Cook University Professor Peter Ridd and the persecution he has faced for speaking out about some of the bad science behind some of the more bizarre claims about the health of the Great Barrier Reef. A recent scientific scandal shows how right he was for raising his concerns, with serious allegations of fraud being levelled at some Jame Cook University researchers. It turns out that many of the claims that have been made about the effects of global warming on the Great Barrier Reef and its ecosystem simply cannot be reproduced. Something One Nation has been warning about for many years. It's impossible to tell how much damage has been done to Australia's economy and reputation by the outrageous claims spread by these alarmists but hopefully, as evidence of their dodgy science continues to be exposed, over time we can repair some of the harm. #PaulineHanson #OneNationAus #AndrewBolt #PeterRidd #TheGreatBarrierReef	3,344	Native Video	https://www.facebook.com/PaulineHansonAu/videos/548093116316714/	Scientific and technical uncertainty

Note. The posts marked in grey from the previous section have been removed and they do not meet the criteria for analysis. The relevant posts include text in full.

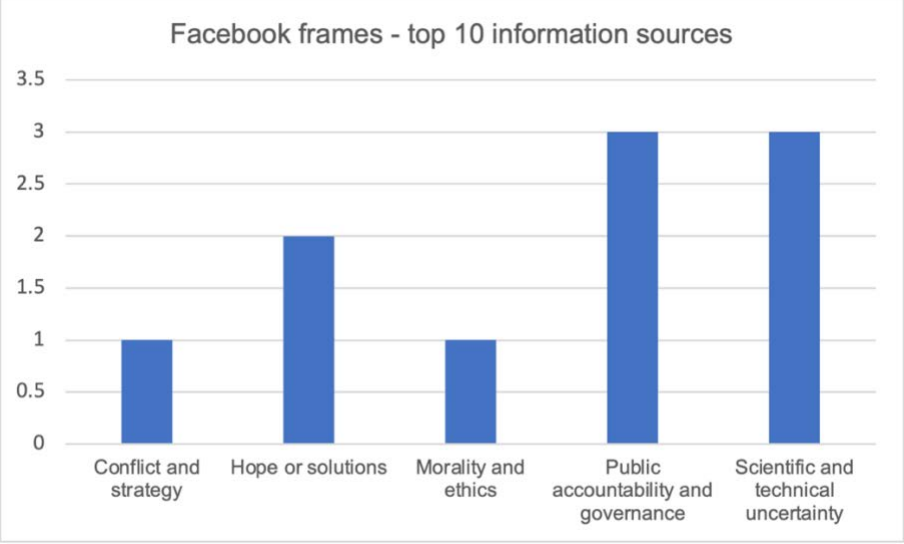

Figure 7.2. The dominant frames from the top 10 information sources in the Facebook spaces-URLs network.

Compared to Twitter and YouTube, there is a much larger diversity of frames in the Facebook top 10 items. It is the first time 'mortality and ethics' from Nisbet's (2009) climate change framing typology has been seen at the global network level. Further, a new frame resulted from this analysis: 'hope or solutions' to reflect the

position that the GBR is under pressure, but there is hope for its future. While 'conflict and strategy' is lower, 'public accountability and governance' remains a salient frame. The 'scientific and technical uncertainty' frame is the strongest it has been across all three global networks. These three instances all relate to Ridd and/or AIMS coral cover report, which was the subject of the scientist's column in *The Australian*. Ridd's column was subsequently republished on *Watts Up With That*, the climate change denial blog that ranks at number 21 in the top domains list in Part A. *Watts Up With That* took the content from behind a paywall to readily accessible and sharable. Mike Huckabee – a conservative US politician and former governor whose Facebook page describes him as "the host of 'Huckabee' on *TBN*, a *Fox News* and *Western Journal* contributor" – shared this content on his Facebook page (Table 7.11, number 3). However, the platform has since put a content warning on the post (Figure 7. 3). This is an example of the social media platforms themselves playing a role in information flows, and can be considered a form of network power. Conservative lobby group Advance Australia shared a link to their blog which uses the results from the AIMS coral cover report and Ridd's assurances "the Reef is fine" to counter "lies" that Queensland industry is destroying the GBR (Table 7.11, number 7; Advance, n.d). One Nation politician Pauline Hansen also invokes truth claims, saying that GBR science is "dodgy" and has damaged the economy, hashtagging *Sky News Australia* commentator Andrew Bolt and Ridd in her post (Table 7.11, number 10).

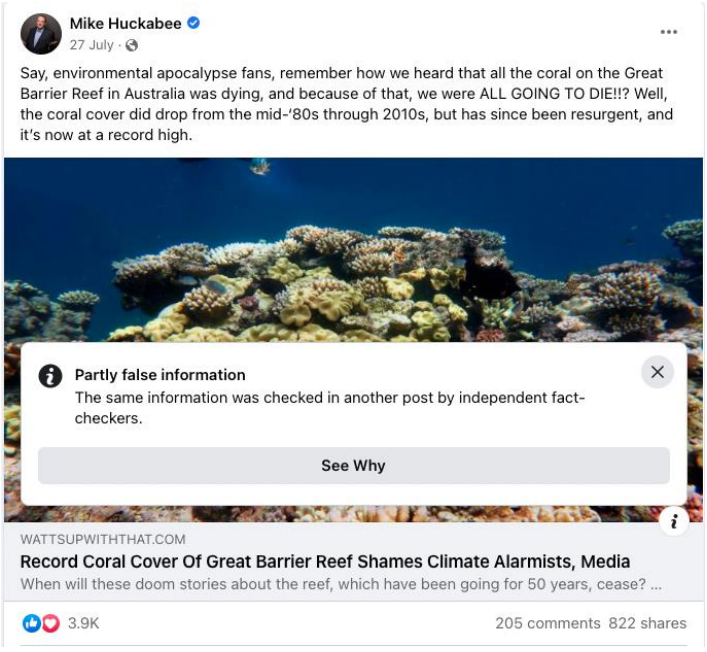

Figure 7.3. This piece of content was number three in the top 10 list, but Facebook hadded a warning to advise it contains 'partly false information'.

7.4 PART C – CONNECTION AND DISCONNECTION

Networked power and network-making power

7.4.1 How does connection and disconnection at the subnetwork level relate to attention, information flows and frames?

Facebook spaces – domains

There is a clear dominant modularity class in this dataset: 188 (coloured green in Figure 7.4 – note: this figure shows domains only). This group includes media actors *The Guardian*, *The Conversation*, the *Sydney Morning Herald*, *The New Daily*, *SBS*, *The Age*, *The Australian Independent Media Network* (theaimn.com), *Pearls and Irritations Public Policy Journal* (johnmenadue.com), *Mongabay* ("Mongabay: News and Inspiration from Nature's Frontline", news.mongabay.com), *news.com.au*, the *Canberra Times*, *Al Jazeera*, *Renew Economy*, the *Northern Territory News*, *The Hill* (US policy and political news site), *WA Today*, *Time Magazine*, and *Hawaii Public Radio*, and *The Shovel*. These are generally left, centre-left and/or independent outlets, except for News Corp-owned *news.com.au*, which Media Bias Fact Check classifies as right-centre, and the *Northern Territory News* (ntnews.com.au), which is not in the MBFC database, but is also owned by News Corp and describes itself as "unconventional, bold, unique and unashamedly Territorian" (NT News, 2021). Also, *The Conversation* and *The Hill* were ranked 'least biased' by MBFC (see also Bruns et al., 2021d; Faris et al., 2017). Although Australian news site *The Shovel* is openly satirical, MBFC says "most stories mock the right" (MBFC, 2020).

The next largest modularity group that is evident in the top 100 actors table is group 212 (coloured orange in Figure 7.4). Members of this cluster that are also prominent media actors by domain include *The Australian*, the *Courier Mail*, the *Australian Financial Review* (AFR), the *Spectator* (Australia), the *Epoch Times*, the *Brisbane Times*, and *2GB Radio*. The first two are owned by News Corp and are considered right-centre by MBFC. The *Spectator* is the Australian version of the British-based right-centre website and magazine (MBFC, 2021b), and Nine Publishing owns the *Brisbane Times*, *2GB* and the AFR . The AFR is right-centre (MBFC, 2022e) and, while the others are not classified by MBFC, I would suggest the *Brisbane Times* is centre-left and Sydney-based talk back radio station *2GB* is conservative due to some of the views expressed by its outspoken presenters (Saxon, 2019). Unlike the others, the *Epoch Times* does not have an Australian base – the Epoch Media Group

publishes across 35 countries according to MBFC (2022f) and its right-wing outlet is connected to "conspiracy theories, pseudoscience, propaganda, fake news, [and] failed fact checks", including pro-Trump conspiracy theories (MBFC, 2022f).

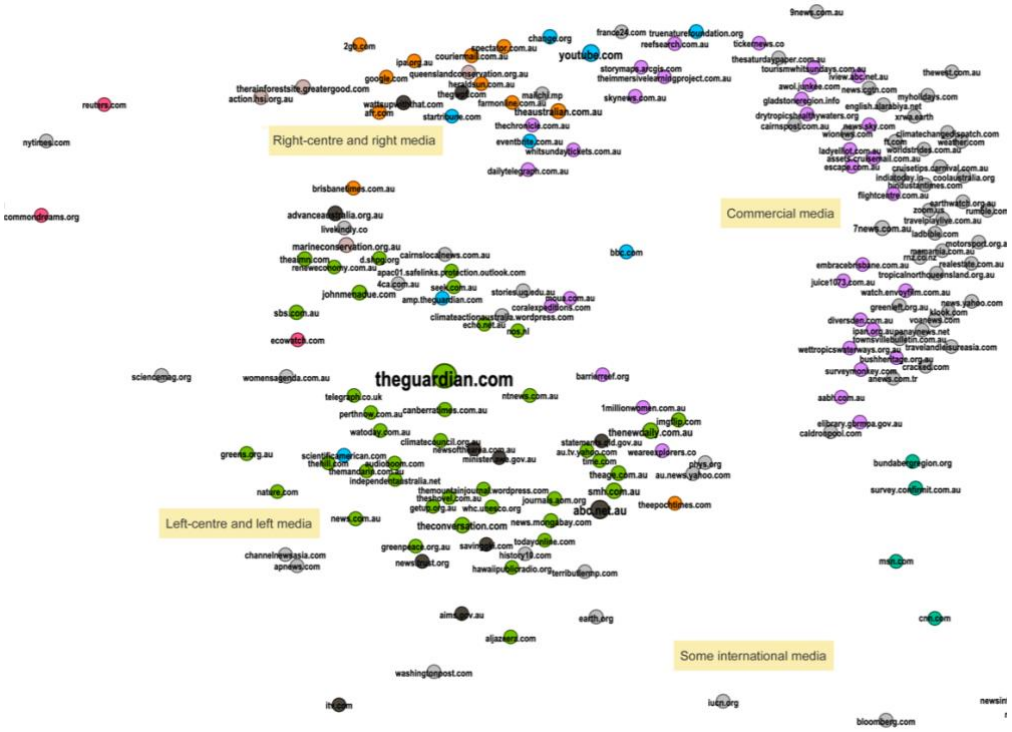

Figure 7.4. Domain nodes by in-degree range 1-1268, which removes Facebook (degree = 1269). Node colour = modularity class, size = in-degree. The labels are indicative and there are exceptions in each group.

Further, examining the positioning of these actors gives an indication of media affinity in the context of information sharing (Figure 7.4). As noted earlier, the cluster of the largely left-centre media outlets can be seen in towards the bottom left in green, while this right and right-centre groups are in a distinctly separate cluster above. The exception is the *Epoch Times*, which despite being classed in the same modularity group, is sitting spatially removed. This could be because it, or the media outlets around it, were interacting on an antagonistic basis, sharing an ideologically-opposed story to counter its framing and narratives. It is interesting to note the other non-media nodes that feature in each cluster. In the left-wing media cluster there are state and federal government department domains, UNESCO and some environmental activist/campaign websites. The right-wing media cluster includes climate change denial blog *Watts Up With That*, the Global Warming Policy Forum (also Net Zero

Watch),[38] and – slightly lower – conservative advocacy group Advance Australia. *ABC News Australia* and some of the government domains, including AIMS, share the same modularity group as these conservative groups, despite being spatially separate. This could be due to the sharing of content antagonistically or strategically, for example, the AIMS domain could appear due to the coral cover report. The cluster to the right of the graph is made up of two modularity classes and, from a media perspective, seems to represent more mainstream commercial outlets' domains, including *7News*, *The West Australian*, *Yahoo News*, and *WION*. The outlets towards the bottom right and along the bottom of the graph appear to be largely international news outlets, including *CNN*, the *Inquirer*, *Manila Standard*, *Bloomberg*, *China Daily* and the *Washington Post*, which is quite near the politically-left cluster.

These relationships, including connections and disconnections, are explored further in Figure 7.5. Unlike the previous visualisation, it includes Facebook spaces and the connections to the domains. Nodes are coloured by type (domains are green, groups are orange and pages are purple) and the strength of the connection is shown by the thickness of the edge. *The Guardian* is an information source heavily shared by climate action groups ('Climate Action Australia', 'Climate Action Launceston', 'Rise Up for Climate Action', 'Climate Crisis Queensland'), plus other advocacy groups like 'We Loathe Dutton & Morrison' and 'Stop Evil Murdoch's Monopoly'. Figure 7.6 shows some of the connections to *The Guardian* (>4 degree). In comparison, *The Australian* and *Sky News Australia* domains have far less incoming ties, and these are from conservative advocacy groups like 'I'll Stand by Tony Abbott' and 'The Greens Little Bag of Stupidity', along with the 'Australian Climate Sceptics Group'. Figure 7.7 shows some of the connections to *The Australian* (>4 degree). An outlier is the 'Australian Greens politics, news and discussion' group, which shared some of *The Australian*'s content antagonistically. As noted earlier, 'Flora 4 Fauna Australia' was the first actor to share *The Australian*'s breaking story to Facebook.

These cluster analyses highlight the role that advocacy groups – either motivated by political stance or attitudes to climate action and policy – play in furthering information that supports their network goals. This is significant noting the dominance

[38] As noted earlier, Net Zero Watch was previously known as the Global Warming Policy Forum and rejects mainstream climate change science (https://www.desmog.com/2021/10/11/climate-science-denial-group-rebrands-as-net-zero-watch/).

of these actors as Facebook spaces in the network, and the centrality of both *Sky News Australia* and *The Guardian* as content shares via their pages (which includes all content, not just external links), and *The Guardian* also as a domain. Further, these clustering patterns are consistent with the media groupings found by Bruns et al., (2021d), which considered media affinity in the context of *The Conversation*.

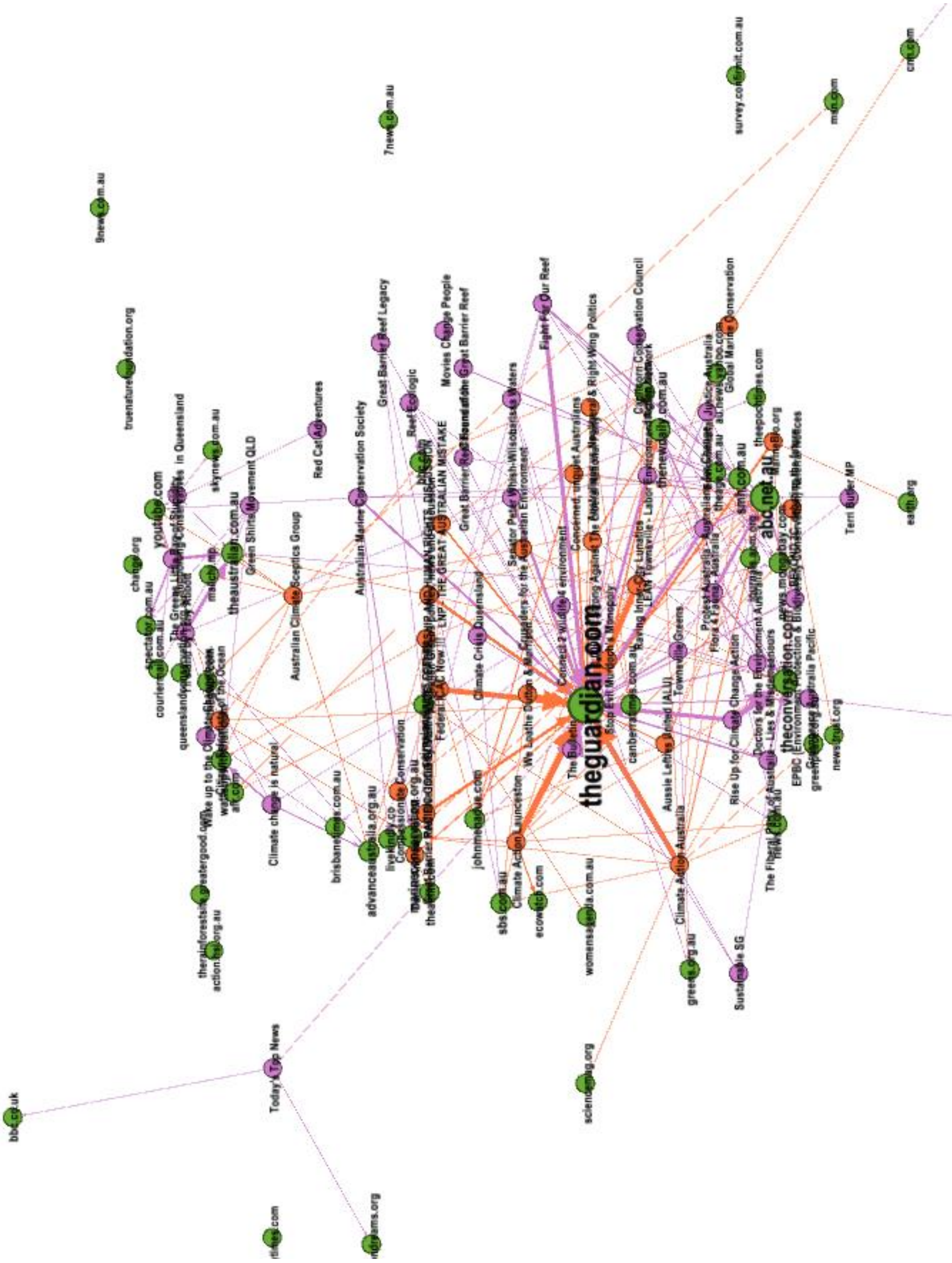

Figure 7.5. Information dynamics for the most attention-getting domains on Facebook. Domains are green, groups are orange and pages are purple. Nodes are sized by in-degree and the graph is filtered to include nodes with a degree >4. The thickness of the edges between each node indicates the strength of the relationship. The Facebook domain is removed.

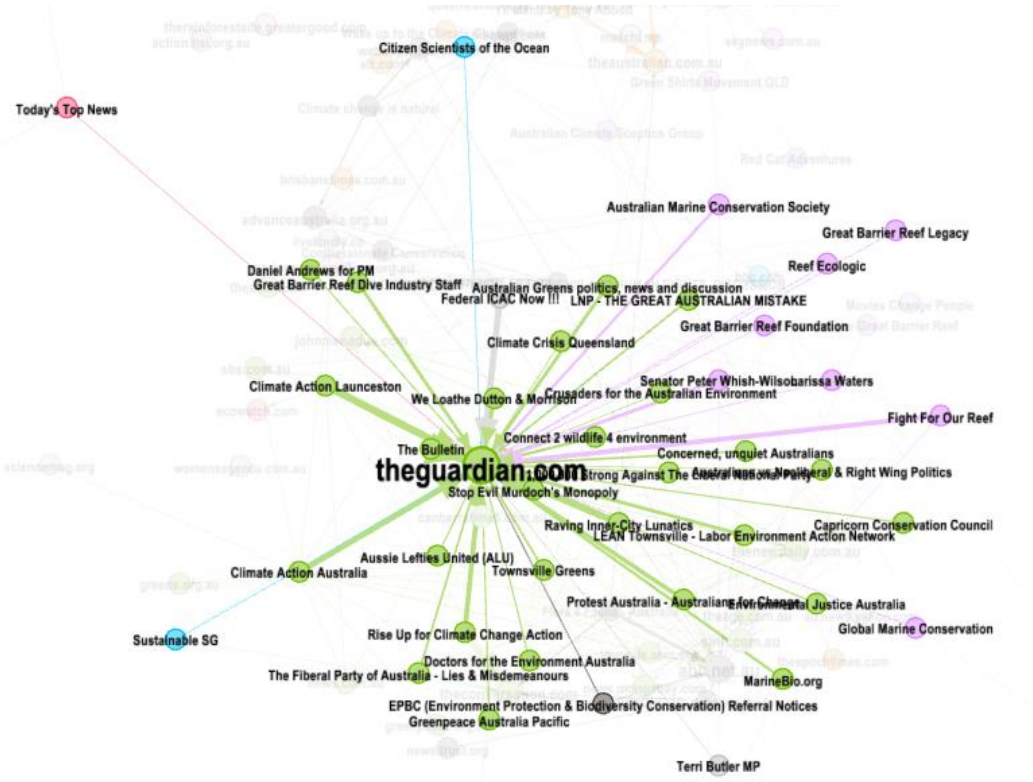

Figure 7.6. Examples of actors who are sharing *The Guardian* domain in their Facebook spaces. Nodes are coloured by modularity, sized by in-degree and the graph is filtered to include nodes with a degree >4. The Facebook domain is removed. Strength of connections is shown by edge thickness.

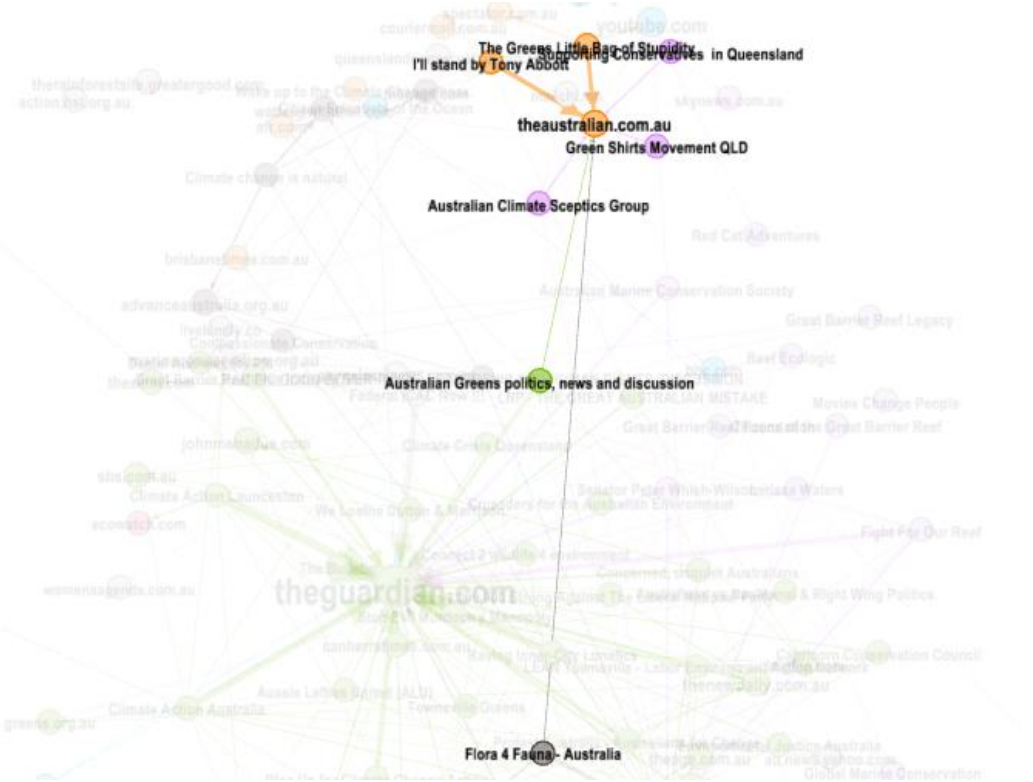

Figure 7.7. Examples of actors who are sharing *The Australian* domain in their Facebook spaces. Nodes are coloured by modularity, sized by in-degree and the graph is filtered to include nodes with a degree >4. The Facebook domain is removed. Strength of connections is shown by edge thickness.

Facebook spaces – URLs

Another way to visualise these relationships is through looking at the information that the most prominent Facebook spaces are sharing in the form of links, which is largely to media information. Figure 7.8 provides an overview of the Facebook spaces and URLs network. The labels have been removed from the graph for clarity, the nodes are coloured by modularity class, and sized by degree. The most striking insight is the comparatively disconnected and separate cluster at the top left. This visualisation reflects the top 100 actors from the Facebook spaces data, with the larger nodes in the main cluster being 'Fight for Our Reef', 'Federal ICAC Now !!!', 'Great Barrier Reef Legacy', 'Climate Action Australia' and *The Guardian*. Yet *Sky News Australia* is removed from the other top actors – it is in the dark grey group on the left. The next visual will zoom in on this cluster to explore the key actors and information sources.

Figure 7.8. Facebook spaces and URLs, node colour by modularity, node size by degree.

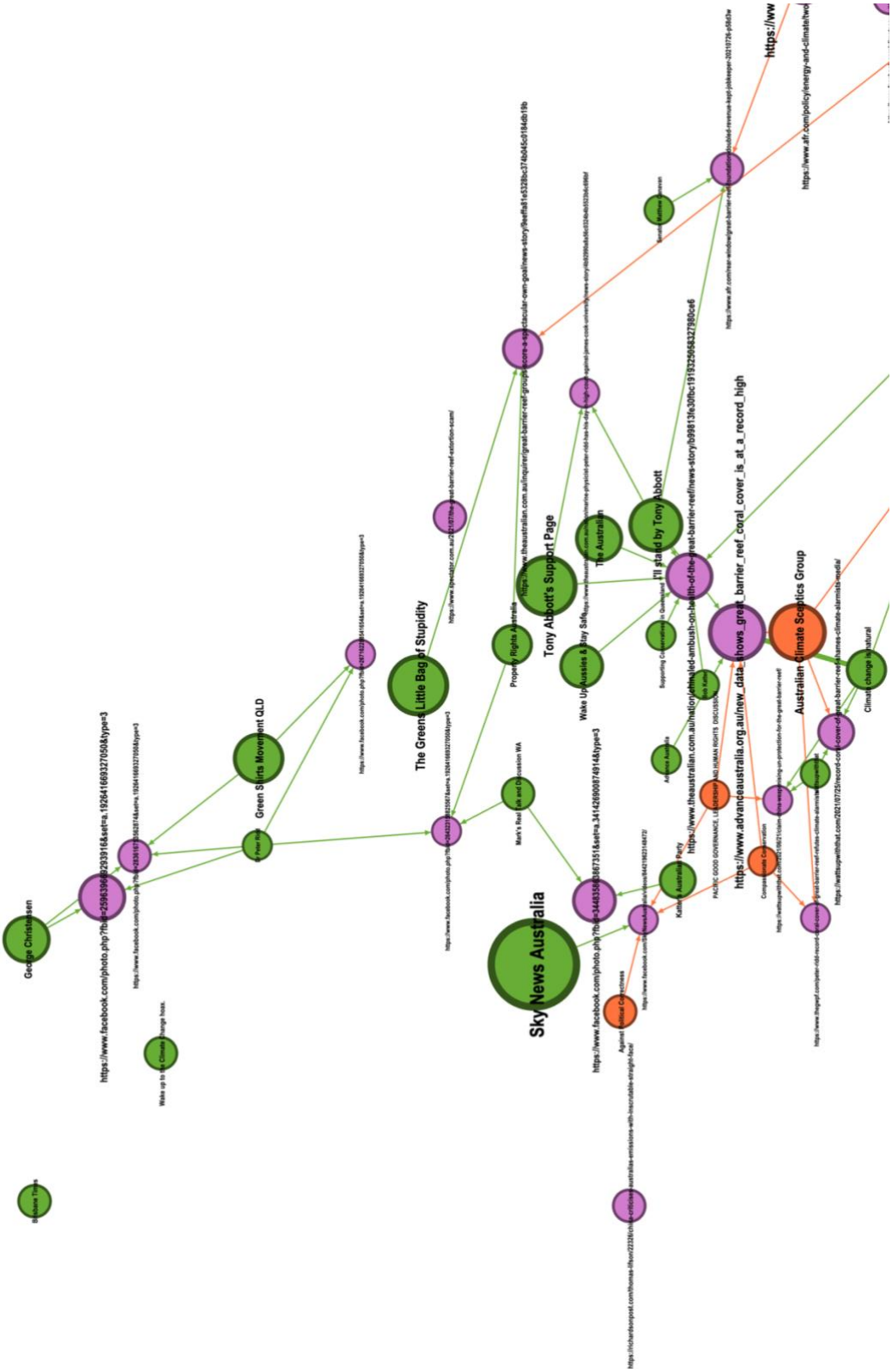

Figure 7.9. Facebook spaces-URLs, close-up of top left of graph. Filtered by a degree range >4, node colour by type (URL = purple, group = orange, page = green), size by degree.

Figure 7.9, takes a closer look at the cluster that was spatially distant from the main group, towards the top left (node colour now reflects node type). By examining the names of Facebook spaces and the URLs shared it is possible to see that this cluster appears ideologically different from the main cluster. Information sources include *Sky News Australia*, *The Australian*, climate sceptics the GWPF, *Watts Up With That*, and the *Spectator* and their associated content that uses AIMS' coral cover report to argue the Reef has recovered. The pages and groups are right-wing politicians Katter's Australia Party, George Christensen, and Senator Matthew Canavan (discussed above); marine geophysicist Peter Ridd; conservative politics advocacy groups (discussed above); and climate scepticism actors like 'Wake up to the Climate change hoax', 'Climate change is natural', and the 'Australian Climate Sceptics Group'. These Facebook spaces are sharing the ideologically-aligned content that draws upon AIMS' coral cover report to further the 'reality' that coral cover is at a record high, climate change alarmists are overreacting, the science is flawed, and argue growth-limiting policy is not needed.

7.5 CONCLUSION

The dominance of the scientific and technical uncertainty frame and use of science information to support certain actors' goals is particularly salient within the Facebook element of the social news media network. The interactions in this network also highlight the networked power of advocacy and political actors in furthering information that reinforces their goals (Figure 7.6; Figure 7.7). Another key finding was the ongoing dominance of *The Guardian* and News Corp as mainstream media actors (Table 7.4) in the context of network-making power, yet they are spatially distant in the network visualisations and their information is being furthered by different actors and in different ways. These information flow dynamics are consistent with Faris et al. (2017) who found an asymmetry between left and right media consumers, with progressive actors more likely to share mainstream sources, while conservatives paid more attention to partisan outlets. The implications of these findings will be further discussed in the next chapter.

Chapter 8: Discussion

> The truth-telling capacities held by science are as much of a product of discursive battles as any other part of society. (Farkas & Schou, 2019, p. 27)

This chapter draws upon the key findings from the results chapters to discuss **how power is asserted and contested in the social news media network in relation to environmental protection.** I have understood power in this 'news-making assemblage' as the ability to attract audience attention (Chapter 3). This could be in the pursuit of profit-making, persuasion, or a mix of both to varying degrees. I have analysed my data according to Castells' four forms of network power (Chapter 4) to consider what actors and content are getting the most attention in the contemporary communication spaces of Twitter (Chapter 5), YouTube (Chapter 6) and Facebook (Chapter 7), and explore how these actors and information are positioning the protection of the Great Barrier Reef. This included examining the informational dynamics across clusters to see if and how these frames are contested. This component of the analysis – Part C – is where 'power over minds' is contested in the form of network-making power. In this exchange, certain networks of actors seek to 'switch' the 'program' of the network. In this case, the program is the 'reality' about the health of the GBR and the actions needed to ensure its ongoing protection. This 'reality' is situated in a broader ongoing discourse about climate change and the values, actions and fundamental changes needed to create a shared and sustainable future. This analysis also considered the interplay of certain actors in creating, furthering and contesting informational flows and frames, including evaluating the centrality of mainstream media in these hybrid and dynamic news-sharing spaces.

This research inquiry finds that power is asserted and contested in the social news media network through the use of attention-getting adversarial[39] framing, the

[39] I use the word 'adversarial' to denote the conflict-provoking and often divisive nature of the three most dominant frames. However, Karlberg (1997) uses 'adversarial frames' to explore the way environmental issues are framed. While Karlberg's term is useful to this work, it is similar to Nisbet's (2009) 'conflict and strategy'. Rather than risking conflating the two, my use of 'adversarial frames' is in its capacity as an umbrella term to group the three most salient frames I have found in this work.

problematic use of science, and the strategic interplay of mainstream media with alternative media outlets, political actors and ideologically-aligned advocates that are furthering information flows and frames in the interests of their network goals. Emerging from this is the finding that mainstream media continue to play a central role in these communication networks in setting the frames and narratives, with this information then disseminated by others to selectively further certain knowledge, 'reality' and interests. There is also evidence to support Konkes and Foxwell-Norton's (2021) argument that science is a social sphere in its own right that can co-create and contribute to mediatised environmental conflict. These findings and implications are discussed in the sections below.

8.1 ADVERSARIAL FRAMES

As recognised in Chapter 3, frames are cultural materials embedded in the process of communication and help to shape meaning (Castells, 2011b). While co-constituted by sender and receiver, frames are a logic used in hybrid media environments to construct social reality and exercise power (Chapter 2; Chapter 3). In the instance of complex environmental issues like climate change and the protection of the GBR, the use of frames by media and other communicative actors in contemporary communication spaces can help shape how an issue is understood and who might engage with it (Nisbet, 2009; Nisbet & Newman, 2015). While differing in salience across Twitter, YouTube and Facebook, the sum of the dominant frames across all three global networks shows that 'public accountability and governance' (11), 'conflict and strategy' (11), and 'scientific and technical uncertainty' (5) were the main lenses used across the six weeks to convey the 'reality' of the GBR's health and the level of action required to ensure its protection.

A commonality of these frames is their adversarial nature, especially compared to the other interpretations available in Nisbet's framing typology for environmental debates (2009). While the full descriptions are available in Appendix D, other options included communicating the mediatised environmental conflict event through a social progress perspective, which foregrounds solving problems or living in harmony with nature; highlighting a middle way, or alternative path between two conflicting or polarised views; or framing the issue in terms of morality and ethics (this occurred once in the global network, see Table 7.11; and once in the cluster analysis, see Table 5.9), or economic opportunity. Instead, the three strongest frames deduced from the

data are adversarial to varying degrees. This approach is consistent with media logic, now understood as hybrid media logics (Chadwick et al., 2016; Chapter 3) to attract audience attention through conflict and drama (Aalberg et al., 2011), particularly to encourage audiences to engage in environmental issues that seem temporally and relationally remote from day-to-day life. In this sense, when the network goal is to achieve attention and a measure of this is the engagement a piece of content receives, informational actors may deliberately or intuitively opt for these more adversarial frames. This was found in recent interviews conducted with GBR catchment-based media professionals, namely that commercial newsrooms in particular are often driven by click-through-rates, which can influence if and how narratives are covered and positioned (Newlands et al., 2021). Further, as the time series graphs from all three networks show, the interest in the Reef as an issue peaked during the initial announcement of the 'in danger' recommendation, and dropped substantially until the WHC's decision created another smaller spike. While it is not possible to determine the exact cause from these data, it is fair to say that, true to hybrid media logics, the health and future of the Reef – and by extension climate change – attracts attention through mediatised environmental conflict.

However, framing is also a way to define the terms of the debate, help to shape public opinion (Nisbet & Newman, 2015), and position 'reality' to meet the goals of certain actors (Strömbäck, 2008). Therefore the use of these frames also offers a window to understanding how 'power over minds' is being asserted about the health and protection of the GBR in digital news-sharing spaces.

The politicisation of the GBR is well-documented by scholars, with some noting it has become the "centrepiece in Australia's climate change politics" (Konkes & Foxwell-Norton, 2021, p. 471) and the prioritisation of mitigating reputational threats has sometimes occurred at the expense of its protection (Foxwell-Norton & Lester, 2017; Newlands, 2019; Morrison et al., 2020; Hughes et al., 2021). This politicisation of the Reef is reflected in the results of this work, including through the frames and stances used to communicate information related to the 'in danger' listing threat. One of the two most dominant frames in all three global networks was 'public accountability and governance', which had two distinct and opposing narratives. Firstly, it was the 'reality' conveyed by the federal government in response to UNESCO's draft 'in danger' listing recommendation: that it had been "blindsided",

was the victim of improper and unfair process and "politics", and the proposed listing was not based on the latest science (DAWE, 2021c; DAWE, 2021d). In the framing analysis, this was the position reflected by *Sky News Australia* (Chapter 6: Table 6.5, number 6, 9).

Shifting the source of the blame to the procedural flaws of the recommendation and adopting a victim role is an attempt by political actors to assert networking-making power by furthering frames that support their programmed goals: to maintain political power. Yet this tactic also directs attention away from the issue at hand: the health of the GBR and whether enough is being done to protect it. This is situated in the broader political context of climate change being the biggest threat to the Reef, which has been acknowledged by the government's scientific reports (Great Barrier Reef Marine Park Authority, 2019), domestic science institutions and the international scientific community (Dixon et al., 2022; Hughes et al., 2017; IPCC, 2022) and recognised by the federal environment minister (Ley, 2021). Yet a potential 'in danger' listing does not bode well politically. Scholars say this status would make approvals for catchment-based fossil fuel developments more challenging, and make it difficult to minimise national climate commitments (Morrison, 2021; Morrison et al., 2020). This is problematic given that Australia's governing institutions and the Australian economy are still heavily committed to fossil fuels, despite their contribution to global warming, with some attributing this dissonance to inadequate climate policy action (Bacon & Jegan, 2020; Chubb, 2012; Holmes & Star, 2018; Tranter & Foxwell-Norton, 2021).

The other key narrative in this frame foregrounded the Australian government's blame shift as a political play. Mainstream media actors furthering this 'reality' included *The Guardian*, *The Washington Post*, and *ABC News*. Specific content included a story from *The Guardian* about UNESCO rejecting Australia's claims about an unfair process (Table 5.6, number 6); *ABC's Media Watch* critiquing the government's blame shift (Table 6.5, number 8), and *The Washington Post* (Table 5.6, number 9) and *UPI* (Table 7.11, number 4) relaying the Australian government's claims the draft recommendation was politically motivated, but foregrounding UNESCO's reasoning. This was also the stance taken by satirical alternative news outlet *The Betoota Advocate*, which had two posts in Facebook's top 10 (Table 7.11, number 8, 9) that both used humour to suggest political actors were not doing enough to protect the Reef. Other actors and content implying politics was being prioritised

over protection included advocacy group GetUp with a petition calling on the WHC to list the GBR as 'in danger', calling for urgent action from the government to "cut climate pollution" (Table 5.6, number 8); and *Difference Frames the World's* salient video with the translation of a Chinese minister criticising Australia's politicisation of the issue (Table 6.5, number 1). Discussing the implications of this type of framing in the US context, Nisbet (2009) notes that it has "outraged and intensified" (p. 20) climate action advocates, leading them to label climate sceptics as "deniers" and attack political opponents (p. 20). Yet for other non-advocates, Nisbet (2009) says the 'public accountability and governance' frame can incite apathy, or even alienation. This is potentially problematic for those seeking to build understanding and "win hearts and minds" (Anders, 2011, p. 8) about the actions and policies needed to protect the GBR.

Another key frame across all three networks was 'conflict and strategy', where the issue was presented as a "power game among elites" (Nisbet & Newman, 2015, p. 328). This attention-getting though often-divisive tactic supports other findings about the polarisation of climate discourse and reporting (Bacon & Jegan, 2020; Holmes & Star, 2018; Roper 2016). There was a main narrative and counter narrative within this, with a couple of additional conflict-centred stances. The main position was the UNESCO 'in danger' recommendation was an attack on Australia by China. This angle was taken by *WION* on YouTube (Table 6.5, number 3, 4) which was explicitly critical of China for "weaponising nature" to target Australia in "vendetta politics" (Table 6.6, number 4). This angle was also consistently pursued by News Corp, which called the recommendation China's "latest shot" in its "victimisation of Australia" (Table 6.5, number 5). The decision not to list the GBR as 'in danger' was presented as a "major loss for the CCP [Chinese Communist Party]" (Table 6.5, number 2), and engaged game tropes like a scorecard. This positioning was also heavily echoed by right-wing politicians, either in *Sky News Australia* interviews, or via the political elites' own social media accounts, for instance Matthew Canavan, Pauline Hansen and Bob Katter's Facebook pages (Table 7.11). This included nods back to News Corp, including hashtagging controversial *Sky News Australia* commentator and *The Australian* opinion columnist Andrew Bolt (Table 7.11, number 10; see also Bacon & Jegan, 2020).

Further, while *The Australian*'s breaking story that positioned the recommendation in the context of 'conflict and strategy' (dominant frame) and 'public

accountability and governance' was not ranked as a top 10 attention-getting information source in any of the global networks, it was in the top 10 list for the Group 2 cluster on Twitter (Table 5.9) and appeared within the top 30 list on Facebook (Table 7.10), and also set the tone for other news reports internationally. Captured in the YouTube data was a video from ABC's *Media Watch* questioning the way some mainstream news outlets had uncritically run with these original frames that focused on the WHC/China conflict and the Australian government's claims of unfair process (Table 6.5, number 8).

The Guardian also engaged 'conflict and strategy' as a frame, but rather than positioning the conflict as an attack by China, it focused on the Australian government's conflict with UNESCO and the strategies and games involved in lobbying other WHC countries for support. Two of these stories were particularly dominant across Twitter: One was about the government "having the numbers" to stop the listing (Table 5.6, number 2), and the other reported the decision not to list the Reef as 'in danger', saying UNESCO's recommendation was "ignored" and the inclusion of an early quote called it a "victory for cynical lobbying" (Table 5.6, number 3). In a much lesser sense, 'conflict and strategy' was also represented in the results by a political-environment group conflict narrative. Examples of this included the 'in danger' recommendation being part of a "global green conspiracy" (Table 6.5, number 10), or environment groups being quoted in opposition to the government, siding with UNESCO (Table 5.6, number 10). As noted earlier, conflict-focused framing reflects hybrid news media logics. While effective at gaining attention in the news-sharing networks, using partisan and divisive tactics in certain conflict angles has the potential to be polarising (Faris et al., 2017), which could be problematic for GBR protection. Though this lens can be empowering by voicing concerns from both sides, an overtly partisan focus on conflict rather than the issue could be delegitimising to international calls for climate action and act as a barrier to productive public discussion about transitioning to sustainable energy sources. Particularly when this call to "partisan social identities" (Levendusky, 2013, p. 567) encourages publics to take sides, or get caught up in distracting side issues while potential threats to the GBR are sidelined.

The third key frame was 'scientific and technical uncertainty'. At a global network level, this frame was the most dominant position on Facebook, yet on YouTube and Twitter it was also important in the sense that information flows

questioning GBR and climate science emerged strongly as counter narratives to pro-environmental protection. This finding emerged in Part C of Chapter 5 and 7 in particular when Castells' most crucial element in his network theory of power was attempted by some actors: network-making power. This is further discussed below as this use of science to attempt to switch the 'reality' of the GBR's health and associated protection proved to be a key way to assert and contest power in digital news-sharing spaces. The frame of scientific and technical uncertainty was represented by the narrative that 'the science' being used to inform GBR policy is flawed or obfuscated by lies (Table 5.6, number 7; Table 7.11, number 3, 7, 10). This included claims that the GBR is actually in "extremely good condition" (Table 6.5, number 7) with the site being the victim of "extinction alarmism" (Table 7.11, number 10).

This well-worn frame and associated tactics of using doubt to stifle climate change awareness, support for change, and the implementation of less anthropocentric policy has been extensively captured by scholars over decades (Jacques, 2006; Ceccarelli, 2011; Dunlap & McCright, 2011; Goldberg & Vandenberg, 2021; Nisbet, 2009; Oreskes & Conway, 2010). The strategic 'manufacturing' of scientific uncertainty aligns with economic goals and logics that support an ongoing social licence for extractive and exploitative industries to operate with minimal government interference, or restriction in growth and profit (Oreskes & Conway, 2010; Ceccarelli, 2011). Namely, if the science is wrong, or the threat is exaggerated, then there is no need to change behaviours or activities. As Jacques (2006) notes: "environmental scepticism defends the structure of dominant social values in world politics, such as the state system, expansive resource exploitation under world capitalism, and a hegemonic and consumptive North…" (p. 95). Hutchins and Lester discuss this value of economic growth at all costs using Anthony Giddens' (2009) term, 'productivism': "a stress upon economic growth as a prime economic value" (Hutchins & Lester, 2015, p. 342). They note that the dominance and political influence of those who champion productivism is secured by the interests of those who seek to benefit the most from this capital, including mining companies, pollution-generating industries, property developers and other exploitative ventures. This of course includes those who mutually gain from being interconnected to this economically-focused network, which includes media and the sphere of science.

Notably, all instances of this frame across the three networks relate to either Ridd or AIMS' coral cover report, or both. In these instances, 'the science' about the Reef's health was selectively framed and subject to both political and hybrid news media logics. The problematic use of science is further discussed below (Section 8.2), including how it is engaged to support the interests of certain actors who "create, tap and steer information flows in ways that suit their goals" (Chadwick et al., 2016, p. 4), which includes furthering their 'realities' about the health of the GBR. Firstly, a limitation must be noted when considering how adversarial frames have been used to assert and contest power in these networks. As highlighted in Chapter 3, this study does not consider other ways that these frames could be furthered, including by the affordances of platforms themselves. As it is out of scope, the framing analysis also does not account for the response of 'produsers' (Bruns, 2008) in these spaces to investigate how power is contested via the acceptance or countering of these positionings. Of course, this would also need to take into account that there are many other factors at play in shaping meaning (Chapter 2).

8.2 PROBLEMATIC USE OF SCIENCE

Another way that power was asserted and contested in the social news media network was via the problematic use of science, which includes its strategic use beyond the 'technical and scientific uncertainty' framing; namely, its mediatisation and politicisation. The AIMS coral cover report was salient across all three platforms and central to the contestation of Great Barrier Reef-related 'reality' in the way its findings were framed and used to support certain actors and their goals and logics. Throughout the social news media network there was an interplay between politics, media (mainstream and alternative), advocacy groups and the sphere of science in an attempt to exercise networked power and network-making power by framing, reframing and furthering scientific information to reinforce or challenge programmed goals.

As discussed in Chapter 1, AIMS' coral cover report was released at the start of the week of the WHC decision (July 19, 2021). Accompanying the report's publication were two media releases: one from the federal environment minister, and another from the science agency itself. The messages of these media releases are largely consistent, saying that coral recovery across the GBR had been widespread due to a respite from weather events, but they have different nuances. The minister's release notes the ability for the GBR to adapt and recover when facing favourable conditions and highlights

how the proposed 'in danger' listing had not been based on the "latest information" (DAWE, 2021d). The AIMS version describes the increase as a "recovery window" and notes there are limits to the GBR's resilience (AIMS, 2021b). It also foregrounds that the high rates of coral cover were largely driven by a coral species that was "fast to grow", but "often the first to go" (AIMS, 2021b). Furthermore, in September 2021, *ABC News* published the outcome of a Freedom of Information (FoI) investigation, which showed the minister's office had pressured AIMS, as its science agency, to speed up the release of the coral cover report ahead of the WHC vote (Slezak, 2021). According to *ABC News'* report, the government also planned a "pre-targeted release" or "leak" of the information to News Corp's *The Australian* and *The Courier Mail*. These informational threads and actor interactions reinforce the politicisation of the GBR's protection (see above; Foxwell-Norton & Konkes, 2018; Morrison et al., 2020), but also highlight the politicisation of the science informing policy. Moreover, by pulling on these threads across the social news media network, it provides useful insights into the interplays involved in the politicisation and mediatisation of science used to inform GBR policy. In this particular case study, this includes how the AIMS coral cover report – a tangible example of 'the science' – was strategically framed, reframed and furthered by certain actors to assert and contest power in the social news media network in pursuit of their goals.

Informational flows about the coral cover report and/or Ridd's interpretation of the GBR's recovery were 'tapped' and 'steered' (Chadwick et al., 2016) in different ways across the three platforms. Yet a common tactic seen across Twitter and Facebook was that ideologically-aligned alternative media actors and certain non-media actors, including advocates and political actors, were able to repurpose and/or amplify content from mainstream media to further messages about the health of the Reef that aligned with their goals. In this sense mainstream media continue to have a central role as information sources and frame-setters in these online spaces, but this information is then co-opted by certain actors for their own means (Section 8.3). YouTube was different in that mainstream news outlet *Sky News Australia* was a super-node in this space and drew upon adversarial framing and countering GBR and climate consensus science to further capitalise on this attention, a finding reflected in other studies (Arsenault & Castells, 2008; Bacon & Jegan, 2020; Copland et al., 2021). In this case study, *Sky News Australia* foregrounded Ridd, a contrarian scientist

associated with the climate sceptic conservative thinktank the IPA (Dunlap & McCright, 2011), who conveyed an alternative scientific 'reality' that echoed the media and advocacy actors' neoliberal productivism views. This 'reality' was then reinforced with conservative political voices that shared the same economic development and free-market values. The interplay of these particular actors, information flows, frames and tactics (Chapters 5-7) are straight from the 'manufacturing' scientific doubt playbook (Ceccarelli, 2011; Dunlap & McCright, 2011; Oreskes & Conway, 2010). This finding is significant and is further discussed later in this section.

The coral cover report's initial release was covered by news organisations, including by *The Australian*, *The Guardian* and *ABC News*, but did not receive significant attention as shown by its absence from the dominant information sources in Chapters 5, 6 and 7. On Friday, July 23, 2021 – the day of the WHC decision – *The Australian* published a column from Ridd, which was headlined, "Science and media doomsayers ignore good news on reef" (Ridd, 2021). This opinion column discussed the report and data as "good news", with the record high result "despite all the doom stories by our reef science and management institutions". It went on to say, "Record coral cover means there was no disaster on the reef. The only disaster is the quality assurance at the science organisations" (Ridd, 2021).

This content was behind a paywall – an act of network power – however, several alternative media outlets known to be climate change scepticism advocates re-published the column, or commentary about the content of the column or the marine geophysicist's views on their online platforms, including *Climatism*, *Watts Up With That*, *ZeroHedge, Climate Change Dispatch*, and *JoNova (joannenova.com.au)*; plus climate scepticism advocacy groups like Net Zero Watch/GWPF and Advance Australia. These links were shared on Twitter and Facebook, which are shown and discussed in Chapters 5 and 7. Ridd was also interviewed on *Sky News Australia*, with the story published to its YouTube channel (Table 6.5, number 7). Within the Twitter and Facebook networks, the informational flows about the GBR being recovered and science being flawed are largely disconnected from the main component in the networks (Figure 5.4; Figure 7.8)[40].

[40] These network visualisations were produced using the same clustering and layout algorithms.

In the case of Twitter, the re-publishing of Ridd's opinion column from *The Australian* on alternative news sites, and subsequent sharing of this content on the social media platform, proved to be a central way for climate change scepticism advocates to contest the otherwise dominant information sources and narratives in this network. Namely, the largest subnetwork (Group 2) was dominated with coral cover report-related information, with claims that the GBR's health is fine and the science is flawed present in 70% of the most dominant sources in this cluster (Table 5.9). The key actors in this group included information sources that have been flagged as problematic by independent outlets like Media Bias Fact Check for the nature of the content, or – in the case of *Climatism* – Twitter exercised network power and banned the account for its problematic information. Some of these alternative media actors are long recognised as "vital" cogs in the "denial machine" (Dunlap & McCright, 2011, p. 153), including *Watts Up With That*, Climateaudit.org[41] and Marc Morano's Climatedepot.com[42], which is heavily supported by US conservative political actors and thinktanks (Dunlap & McCright, 2011). This cluster also included Nationals Senator Matthew Canavan, whose views about the GBR being "fully recovered" and economic-limiting protection measures being unwarranted, were also threaded through Facebook and YouTube and appeared in the most attention-getting content.

While the network visualisation of YouTube showed more of a 'hub and spoke' typology with activity arranged around key information sources (Figure 6.3; Smith et al., 2014), the problematic use of science occurred mainly through *Sky News Australia*, which interviewed Ridd about the coral cover report, yet did not conduct any interviews with other scientists, from AIMS or otherwise[43]. This story was published to its YouTube channel with the title: "Data 'unequivocally' shows Great Barrier Reef is in 'extremely good condition'" (Table 6.6, number 4). The minimal use of scientists in stories is reflected in Bacon and Jegan's (2020) research into four News Corp mastheads, finding that very little attention was paid to climate scientists and academics, who made up just 6% of the sample (p. 71). Those who were quoted

[41] Not in top 10 in Group 2 so not mentioned in Chapter 5, but number 1723 in G2.
[42] As above, number 23 in G2.
[43] It is of course possible that interview requests were made to other scientists, but were declined. However, there is a very limited range of scientific sources engaged with by this outlet (Bacon & Jegan, 2020). Also, climate scientists have refused to engage with *The Australian* in the past, due to its overt climate scepticism (McKight, 2013, p. 225).

included “well-known sceptics or individuals on the fringes of climate science” (p. 73). One of the sources they identify is Ridd, who is positioned as a free speech champion, worthy of exposure, while the vast majority (99%) of scientists who align with the consensus remain absent. *Sky News Australia* also conducted interviews that included mentions of the report, including an interview with Nationals Senator Matthew Canavan where he was critical of the Queensland and Federal government reports that have “the most doomsaying, exaggerated threats about the Reef”, and said “the coral is back to record levels” and “it’s all fine” (Table 6.6, number 9). This finding is again consistent with Bacon and Jegan (2020) who say News Corp is twice as likely to quote a politician than a scientist in a story about climate science (p. 71).

The framing and use of the coral cover report as evidence that the GBR’s health was “fine” and climate change action was not required was also salient on Facebook (Chapter 7). As a domain, aims.gov.au was number 96 in the top domains list (out of 619) showing that the report itself generated interest, which is also evidenced in the top 10 content items. The coral cover report is used in three of these posts to argue that the GBR had recovered. Further, as noted earlier (Figure 7.9), these information flows were largely confined to a subnetwork away from the main network activity, and saw climate change scepticism advocacy actors like the ‘Australian Climate Sceptics Group’, ‘Climate change is natural’, and ‘Supporting Conservatives in Queensland’, along with right-wing politicians Katter’s Australia Party, George Christensen, and Senator Matthew Canavan, sharing information from *The Australian*, *Watts Up With That*, *The Spectator*, GWPF/Net Zero Watch, and the blog of conservative advocacy group Advance Australia, which all touted the recovery of the GBR.

The problematic use of science as outlined in this section is significant for two key reasons in the context of this research. Firstly, through forensically tracking the information flows associated with AIMS’ coral cover report, interactions are made clear between actors that have been identified in existing scholarly work as key agents in ‘manufacturing’ and furthering scientific uncertainty to undermine growth-limiting climate policy (Dunlap & McCright, 2011; Miller & Dinan, 2015; Oreskes & Conway, 2010; Taylor, 2014). This has worked in the United States, but Dunlap and McCright (2011) note that the “denial machine” (p. 144) has spread to other nations with conservative governments and established conservative thinktanks, like Australia and the UK. They document the impact of the Institute of Public Affairs (IPA) on

Australian climate policy, and express concerns for the "globalization of organized climate change denial" and the international impact on constraining the ability of policy-making to deal with "the reality of climate change" (Dunlap & McCright, 2011, p. 156). This study offers an insight into how the actors driving the climate change "denial machine" (p. 144) in Australia are contesting power in these key communication spaces, which is particularly relevant given that scholars have already observed how domestic climate policy has been stifled by such interactions (Chubb, 2012; Holmes & Star, 2018).

Secondly, these findings empirically support Konkes and Foxwell-Norton's (2021) argument that science is the fifth sphere in mediatised environmental conflict due to its ability to enact and engage in power struggles with other spheres of action. This verification is significant because, as noted by the authors, the role of scientists as actors in the mediatisation of science communication contributes to the "vexed polarisation of debate about climate change" (p. 471). This finding also poses important questions about the role of scientists in these polycentric communication spaces. Namely, does this mean that scientists should stay out of public debate altogether to avoid confusion? Or not voice any concerns that run counter to the consensus? As de Melo-Martin and Intemann (2013) highlight, this silencing of dissent could be equally as problematic and damaging, particularly if it limits the opportunity to correct strategic framing and problematic use of science (Holst & Molander, 2017; Driscoll et al., 2020a; Driscoll et al., 2020b). This raises the question about how challenges to scientific information should be addressed in a way that fosters the creation of the best-available science and fit-for-purpose and effective environmental policy (Ceccarelli, 2011; Douglas, 2009). Though equally, if not more pressingly, it calls for public education about science and hybrid media logics and tactics (Chadwick et al., 2016). This would empower embedded members of these news-sharing spaces – the 'produsers' – in the shaping of their knowledge assemblages. This idea is discussed further in Chapter 9.

8.3 INTERPLAY OF MAINSTREAM MEDIA WITH OTHER ACTORS

The dominance of mainstream media actors in relation to alternative news media actors and the interplays with other 'networks of operatives' (Cottle, 2013) embedded in these dynamic information spaces works slightly differently across all three networks. A common thread is the dominance of both *The Guardian* and News Corp-

owned media outlets as information sources, although these information flows are furthered by different actors in different ways to assert and contest power within the social news media network.

An online-only outlet in the Australian context with a number of different spin-off publications including *The Guardian*, *The Guardian Australia* and *Guardian Environment*, this actor's dominance was evident across both Twitter and Facebook, and it was present – albeit far less dominant – in the YouTube network. The attention-getting capacity of *The Guardian* as an information source is shown in Chapters 5 and 7. This mainstream media outlet's key role in the social news media network is highlighted by the attention generated by its embedded journalists and other contributors; its prevalence as an information source in the form of URLs and its domain; and the salience of its frames. This is consistent with findings from Kirilenko and Stepchenkova (2014), Newman (2017), and Mitchell and Roffey-Mitchell (2018). Faris et al. (2017) also identified *The Guardian* as a popular source for progressive 'produsers' (Bruns, 2008) of Twitter in particular, and Facebook.

However, another key mainstream media actor is perhaps equally as central, but the way its information flows unfold presents a far more complex picture in these hybrid news-sharing spaces. This actor is News Corp, which has several different forms of media outlets under its banner from traditional print, to broadcast, to online; though the logics of contemporary communication environments have largely turned these information sources into hybrid resources. For instance, a column that is published in *The Australian's* print newspaper is also posted online behind a paywall, or a segment is aired on *Sky News Australia* and published to YouTube for audiences to access for free. News Corp also promotes its content and actors across platforms to further the reach of its content. For example, it will have a *Sky News Australia* presenter as a columnist in *The Australian*, or the newspaper's environmental editor could be interviewed as a source in a television segment, as seen in Chapter 6 (see also Bacon & Jegan, 2020).

Considering the top 100 actors list on Twitter (Table 5.2), News Corp has seemingly minimal dominance in this digital space. *Sky News Australia* appears at number 82 and – despite having broken the story about the UNESCO recommendation – *The Australian* is not even in the top 100 list, although does rank number 25 in the top 30 domains list. However, through the subnetwork analysis it became clear that

News Corp's information and frames were indeed generating attention within the network, due to the re-publication and amplification by alternative news outlets advocating for reef science and climate change scepticism. These information flows were furthered by other advocate and political actors who shared these views. Crucially, these alternative news outlets received more attention as domains than the mainstream news outlet that originally published the content, yet via these decentralised flows, the News Corp-driven 'reality' still captured attention.

Conversely, News Corp has a more obviously dominant presence within the YouTube element of the social news media network, which is generated from the volume of interactions with the *Sky News Australia* content. In this network it is the most attention-getting actor and information source by far. While a systematic analysis of the video comments was out of scope, anecdotally, many appear to be adversarial, which has been suggested to be part of *Sky News Australia's* digital business strategy and requires further investigation (Bacon & Jegan, 2020; Copland et al., 2021). For instance, the channel has attracted nearly one million additional subscribers in the course of a year: 1.42 million in April 2021 (Copland et al, 2021) compared to 2.37 million in April 2022. This contrasts with the ABC's 1.6 million, which experienced a much smaller increase from its 1.32 million subscribers in April 2021 (Copland et al., 2021). Considering the dynamics of *Sky News Australia's audience* as outlined in Chapter 2, the potential footprint of this mainstream and interconnected media actor is of interest in the context of environmental policy discourses and are further explored in Section 8.4.

On Facebook, the informational authority is less immediately evident due to the affordances of the platform and the available data. Specifically, it would be misleading to look at URLs and domains alone in this network, as *Sky News Australia's* content in particular appears in several different formats, including links to its website, but also to videos on YouTube and content uploaded directly to its page as 'native videos'. Yet the dominance of *Sky News Australia* can be seen by the volume of content it shares to its Facebook page (ranking it on a similar level to *The Guardian*), and via the prevalence of *The Australian's* domain at number 7 on the top 100 actors list (Table 7.6). Also, while it does not have dominance as a URL, its content achieves salience via amplification by ideologically-aligned actors. Namely, posts made by conservative partisan politicians like George Christensen and Matthew Canavan that feature links

to *The Australian's* information received some of the highest engagement levels in the Facebook network (Table 7.10)[44]. This is also the case for Advance Australia and New Corp's *Fox News* contributor Mike Huckabee who link to content that has Ridd's framing of the report, including alternative media actor *Watts Up With That*. These posts are attention-getting, ranking in the top 10 list for engagement (Table 7.11). Of course, another indicator of News Corp's dominance is the point made earlier about other mainstream and alternative news outlets all over the world adopting similar framing, or at least using the Australian government's 'blindsiding' or China's 'victimisation' of Australia as a hook into their reporting.

In summary, mainstream media remain a dominant source of information in the social news media network, especially in the ability to set certain frames, while the steering of information flows relies on the dynamic interplay of embedded actors who channel the framed content to suit their goals. In the case of News Corp in particular, these online information flows are impacted by a range of diverse and decentralised alternative news and partisan actors who are furthering these information sources and frames in ways that make use of the hybrid media logics of the social news network. These findings are consistent with Faris et al. (2017) who studied US politics on Twitter and Facebook and found that there were different traditions and logics associated with left and right-learning media outlets. Namely, that liberal audiences gravitate towards more established media organisations that reflect traditional journalistic norms, while conservatives pay more attention to highly partisan media outlets.

While this interplay is another way that power is asserted and contested in the social news media network, this finding also has broader implications for discussions about media power and regulation. Namely, arguments that Australia's concentrated media ownership is less problematic in the context of decentralised digital platforms (Environment & Communications References Committee, 2021). As these results indicate, there may be a plurality of voices, yet in the context of environmental protection, mainstream media and political elites still play a central role in the contests of 'power over minds'. However, the important question 'to which degree?' cannot be

[44] Some of the URLs in the posts are not visible as they were cut when the text was shortened due to space constraints, but the full text is in Appendix I.

answered in this work, as this would require examination of 'produsers'' (Bruns, 2008) responses to this information. This would help to understand if these attempts to win 'hearts and minds' (Hansen, 2011) are gaining traction to challenge this agenda setting and framing, and if network-making power is being enacted. Regardless, it highlights an important area for further investigation.

8.4 NEWS CORP'S NETWORKED AND NETWORK-MAKING POWER

The finding about News Corp's continued centrality as a media actor is also significant in the context of previous work – both scholarly and non-scholarly – that has examined its power as a multimedia corporate actor, and its role in the politicisation and mediatisation of science; in particular, climate science and policy (Arsenault & Castells, 2008; Bacon, 2013; Bacon & Jegan, 2020; Blaine, 2019; Chubb, 2012; Manne, 2011; McGaur & Lester, 2013; McKnight, 2010; McKnight, 2012; Newlands, 2020). Holmes and Star (2018) say it is not possible to understand climate change communication in Australia without considering the interplay of the fossil fuel industry, politics and mainstream media, stating: "Australia offers a lesson on how a dysfunctional relationship between a country's media, its political culture and its scientific institutions can seriously impede progress on climate action" (p. 153). They note polarisation in media reporting emerged in the early 2000s, with left-wing media accepting the scientific consensus and reporting accordingly on impacts and potential solutions, while some tabloid press and commercial broadcasters either avoided the topic, or have been "stridently hostile" (p. 153). News Corp has been especially complicit in this (Bacon, 2013; Bacon & Jegan, 2020; Holmes & Star, 2018; McKnight, 2010), questioning the science itself and politicising climate change policy.

In particular, Manne notes *The Australian* has been a "tireless defender of the coal industry" (p. 45), has attacked and villainised environmentalists and the Australian Greens, and has "conducted a prolonged and intellectually incoherent campaign against action on climate change, which has undermined the hold in public life of the central values of the Enlightenment, Science and Reason" (p. 113). He goes on to note this has made it difficult for the government to take action on climate change.

Yet News Corp CEO Rupert Murdoch has repeatedly rebuked accusations of 'climate denialists' at his company, most recently in 2019 and 2020 (Bacon & Jegan,

2020. p. 6), and he announced in October 2021 that News Corp supported the Australian Government's pledge to reach net-zero emissions by 2050 (Environment & Communications References Committee, 2021, p. xiii; Mocatta, 2021). However, as noted by McKnight (2012), Murdoch made this same commitment in 2007, which proved to be a fleeting venture, the media company soon returning to its role as a "platform for climate scepticism" (p. 229). Recent studies show that the reporting itself is far less problematic than the opinion columns, with Bacon and Jegan finding in their 2020 study of four News Corp mastheads that two-thirds of the climate-related content was in the format of opinion and, of those, two-thirds presented sceptical views of climate change and the related science. They also found that the content of these opinion pieces was amplified across News Corp's other platforms, including *Sky News Australia*, with these partisan tactics used to drive attention and create "an impression that readers [or audiences] are being mobilised to defend assaults on their ideas and values" (Bacon & Jegan, 2020, p. 43; see also Bacon, 2013; Holmes & Star, 2018; Manne, 2011). As noted earlier, this can be part of selling advertising to specialised markets: "sensationalism sells" (Arsenault & Castells, 2008). Some of these key scepticism-advocating commentators appeared throughout my findings, including Peta Credlin, Andrew Bolt and Chris Kenny.

But how much power does News Corp have? While it controls 70% of the print market (Wright, 2021), has a near monopoly on print-based publications in some states (Bacon & Jegan, 2020) – including the GBR's home of Queensland – and *Sky News Australia* is now available for free on commercial television (Copland et al., 2021); some have questioned its impact in the concentrated market due to the decentralised news-sharing environment offered by online media platforms, including Facebook itself. In a submission to the *Senate Inquiry into Media Diversity in Australia* in 2021, the tech giant said:

> Technology has democratised the sharing of ideas and information. Australians are no longer dependent on a small number of gatekeepers in order to access information; they are able to access information about newsworthy developments from international media publications, freelancers and bloggers, or from direct contact with journalists or newsmakers (Facebook, Submission 50, p. 7, as cited in Environment & Communications References Committee, 2021).

Amongst those who have recently raised concerns about News Corp's impact on Australian policy and democracy are former Labor Prime Minister Kevin Rudd, who was the proponent of the petition that garnered half a million signatures and prompted the Senate Inquiry (Parliament of Australia, 2020). Rudd commented:

> …if you look at the impact of the Murdoch print media operation, it's a bit like this: print seeks to determine and drive the national news agenda on a given day. The electronics—go to radio—bounce their stories each day usually, not always, but usually, out of what's in print. The televisions, who do not have independent journalistic resources to do their own investigative programs much, are also directly influenced by what appears in print... [Then there is] the wash through onto online platforms— ironically Google and Facebook [from] the print origins of the story or the colouring of the story that day. That then completes the picture… [Murdoch] knows that by owning print, even if it no longer delivers profitable revenue lines, he has enormous influence over the nation's future political and policy agenda. That's why he's in the business. (The Hon Kevin Rudd AC, Private capacity, *Committee Hansard*, 19 February 2021, p. 14, as cited in Environment & Communications References Committee, 2021)

Recent interplays with the digital platforms – foregrounded above by both Facebook and Rudd – offer interesting and relevant insights into enacting network, networked and network-making power. News Corp's Facebook pages were amongst the media organisations that were temporarily de-platformed during Facebook's contestation of the Australian government's *News Media and Digital Platforms Mandatory Bargaining Code*, which called for the tech giants to compensate legacy media companies for their content posted on the digital platforms (Bossio et al., 2022; Nicholls, 2020). Flew and Wilding (2021) highlight the politics at play in the lead-up, saying how large digital platforms like Google and Facebook were "pitted" against "the giants of traditional media, most notably Rupert Murdoch's News Corporation" (p. 50). Confidential and seemingly lucrative deals have since been struck between the main players to ensure information flows continue to circulate, including a multi-year deal for News Corp's major Australian publications with both Facebook and Google (Bossio et al., 2022, p. 11). *Sky News Australia* was also subject to a show of network power in August 2021 when YouTube banned the broadcaster from uploading any new content for a week in response to concerns about the News Corp channel circulating

COVID-related misinformation (Houghton, 2021). *Sky News Australia's* response was to delete a series of videos, and returned to being fully operational with little indication from YouTube about what community standards were breached, or if there would be any ongoing monitoring (Taylor, 2021). While these digital platform power tussles exist, the above examples suggest network power over information flows is asserted by the digital platforms in an ad hoc manner, but these actions are not ultimately damaging to News Corp's attention-seeking and longer-term income-generating goals. In fact as noted above, in the case of *Sky News Australia*, its YouTube audience has grown by nearly a million subscribers in a year.

Further to this, Arsenault and Castells (2008) have described Rupert Murdoch as a key enactor of network-making power in the network society for his ability to connect media, political and business networks in pursuit of his own economic goals. They argue that a perception of control over public opinion, real or not, provides political leverage, which then supports Murdoch's ultimate goal of business expansion and growth. This can include lobbying politicians for favourable media regulation outcomes (Lidberg, 2019). Further, while Murdoch himself possesses conservative political views, he has shown a willingness to support any political agenda that advances his overarching business goals (Arsenault & Castells, 2008). This is evidenced in his support for Kevin Rudd's prime ministership in 2007 and British Labor leader Tony Blair in 2006 (Arsenault & Castells, 2008; Manne, 2011). Thus some suggest that the influence of *The Australian* stems from the perception of the power it wields from the political class who read it, with the newspaper displaying a track record of impacting political powerplays (Manne, 2011).

News Corp's and Murdoch's influence on public opinion is harder to state. There is a lack of empirical evidence about the link between its climate change reporting and audiences' attitudes towards climate change. Yet this knowledge is particularly relevant in a communications environment where social media amplifies mainstream media messages (Holmes and Star, 2018, p. 152) and portions of the Australian population still seem reluctant to support climate-related action (Park et al., 2020b), though there are encouraging signs that these sentiments are changing (Quicke, 2021). Noting the politicisation and mediatisation of the GBR and environmental policy, these informational power dynamics are particularly important to understand in the lead-up to elections, especially in the historically divided state of

Queensland where protection of the environment is often seen to oppose economic security (Bacon & Jegan, 2020; Blaine, 2019; Lester et al., 2014). This false binary also reinforces the "fossil-fuel industry, politics and mainstream media nexus" (Holmes & Star, 2018, p. 151), activates the scientific doubt playbook, and stifles the development of meaningful policy.

Chapter 9: Conclusions

9.1 SUMMARY OF FINDINGS

Through examining the news-sharing spaces of Twitter, YouTube and Facebook, this research found that three key ways that power is asserted and contested in the 'social news media network' (Bruns 2018) during a case study of the Great Barrier Reef protection are: adversarial framing, the problematic use of science, and the interplay of mainstream media with alternative media actors, politicians and ideologically-driven advocacy groups to further information flows.

This research contributes to knowledge empirically in environmental media and political communications studies in particular, and operationalises Castells' network theory of power for social media networks. In the context of the problematic use of science and the 'networks of operatives' (Cottle, 2013) associated with the furthering of information flows, this work produces empirical evidence of the interplays between actors in the climate "denial machine" (Dunlap & McCright, 2011, p. 144) in the context of Australian environmental protection within interconnected news-sharing spaces. There is an underrepresentation of work that has tracked how informational flows have sowed scientific doubt across multiple social media networks, with this research beginning to address a gap by mapping these digital networked interactions in relation to the Great Barrier Reef's 'politics of protection' (Foxwell-Norton & Konkes, 2018). This work also provides empirical evidence to support Konkes and Foxwell-Norton's (2021) argument that science has become a sphere of action in its own right as an enactor of 'mediatised environmental conflict' (Hutchins & Lester, 2015).

This study also contributes to existing research about the role of mainstream media in relation to other actors embedded in contemporary communication spaces in framing 'reality' and furthering information flows to assert and contest 'power over minds' (Castells, 2016). In the context of the protection of the GBR, mainstream media actors continue to play a central role in the networked spaces of Twitter, YouTube and Facebook. This is particularly evident with *The Guardian* and News Corp as frame-setters, though this 'knowledge' and 'reality' is furthered via different interplays of actors, information flow dynamics, and attention-getting tactics. In other words, while

other actors embedded in these hybrid news-sharing spaces have a key role in 'tapping' and 'steering' information flows to suit their goals (Chadwick et al., 2016) – which can include attempting to 'switch' the 'reality' of the GBR's health and impact of climate change – it is still largely the traditional actors involved in media politics that are creating and legitimising the information that frames this 'reality'.

The continued dominance of mainstream media actors in this capacity is important considering previous scholarly research about News Corp's network-making power (Arsenault, & Castells, 2008), particularly its role in politicising and polarising climate change debates and stifling environmental policy advancement (Bacon & Jegan, 2020; Chubb 2012; Holmes & Star, 2018; Konkes & Foxwell-Norton, 2021; Manne, 2011; Taylor, 2014). The findings are also relevant given current discussions about media diversity in Australia in the context of decentralised communications spaces (Environment & Communications References Committee, 2021; Flew & Wilding, 2021; Meese, 2021), and escalating pressure from the global community for Australia to take meaningful and substantive action on climate change (ABC News, 2022).

Finally, in enlisting Manuel Castells' network theory of power, this work adapted and operationalised this concept to investigate interplays within the social media network elements of Twitter, YouTube and Facebook. In doing so, it aligned Castells' four forms of network power to social network theory-inspired power indicators and SNA metrics to study power dynamics in the attention-focused social news media network. Through considering the centrality of actors, dominance of information, salience of frames and efforts to reframe and steer information to suit the goals of certain embedded actors, these indicators – and the way they were used – revealed patterns of attention-getting actor interactions and information flows that were being co-opted to contest environmental protection.

9.2 SIGNIFICANCE

The Great Barrier Reef and climate policy assemblages in Australia are interconnected, complex, and the sites of ongoing power contestations, with the multimedia communication networks – and the social news media network in particular – constituting the dynamic environment for many of these interplays. Publics are informed about Great Barrier Reef and climate change science and policy through

multimedia networks, yet, as found in previous work and supported by this research; mainstream media continue play an important role in framing information and agenda setting. Furthermore, this inquiry finds the distribution and leveraging of these information flows is impacted by alternative news outlets and political and advocacy actors who are 'tapping' and 'steering' content in ways that suit their own goals. In the case of mainstream media content that undermines science or delegitimises the need for enhanced environmental protection, these information flows are often channelled by actors who oppose climate action or government interference in the free market. This includes conservative partisan politicians and mainstream and alternative media; advocacy groups, including economically-driven thinktanks; and a contrarian scientist. While scientific information often informs policy making (Jasanoff, 1990, as cited in Pielke, 2004), in the case of the GBR's protection, this work shows how 'the science' is being politicised and mediatised to suit the particular goals of the actors embedded in dynamic news-sharing networks. From a Castells' network theory of power perspective, the sphere of science and its associated goal to provide meaningful and well-rounded policy advice is being 'switched' to serve political, economic and media interests.

This is generally problematic, but specifically concerning when coupled with the pressures faced by the GBR, the mounting global threat of climate change, and the ongoing political lack of appetite in Australia for meaningful and decisive climate-focused policy to benefit all living beings – human and non-human. Yet, while these findings contribute new knowledge in the sense that these digital news-sharing spaces and the dynamics between actors have not previously been studied in this way and at this scale in the context of the politics of Great Barrier Reef protection, there is nothing novel about the tactics being used by actors to further their goals (Ceccarelli, 2011; Dunlap & McCright, 2011; Oreskes & Conway, 2010; Taylor, 2014). The playbook of the "denial machine" (Dunlap & McCright, 2011, p. 144) is simply transposed into contemporary communication spaces. Understanding these information flows and tactics that are specific to the Australian context could offer benefits in mitigating damaging impacts, such as the extent to which climate change has been polarised in the US (Dunlap & McCright, 2011; Merkley & Stecula, 2018). It could also provide guidance to GBR policy-makers and science communicators when faced with similar mediatised environmental conflict events.

9.3 RECOMMENDATIONS

The findings from this study, including the homophilous problematic science clusters within Twitter and Facebook, and the partisan framing of GBR science and climate change by the dominant *Sky News Australia* on YouTube, suggest further work needs to be done to understand informational dynamics around potentially divisive environmental issues in Australia. Understanding the drivers and tactics used in political communication and then sharing this knowledge and educating 'produsers' (Bruns, 2008) as both consumers and creators of content is crucial. This includes foregrounding how science is part of political communication and how hybrid media logics work in these dynamic news and information spaces. These findings reinforce the call for widescale and targeted media and data literacy, but also political and science literacy so audiences understand *why* and *how* their attention is being targeted and the implications and connections to the wider social context (Carmi et al., 2020; Graham et al., 2020a; Lenzi, 2019). This should encompass fostering understanding about the goals and logics of embedded actors, particularly within the multimedia mass communication networks, but also the political and economic networks in the network society (Castells, 2011a).

For example, some of the drivers of 'power over minds' could be foregrounded via the disclosure of connections that actors have which could impact the way information is framed and furthered to achieve those goals. For example, the average viewer of *Sky News Australia* or reader of *The Australian* may not know that these outlets are owned by the same publisher. They also may not be aware that contributor and GBR science critic Dr Peter Ridd is professionally associated with right-wing thinktank the Institute of Public Affairs (Project for Real Science, 2022), and even if they did, they may not realise the organisation's history of climate contrarian attitudes and activities, and financial contributors (Dunlap & McCright, 2011). While the IPA does not disclose who its financial sources are, journalists have reported that an Australian mining magnate has funded up to half of its activities (Seccombe, 2018). This transparency may provide useful context into its goals, logics and associated resistance to climate action and policy. As Ceccarelli (2011) notes, identifying these "unambiguous linkages" (p. 216) helps to dispel the notion of contrarian scientists as "clear-eyed" (p. 216) heroes following the evidence and can help reverse the dynamics of uncertainty. This is particularly relevant in the News Corp context where research

has found the publisher presents dissenting scientists as "free speech champions who deserve exposure" (Bacon & Jegan, 2020, p. 80), or underdogs fighting for the truth (Roper, 2016). Noting that scholars have found that opinion pieces and commentators are responsible for the majority of problematic information (Bacon & Jegan, 2020; McKnight, 2010), a small but potentially effective mitigation strategy could be greater transparency about contributors' connections and potential motivations. For instance, introducing a requirement for each piece of commentary to state the name of the organisation(s) the contributor represents, a link to the 'About Us' webpage or current annual report of those entities, and the disclosure of any commercial interests that could impact the views expressed in the column. A similar principle could apply to expressing the connections between media actors in the context of ownership. Although this approach would be difficult, if not impossible, to enforce for alternative media actors, it would at least encompass the frame-setting mainstream media and their associated network-making power.

In a case study sense, considering the tactics and interplays identified in this research and the politicisation and mediatisation of the Reef identified in previous media politics work, it is likely that the upcoming 2022 WHC decision about the GBR's World Heritage status will prompt similar informational dynamics and frames (though, the 'conflict and strategy' Australia vs China angle will most likely not be as salient as China is no longer the Chair). Yet looking beyond this imminent MEC event and considering the impact of GBRMPA's previous Outlook Reports in prompting action from UNESCO (Chapter 1), the next GBR Outlook Report (due 2024) provides another central opportunity for the politicisation and mediatisation of GBR science. It is therefore recommended that scientists and science communicators prepare as much as possible in advance of these mediatised environmental conflict events to ensure that "when their work becomes an act of political communication it better conveys the intended message" (Konkes & Foxwell-Norton, 2021, p. 480). This is especially relevant given that political actors collectively continue to play a greater role in steering information flows than scientists via networked power, though not to the extent of advocates, and mainstream and alternative media actors. This points to a situation where GBR science is likely to continue to be used as an element in network-making power by those seeking to achieve their network goals – goals that may not always prioritise the Reef's protection.

As these challenges will be ongoing, it is important to continue to study and unpick the interactions, informational flows and the way that 'knowledge' and 'reality' are being furthered and contested in the primary fields of power – the multimedia communication networks. While the battle of 'power over minds' (Castells, 2016) will be ongoing, knowing the strategies and tactics used will mean 'produsers' (Bruns, 2008) in these dynamic communication spaces are better equipped to navigate them, while informational, scientific and political literacy can be directed accordingly.

9.4 FUTURE OPPORTUNITIES

While this work provides a useful insight into the powerplays that are unfolding in these polycentric spaces to shape 'reality', this inquiry has also foregrounded further avenues for investigation. One of these reflects the observation about homophilic clusters containing news outlets and ideologically-aligned actors within Facebook and Twitter in particular. In the case of these networks, the right-wing media, conservative politicians and climate change denial advocate actors are distinctly removed from the main cluster. In the case of Twitter (Chapter 5), there were very minimal inter-cluster interactions between the segregated group (Group 2) and the main cluster (Figure 5.7). From the data that could be mapped in Facebook, it appears that the group that was spatially separate to the top left of the visualisation (Figure 7.8) had very similar actors to those in the disconnected cluster of Twitter. In both networks these actors appeared ideologically distinct from the main clusters. YouTube was spatially different in the sense that most actors were organised around the 'hub and spoke' style broadcast clusters represented mainly by mainstream media or vloggers, with the biggest hub created by partisan mainstream news actor *Sky News Australia*. There was minimal sharing between these clusters.

However, these homophilous interactions also serve as flags that there is further analytic value in exploring the subclusters for evidence of disconnection, or polarisation. Namely, the in-depth close reading and framing analysis on the select subclusters indicated that there were signs of ideological opposition to attitudes about climate and GBR science, and also signs of antagonism and affective polarisation in the way that some of these actors referred to those with differing worldviews as liars, corrupt, part of a conspiracy, or just "loathed" them (Table 7.4). It is also of specific interest that the two most authoritative mainstream news actors – News Corp and *The Guardian* – and their audiences represent opposite ends of the political spectrum

(Figure 2.1). Understanding these interactions would help to address a significant gap in work to-date, particularly as there are few empirical studies of this interdisciplinary nature that focus on Australian mediatised environmental conflict and polarisation (Arguedas et al., 2022).

9.5 FINAL WORDS

This work and its findings address current gaps in knowledge about how information flows and power are contested in contemporary digital communication spaces in relation to Australian environmental policy, and specifically the Great Barrier Reef. It is hoped the knowledge generated can be used towards enhancing science communication and environmental policy outcomes. It is important to continue to study dynamic interplays in the knowledge-shaping spaces of the social news media network (Bruns, 2018) to gain valuable insights into how 'power over minds' (Castells, 2016) is asserted and contested in relation to some of the most central issues facing society. Namely, the global crisis of climate change, and 'produsers'' (Bruns, 2008) relationships with information, knowledge and power in the "chaos" (Chadwick et al., 2016, p. 2) of disrupted, hybrid and interconnected communications networks.

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Appendices

Appendix A

Twitter Method – Detailed Steps

This is the step-by-step guide used for the Twitter data collection:

1. Tweets were collected for parameters outlined in Chapter 4 by using AcademicTwitteR, though I had an extended date range to have a data buffer.
2. AcademicTwitteR confirmed that 177 pages were queried. The data was captured as JSON objects. I used AcademicTwitteR to bind the data into a tibble (a dataframe). I then used Eric Mill's website (https://konklone.io/json/) – recommended by Twitter's Developer Platform[45] – to convert the 'User' JSON files into a CSV. These contained the TweetIDs – a unique identifier that Twitter creates for each Tweet. At this stage, there were a total of 86,677 tweets in the CSV.
3. I reduced these tweets to the date range, resulting in a total of 85,818 tweets.
4. I isolated these TweetIDs and used an Excel formula to replace the 'x' character at the start of each ID (the 'x' is added to stop Excel automatically converting the data to a number).
5. I then imported the TweetIDs into NodeXL using the data importer.
6. There was extensive cleaning required of the URLs, with many not expanding from the http://t.co' format, or requiring an extra step if the expanded version was then a bit.ly. I used Urlcheckr Premium (https://www.urlcheckr.com/) and uploaded the data in batches, with the unexpanded links then manually resolved. Cleaning also included the removal of URL tracking codes.
7. Note RE point 5: I could have imported the CSV (from the JSON files) into NodeXL instead of the TweetIDs, but during the pilot studies, I found that this was more less effective than simply importing the data straight into NodeXL

[45] (https://developer.twitter.com/en/docs/tutorials/five-ways-to-convert-a-json-object-to-csv)

from the Twitter Import option. There are no restrictions on the Twitter API (v1.1) NodeXL uses when importing data via a TweetID List Network (for instance, as there would be if I was sourcing the Tweets directly from NodeXL).

8. As an additional step for comparison purposes, I also prepared the raw data in CSVs and imported it into Gephi for further analysis. See Chapter 4 and Chapter 5.

Appendix B

YouTube Method – Detailed Steps

This is the step-by-step guide used for the YouTube data collection:

1. To collect YouTube data, access is needed to the YouTube API v.3, which is actioned through the Google Developers Console (https://developers.google.com/youtube/v3/getting-started).
2. I initially created one API key, but then added an initial nine to reach the maximum of 10. This is because each API key has a total credit of 10,000, with different elements in a data collection worth different amounts of 'credits'. To ensure I was collecting all the data, I collected it in smaller segments with different API keys.
3. I sourced R package TubeR (Sood et al., 2020), which can be used to collect Video IDs straight from YouTube. This required creating an OAuth 2.0 Consent (https://www.analyticssteps.com/blogs/extracting-pre-processing-youtube-comments) in addition to the API key.
4. I modified the code to suit my search parameters using the TubeR documentation (Sood et al., 2020), which included specifying the search query "Great Barrier Reef", the type as 'video', the date window (same as Twitter – 21/06/21 – 01/08/21). As was the case with Twitter, I removed any videos afterwards that appeared outside of the final date range. This returned 464 video IDs.
5. I saved this dataframe as a CSV file and prepared the data in Excel for import into NodeXL, including removing the 'x' character at the start of the video IDs. I imported these in batches of 50 into NodeXL using the YouTube User Network importer, and enlisted a different API key for each batch to ensure I captured as much data as possible.
6. Other parameters selected on the importer were opting to create an edge for every user that commented on a video and replied to a comment on a video (as well as posting a video). A limit was set to 150 comments and

150 replies after reviewing previous data collections and seeing that this covered the bulk of the interactions on each video. Also, previous advice in NodeXL training sessions suggested 100 comments, but I made this wider given the credits available due to the additional API keys.

7. Once the complete dataset was returned in NodeXL in the format of separate edges, vertices (nodes), groups and other tabs, I compared the collected data with previous experimental collections using both TubeR and NodeXL's data importer directly. Through cross-checking the content and actors, I confirmed that the final collection returned the most complete representation of the data of all methods tried. In other words, it had maximum relevancy (no irrelevant COVID-19 videos and few spam, yet had still captured the most dominant content showing up in the test datasets relating to the Great Barrier Reef). However, I did later notice a limitation that 389 of the 464 video IDs collected via TubeR had been imported into NodeXL. Further investigations showed that videos that had comment functionality disabled did not import due to a lack of edges, which was the result of the absence of comments and comment replies.
8. Note: While there were some edges containing non-English-language content, I did not remove these from the dataset to ensure consistency with approach taken with Twitter (I did not remove edges in this respect either).

Appendix C

Coding Instrument for Actor Types

Codebook for classifying actor types	
Media non-news[+]	Anyone, or outlet, that is in the mainstream media sphere, but is not news.
Media mainstream news[+]	Media outlets and media professionals that are existing news brands, or are associated with existing news brands. Often corporate, but can also be funded in other ways (like the *ABC* and *The Guardian*). Also includes retired media professionals who worked for corporate or public service news outlets.
Media alternative news[+]	Media outlets or media professionals that are news-focused, yet are not associated with mainstream media entities, e.g. independent outlets. Also encompasses smaller outlets, including blogs, or outlets with different journalistic affordances, like *The Conversation* where content is supplied by experts, but edited by journalists, or science magazines with news.
Vlogger	Created inductively from the YouTube analysis. A form of media (goal is attention and often monetisation), but not mainstream media, and not news either. Different objectives in relation to the GBR and climate change, and different logics. Subcategories are outlined in Chapter 6.
Advocacy[*]	Anyone, organisation or group concerned about bringing about change, championing an issue or viewpoint, or campaigning – their goal is making a difference. Includes those advocating for GBR health and climate action/policy, but also those advocating for scepticism towards GBR health and climate claims. While these are different arguments, the logic is the same as they are both driven by the need to convince people of their way of thinking. In bios, it is people who state their position for or against something (e.g. a political party, climate views, or even vaccination support), or indicate they are promoting social change of some kind. For organisations, they are communicating or promoting a cause or policy for the good of society, or a particular group of society. Can include people who have written books, if they are not primarily authors; i.e., wrote the book to convey their views and make a difference to their main priority of the social issue/cause. NOTE: Environmental Non-Government Organisations (ENGOs) are included here.
Political[*]	Government members and spokespeople of local, state and federal governments, includes public service government departments (unless otherwise coded science).
International[*]	International governance organisations like UNESCO and the IUCN.
Industry[*]	Businesses, companies, and those with a strong economic interest.
Indigenous[*]	Aboriginal and Torres Strait Islander people and organisations.
Science[*]	Scientists, research institutions, and those who speak on behalf of scientific organisations and authorities.
Community	Added inductively with Facebook data. Not individuals, rather grassroots groups like community forums. Not advocating and not news, but just sharing hyperlocal information.
Individuals	Individual users that needed to be deidentified for privacy reasons.

Unknown*	Not able to be classified based on the available information.
Inauthentic	Spam accounts.

Note.

* These classifications are based on Newman, 2017; Foxwell-Norton & Konkes, 2018, and Konkes & Foxwell-Norton, 2021. Although, unlike Hutchins & Lester (2015) and Foxwell-Norton & Knonkes, (2018), ENGOs have been put into the advocacy category. Advocacy was determined to be a more suitable term than 'activist'.

+ Rather than 'media' being one group as it was in the above-mentioned studies, this actor group has been split into sub categories to allow for more in-depth analysis of power. While inspired by Newman (2017), these classifications were informed inductively by the data.

Examples of YouTube coding: individuals vs. inauthentic

This user was coded as an individual: "@User all the below average cold temperatires [sic] really show global warming though don't they. Half the US is a bit hot the other half is having record cold temperatures. Satellite data shows a cooling world, unless you don't believe the satellites".

While this account was inauthentic: "Investing in crypto now should be in every wise individuals [sic] list, in some months [sic] time you'll be ecstatic with the decision you made today".

Appendix D

Typology of Frames Applicable to Climate Change and Environmental Debates

Frame	Defines science-related issue as…
Social progress	A means of improving quality of life or solving problems; alternative interpretation as a way to be in harmony with nature instead of mastering it.
Economic development and competitiveness	An economic investment; market benefit or risk; or a point of local, national, or global competitiveness.
Morality and ethics	A matter of right or wrong; or of respect or disrespect for limits, thresholds, or boundaries.
Scientific and technical uncertainty	A matter of expert understanding or consensus; a debate over what is known versus unknown; or peer-reviewed, confirmed knowledge versus hype or alarmism.
Pandora's box/Frankenstein's monster/runaway science	A need for precaution or action in face of possible catastrophe and out-of-control consequences; or alternatively as fatalism, where there is no way to avoid the consequences or chosen path.
Public accountability and governance	Research or policy either in the public interest or serving special interests, emphasizing issues of control, transparency, participation, responsiveness, or ownership; or debate over proper use of science and expertise in decisionmaking ("politicization").
Middle way/alternative path	A third way between conflicting or polarized views or options.
Conflict and strategy	A game among elites, such as who is winning or losing the debate; or a battle of personalities or groups (usually a journalist-driven interpretation).

SOURCES: W. A. Gamson and A. Modigliani, "Media Discourse and Public Opinion on Nuclear Power: A Constructionist Approach," American Journal of Sociology 95, no. 1 (1989): 1–37; U. Dahinden, "Biotechnology in Switzerland: Frames in a Heated Debate," Science Communication 24, no. 2 (2002): 184–97; J. Durant, M. W. Bauer, and G. Gaskell, Biotechnology in the Public Sphere: A European Sourcebook (Lansing, MI: Michigan State University Press, 1998); M. C. Nisbet and B. V. Lewenstein, "Biotechnology and the American Media: The Policy Process and the Elite Press, 1970 to 1999," Science Communication 23, no. 4 (2002): 359–91; and M. C. Nisbet, "Framing Science: A New Paradigm in Public Engagement," in L. Kahlor and P. Stout, eds., Understanding Science: New Agendas in Science Communication (New York: Taylor & Francis, in press, 2009).

Note. Nisbet's (2009) typology of frames applicable to climate change and environmental debates, which was synthesised from the above-mentioned sources. This is also included in Nisbet and Newman (2015), with some small changes to wording.

Appendix E

Complete List of Coverage: *The Guardian* and *Sky News Australia*

Table E1

All stories about the Great Barrier Reef published by *The Guardian* during the data collection window

	Story headline	Link	Date	Type
1	UNESCO recommends Great Barrier Reef world heritage site should be listed as 'in danger'	https://www.theguardian.com/environment/2021/jun/22/great-barrier-reef-should-be-listed-as-in-danger-unesco-recommends	22/6/2021	News
2	Great Barrier Reef timeline: decades of damage and Australia's fight to stop 'in danger' listing	https://www.theguardian.com/environment/2021/jun/22/great-barrier-reef-timeline-decades-of-damage-and-australias-fight-to-stop-in-danger-listing	22/6/2021	News
3	The Australian government wants to avoid the Great Barrier Reef being listed as 'in danger' at all costs	https://www.theguardian.com/commentisfree/2021/jun/22/the-government-wants-to-avoid-an-in-danger-listing-for-the-great-barrier-reef-at-all-costs	22/6/2021	Opinion
4	Queensland minister says UN warning on Great Barrier Reef status shows Morrison must act	https://www.theguardian.com/environment/2021/jun/22/queensland-minister-says-un-warning-on-great-barrier-reef-status-shows-morrison-must-act	22/6/2021	News
5	Political ploys and an ocean jewel: what's behind the UN's 'in danger' warning for the Great Barrier Reef	https://www.theguardian.com/environment/2021/jun/23/political-ploys-and-an-ocean-jewel-whats-behind-the-uns-in-danger-warning-for-the-great-barrier-reef	23/6/2021	Investigations
6	UN official rejects Australia's claim it was told Great Barrier Reef wouldn't be put forward for 'in danger' list	https://www.theguardian.com/environment/2021/jun/23/un-official-rejects-australias-claim-it-was-told-great-barrier-reef-wouldnt-be-listed-as-in-danger	23/6/2021	Investigations
7	Unesco and Australia dispute Great Barrier Reef's 'in danger' status – video	https://www.theguardian.com/environment/video/2021/jun/23/unesco-and-australia-dispute-great-barrier-reefs-in-danger-status-video	23/6/2021	Video
8	Who does Unesco think they are? Listing the Great Barrier Reef as 'in danger'! After all we have done for it! First Dog on the Moon	https://www.theguardian.com/commentisfree/2021/jun/23/who-does-unesco-think-they-are-listing-the-great-barrier-reef-as-in-danger-after-all-we-have-done-for-it	23/6/2021	Opinion
9	Great Barrier Reef: Labor calls on Sussan Ley to back up claim Unesco bowed to political pressure	https://www.theguardian.com/environment/2021/jun/24/great-barrier-reef-labor-calls-on-sussan-ley-to-back-up-claim-unesco-bowed-to-political-pressure	24/6/2021	News
10	Australia and 11 other countries lobby Unesco over Great Barrier Reef decision-making	https://www.theguardian.com/environment/2021/jun/24/australia-and-11-other-countries-lobby-unesco-over-great-barrier-reef-decision-making	24/6/2021	News
11	The return of Australia's toxic climate politics – with Lenore Taylor	https://www.theguardian.com/australia-news/audio/2021/jun/25/the-return-of-australias-toxic-climate-politics-with-lenore-taylor	25/6/2021	Podcast
12	Unesco says 'in danger' listing would be 'call to action' on Great Barrier Reef	https://www.theguardian.com/world/2021/jun/26/unesco-says-in-danger-listing-would-be-call-to-action-on-great-barrier-reef	26/6/2021	News
13	From Barnaby Joyce to the Great Barrier Reef, Coalition climate inadequacy is on parade Greg Jericho	https://www.theguardian.com/business/commentisfree/2021/jun/27/from-barnaby-joyce-to-the-great-barrier-reef-coalition-climate-inadequacy-is-on-parade	27/6/2021	Opinion
14	Why Australia's Great Barrier Reef may end up on the world heritage 'in danger' list – and what it means	https://www.theguardian.com/environment/2021/jun/27/why-australias-great-barrier-reef-may-end-up-on-the-world-heritage-in-danger-list-and-what-it-means	27/6/2021	Investigations
15	Great Barrier Reef: leading scientists praise Unesco's 'in danger' warning	https://www.theguardian.com/environment/2021/jul/02/great-barrier-reef-leading-scientists-praise-unescos-in-danger-warning	2/7/2021	News
16	Australia demands world heritage experts visit Great Barrier Reef ahead of 'in danger' list decision	https://www.theguardian.com/environment/2021/jul/07/australia-demands-world-heritage-experts-visit-great-barrier-reef-ahead-of-in-danger-list-decision	7/7/2021	News

17	The government must take responsibility for the Great Barrier Reef and stop looking for someone else to blame Peter Garrett	https://www.theguardian.com/commentisfree/2021/jul/12/the-government-must-take-responsibility-for-the-great-barrier-reef-and-stop-looking-for-someone-else-to-blame	12/7/2021	Opinion
18	Australian environment groups urge UN to put Great Barrier Reef on 'in danger' list	https://www.theguardian.com/environment/2021/jul/13/australian-environment-groups-urge-un-to-put-great-barrier-reef-on-in-danger-list	13/7/2021	Investigations
19	Australia to host ambassadors at Great Barrier Reef ahead of 'in danger' list vote	https://www.theguardian.com/environment/2021/jul/14/australia-to-fly-ambassadors-to-great-barrier-reef-ahead-of-in-danger-list-vote	14/7/2021	News
20	'Fossil fuel friends': Saudi Arabia and Bahrain back Australia's lobbying on Great Barrier Reef	https://www.theguardian.com/environment/2021/jul/14/fossil-fuel-friends-saudi-arabia-and-bahrain-back-australias-lobbying-on-great-barrier-reef-unesco	14/7/2021	Investigations
21	Scientists dismiss Warren Entsch's claim warm water from northern hemisphere is damaging reef	https://www.theguardian.com/environment/2021/jul/16/scientists-dismiss-warren-entschs-claim-warm-water-from-northern-hemisphere-is-damaging-reef	16/7/2021	News
22	Chinese Unesco official defends plan to list Great Barrier Reef as 'in danger'	https://www.theguardian.com/environment/2021/jul/19/chinese-unesco-official-defends-plan-to-list-great-barrier-reef-in-danger	19/7/2021	Feature
23	Joanna Lumley and Jason Momoa join prominent group backing Great Barrier Reef 'in danger' listing	https://www.theguardian.com/environment/2021/jul/20/joanna-lumley-and-jason-momoa-join-prominent-group-backing-great-barrier-reef-in-danger-listing	20/7/2021	News
24	Coalition believes it has numbers to stop Great Barrier Reef being listed as 'in danger'	https://www.theguardian.com/environment/2021/jul/21/coalition-believes-it-has-numbers-to-stop-great-barrier-reef-being-listed-as-in-danger	21/7/2021	Investigations
25	A historic decision on the future of the Great Barrier Reef	https://www.theguardian.com/australia-news/audio/2021/jul/21/a-historic-decision-on-the-future-of-the-great-barrier-reef	21/7/2021	Podcast
26	Whether or not the Great Barrier Reef is listed as 'in danger' won't alter the fact it is at risk from climate change	https://www.theguardian.com/environment/2021/jul/23/whether-or-not-the-great-barrier-reef-is-listed-as-in-danger-wont-alter-the-fact-it-is-at-risk-from-climate-change	23/7/2021	Investigations
27	World Heritage Committee agrees not to place Great Barrier Reef on 'in danger' list	https://www.theguardian.com/environment/2021/jul/23/world-heritage-committee-agrees-not-to-place-great-barrier-reef-on-in-danger-list	24/7/2021	News
28	The Great Barrier Reef is not on the 'in danger' list. Why, and what happens next?	https://www.theguardian.com/environment/2021/jul/25/the-great-barrier-reef-is-not-on-the-in-danger-list-why-and-what-happens-next	25/7/2021	Investigations
29	The Great Barrier Reef is a victim of climate change – but it could be part of the solution Peter Thomson and Ove Hoegh-Guldberg	https://www.theguardian.com/environment/commentisfree/2021/jul/26/the-great-barrier-reef-is-a-victim-of-climate-change-but-it-could-be-part-of-the-solution	26/7/2021	Opinion
30	The lobbying push that killed off a fight to save the Great Barrier Reef	https://www.theguardian.com/news/audio/2021/jul/29/the-lobbying-push-that-killed-off-a-fight-to-save-the-great-barrier-reef-podcast	29/7/2021	Podcast
31	Coalition criticised after Great Barrier Reef Foundation receives $351,000 in jobkeeper payments	https://www.theguardian.com/environment/2021/jul/30/coalition-criticised-after-great-barrier-reef-foundation-receives-351000-in-jobkeeper-payments	30/7/2021	News

Table E2

All stories about the Great Barrier Reef published by *Sky News Australia* to YouTube during the data collection window

	Video title	**Link**	**Date**
1	China-backed UNESCO was 'politicised' to recommend listing Great Barrier Reef as 'in danger'	https://www.youtube.com/watch?v=DejhDPs2QzM&t=1s	22/6/2021
2	Great Barrier Reef declared 'in danger' by UNESCO	https://www.youtube.com/watch?v=Q_NFWSze-A8	22/6/2021
3	Great Barrier Reef 'China's latest shot' in its 'victimisation of Australia'	https://www.youtube.com/watch?v=Bpb6zD-ZVuk&t=86s	22/6/2021
4	UNESCO is 'wrong' to single out Great Barrier Reef: Environment Minister	https://www.youtube.com/watch?v=BbRDuKLe-_g	22/6/2021

5	UN only picking on Australia's reefs because 'they don't like our climate policy'	https://www.youtube.com/watch?v=06ufwX7qT5g	22/6/2021
6	The ‘hypocrisy is stark’ in China’s ‘latest swipe’ at Australia	https://www.youtube.com/watch?v=OUxp7pOHz4Y	22/6/2021
7	We can't believe anything 'that comes out of' the China-led United Nations	https://www.youtube.com/watch?v=sjoL0AQIGLY	22/6/2021
8	Katter accuses China of bullying following UN recommendation	https://www.youtube.com/watch?v=dgNUopjxlPs	22/6/2021
9	China 'specifically mentioned' in Coalition meeting about UNESCO	https://www.youtube.com/watch?v=Gpjp7k8qQyo	22/6/2021
10	Dr Peter Ridd's High Court appeal prompts questions on govt response on 'free speech'	https://www.youtube.com/watch?v=TnLux0F8lN0	22/6/2021
11	China-chaired UNESCO 'hasn't visited Great Barrier Reef since 2012'	https://www.youtube.com/watch?v=p_9z3r5RG2I&t=1s	23/6/2021
12	Federal government will ‘strongly oppose’ UNESCO’s Great Barrier Reef draft decision	https://www.youtube.com/watch?v=wH7MC1ZkXAE&t=50s	23/6/2021
13	Australia 'doesn't take lectures' on climate from China	https://www.youtube.com/watch?v=hq9_hYSKTUA	23/6/2021
14	Peter Ridd: The idea coral reefs are close to extinction is ‘completely ridiculous’	https://www.youtube.com/watch?v=0wAzioGmV88	8/7/2021
15	Data ‘unequivocally’ shows Great Barrier Reef is in ‘extremely good condition’	https://www.youtube.com/watch?v=ST6xYhFp2d8&t=42s	14/7/2021
16	China use influence to put 'black eyes' on Australian environmental and cultural issues	https://www.youtube.com/watch?v=DjFEU8X9G20	15/7/2021
17	International ambassadors tour Great Barrier Reef ahead of UNESCO decision	https://www.youtube.com/watch?v=j7JJMoAChYs	17/7/2021
18	New report shows reef recovery	https://www.youtube.com/watch?v=1vsTrf0GlP8	19/7/2021
19	Great Barrier Reef 'such an important tourist attraction' in Australia	https://www.youtube.com/watch?v=3xmnuRPb7zg	20/7/2021
20	Government 'delighted' at UNESCO Great Barrier Reef decision	https://www.youtube.com/watch?v=vEsclklEaxM&t=2s	23/7/2021
21	Great Barrier Reef avoids UNESCO 'in danger' listing	https://www.youtube.com/watch?v=2y1oaUwj_OA	24/7/2021
22	Failed push to change status of Great Barrier Reef a ‘major loss’ for the CCP	https://www.youtube.com/watch?v=3f34Dx9PD3A&t=41s	25/7/2021
23	The UN process has seen the Great Barrier Reef as a 'poster child' for climate targets	https://www.youtube.com/watch?v=oOaSaxSP02I&t=17s	26/7/2021
24	The ABC ‘cannot be trusted’ when it comes to the Great Barrier Reef: Andrew Bolt	https://www.youtube.com/watch?v=mSlPIYEHM80	27/7/2021
25	Outrageous' JobKeeper payments to Great Barrier Reef Foundation 'should be repaid'	https://www.youtube.com/watch?v=5r9rCYOCDLU	27/7/2021

Appendix F

Full Twitter Network: Gephi

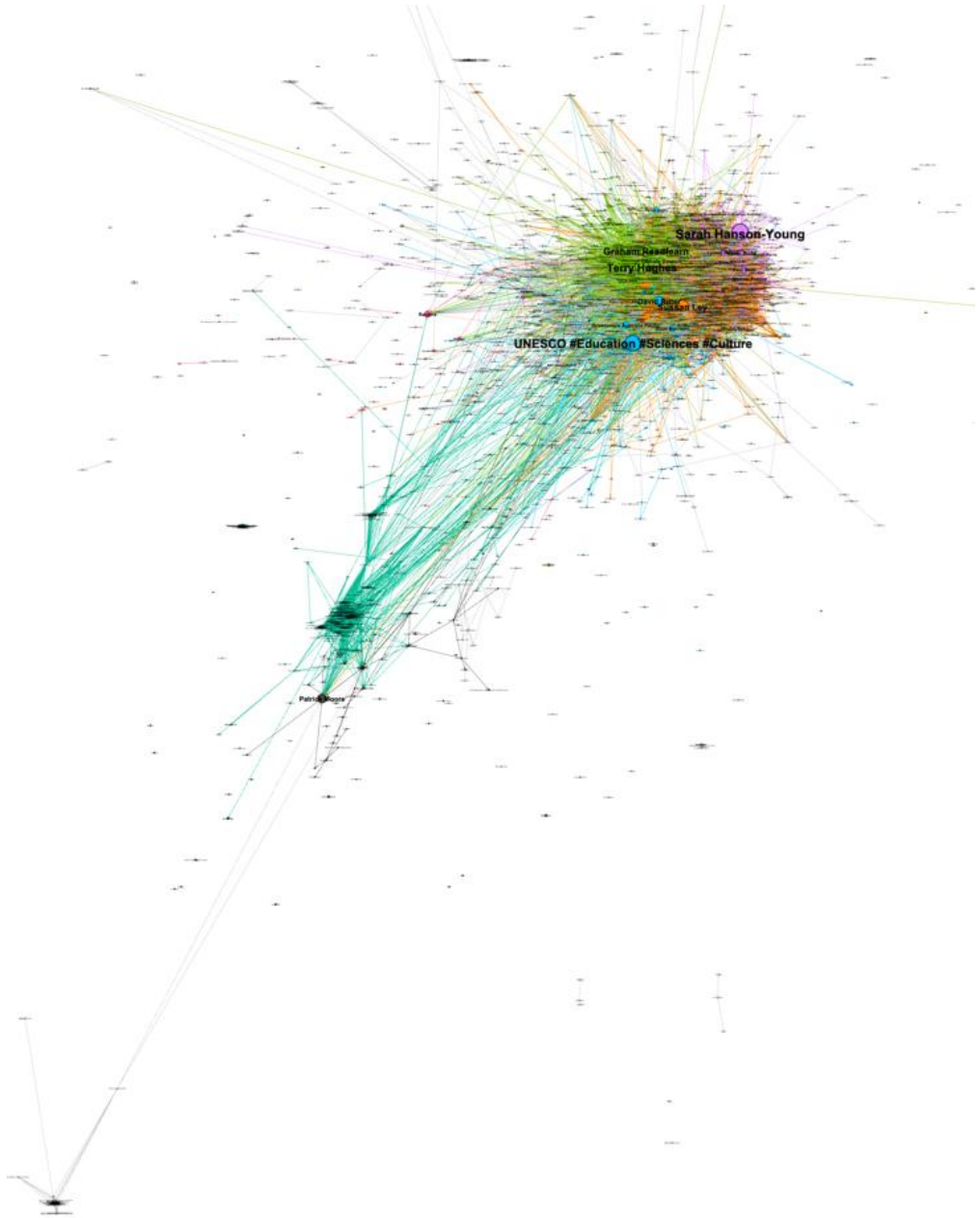

Figure F1. Twitter data visualised using the Louvain community detection algorithm and ForceAtlas2 force-directed layout algorithm with Gephi. Modularity is by colour and nodes are sized by in-degree, filtered to in-degree of >3. The group that was cropped out of the main body of the thesis includes accounts with themes related to Trump, US politics and anti-vaccination.

Appendix G

Comparing Algorithms and Modularity Classes

Not in PM* Louvain Group, but in G2 Wakita-Tsurumi	In PM* Louvain Group, but not in G2 Wakita-Tsurumi	In both groups
♁simon holmes à court	Zerohedge	Patrick Moore
Matthew Canavan	The Times	GWPF
Sky News Australia	Tom Harwood	Climate Realists
Greenpeace	Tracy (Chi)	Watts Up with That
Steve Millroy	Climate Dispatch	Greta Thunberg
Prue MacSween	Indo-Pacific News - Watching the CCP-China Threat	Daily Mail
Malcolm Turnbull 💉💉	Byron Wan	DonKeiller
𝔻𝕒𝕨𝕞𝕋𝕁𝟡𝟘™ PH🌩CA Climate of Dawn	Marcel Crok	YouTube
Cypress (⧖)	Say No To Sino	Chris Martz
Chris Bowen	CCP-China Watch	Luis B. Aramburu 🌍
Tom Nelson		
Bev		

Note.

This is from the Twitter data. The top 20 actors from Group 2 in the Wakita-Tsurumi-analysed dataset from NodeXL was compared with the top 20 actors from the 'Patrick Moore' group in the Louvain-analysed dataset from Gephi. The purpose to was to see how closely the algorithms grouped these actors. The actors that were grouped together by both algorithms must have strong connections for both Louvain and Wakita-Tsurumi to classify them as the same modularity.

* PM = Patrick Moore

Appendix H

Links Shared by Lexneuron

Video name	Channel	Link
Why The Great Barrier Reef Could Disappear By 2050 (October 14, 2019)	Science Insider	https://www.youtube.com/watch?v=Tmd4tEDDF1s
How dead is the Great Barrier Reef? (22 May 2017)	Vox	https://www.youtube.com/watch?v=BO44JlAElXM
The Great Barrier Reef: Our Ocean's Dying Paradise | Great Barrier Reef I Real Wild (30 Nov 2020)	Real Wild	https://www.youtube.com/watch?v=i8CnA2fKpvI
How to save the Great Barrier Reef? I ACCIONA & #DavidPocock	ACCIONA	https://www.youtube.com/watch?v=3HdxBoRjkfo
Australia's Great Barrier Reef disappearing due to climate change (12 April 2019)	FRANCE 24 English	https://www.youtube.com/watch?v=J_TRf_hJhuo

Appendix I

Full Text of Top 10 Facebook Posts

	Page Name	Type	Total Interactions	Post message text
1	Australia.com	Native Video	9,940	Just when you thought your bucket list couldn't get any longer ✍ 😍 Thanks to Mark Fitz Photography for capturing this epic view of Visit Queensland, Australia's Heron Island, Queensland, Australia, located on the Southern Great Barrier Reef.
2	The Conversation	Link	8,212	Researchers found 16% of the island's coral species have not been seen for many years. 😟
3	Australia.com	Native Video	7,969	Who wants to swim with Manta Rays? 🙋 Haylsa & Kyle & Elliot Grafton had this simply unforgettable experience at Lady Elliot Island Eco Resort on the Southern Great Barrier Reef in Visit Queensland, Australia.
4	Love Nature	Native Video	6,189	The crown-of-thorns #starfish is a major cause of coral loss on the Great Barrier Reef of Australia. Thankfully, the Giant Triton #snails have a great appetite for these nature vandalists 🐌
5	Tropic Skincare	Native Video	6,086	BRAND NEW: Ocean Dive Pore-Clearing Serum is the 100% naturally derived serum that dives deep into pores to… 🌊 Unclog them and refine their appearance 🌊 Kill acne and blemish-causing bacteria 🌊 Balance out sebum levels 🌊 Gently exfoliate If you're experiencing any of the skinarios below, this is the serum for you... 🌊 Clogged pores 🌊 Enlarged pores 🌊 Excess oil 🌊 Whiteheads and blackheads 🌊 Hormonal blemishes 🌊 Maskne 🎯 Targeted results – ideal for anyone looking to focus on specific areas of oiliness, individual blemishes, or congested pores, like your nose or T-Zone. 🔬 Created with a purpose – in development for several years, Ocean Dive's journey began with our Founder @susiema's desire to target solely the oily, congested areas of her combination skin, as well as hormonal breakouts. 💧 A potent trio of water and oil-soluble acids – marine fulvic, lactic, and salicylic acids at the optimum percentages for oily areas work to deeply exfoliate different levels of the skin and speed up the lifecycle of blemishes. ♻ 100% recyclable – all packaging (a glass bottle and aluminium cap) can be recycled and the FREE box of 31 biodegradable Bamboo Buds can go in the compost, garden waste, or food bin after application. 🏞 10% of profits donated – this will go towards the Reef Restoration Foundation in Cairns, Australia (where Susie grew up) supporting their work creating ocean-based coral nurseries to help regenerate the Great Barrier Reef. Ocean Dive is available from Mon 26.07.21 exclusively via your local Ambassador (DM us to be connected to yours) and coming to tropicskincare.com from Wed 28.07.21. Ready to ride the waves? 🌊
6	Mike Huckabee	Link	5,016	Say, environmental apocalypse fans, remember how we heard that all the coral on the Great Barrier Reef in Australia was dying, and because of that, we were ALL GOING TO DIE!!? Well, the coral cover did drop from the mid-'80s through 2010s, but has since been resurgent, and it's now at a record high.
7	Costa Georgiadis Official	Link	4,886	July 2021 What a month it has been and what a perfect time to take the helm. The Betoota Advocate have paved the way and I am up for this. Ok Chillerz. I am ready to roll this Q 'n' A around the block for you. Let's take it back home to Monday nights when people are fueled from the weekend and ready to walk the talk. So let's compost the side steppers and the small talk'n same same tread water time wasters. No flotsam and jetsam need apply. Bring some vision. Round the block with a backpack full of solutions and actions. I've got red cards and yellow cards and I'm not afraid to use them. It may be chilled but passengers need not apply. See you Monday night here 930pm. July has had a host of topics we can start to unpack: Plastic Free July National Landcare Week is about to kick off along with the National Landcare Conference Landcare Australia The status of the Great Barrier Reef has been flip'n like a two up throw. National Tree Day and Schools Tree Day roll up this weekend. Dams are proposed for the The Tarkine Wilderness The UN Food Systems Summit is being boycotted by Social Fair Food Movements Naidoc Week was celebrated with a focus on Healing Country. What questions do you have around these topics that you would like to put to our panel ? Join the conversation live 930pmAEST tomorrow.
8	Animal Matters	Link	4,860	"The United Nations on Tuesday warned in a report that the Great Barrier Reef should be designated an endangered World Heritage site...The recommendation comes from UNESCO's World Heritage

				Committee and cites a deterioration of the world's largest coral reef due to climate change."
9	Tim Faulkner	Native Video	4,279	🐢 How amazing is this?! Researchers say this is the largest aggregation of turtles they've filmed at Raine Island off the tip of Cape York. Drones helped them estimate there were about 64,000 green turtles waiting to nest on the island last December. They published research this week in the PLOS ONE scientific journal finding drones were a much easier, safer and more accurate way of surveying turtles than counting them from boats. 📷: Great Barrier Reef Foundation | Queensland Environment Department | ABC Kimberley
10	Katter's Australian Party	Photo	4,208	KAP's Bob Katter has called on the Federal Government to cancel its membership with the United Nations Educational, Scientific and Cultural Organization (UNESCO) which he says has become controlled by the dictatorial Chinese regime. Mr Katter's comments follows a push by a China-chaired UN committee to declare the Great Barrier Reef "in danger". Mr Katter says the move by UNESCO is not related to environmental concerns but a further bullying move by the Chinese regime. "UNESCO has moved to classify one quarter of Australia's oceans endangered, well how come only five years ago the leading world authority on nature, David Attenborough, said the reef was 'the most magical place on earth'," Mr Katter said. "Just last October myself and the other Members of the KAP (Robbie Katter MP, Nick Dametto MP and Shane Knuth MP) went diving on the Great Barrier Reef off Mission Beach, and I would describe it as magnificent. "My office was on the phone just this morning with Daniel McCarthy one of the biggest tourism operators in Cairns; he's been at Lizard Island for two months and he said the areas that were thought to be dead or destroyed two years ago are now thriving." Mr Katter said Australia had to stand up to the bully that is China, and fight this move to classify the Great Barrier Reef as endangered. "China has come after our coal industry, they've halted trade on our beef, grain and wine; well we must say enough is enough," he said. "When are we going to stand up? China is still in control of the Darwin Port; they still have their tentacles in our universities with the Confucius Institutes and they're still in control of our sensitive defence data through the China-owned Global Switch data centre in Sydney. "The Federal Government has made the right noises, but I don't see them acting." #KAP #KAPteam #Australia #UNESCO
11	Dr Peter Ridd	Photo	3,917	Just letting you know that we have arrived in Canberra in preparation for the High Court hearing tomorrow. The hearing will likely be over by mid-afternoon. The case has been distilled into a narrow debate about academic freedom of speech. Should a scientist with 30 years working on the Great Barrier Reef be able to say that work coming from other reef science organisations had insufficient quality assurance, and was thus not trustworthy? Or should he be fired because it was discourteous and disrespectful? The documentation for the hearing can be found at https://www.hcourt.gov.au/cases/case_b12-2021 It is a clash between the Intellectual freedom of speech clauses in the JCU work contract, which give a broad right to have a robust intellectual discussion, and the "code of conduct". The code of conduct would force all speech to be courteous, and any criticism of fellow academic's work would contravene the code because it would not "uphold the reputation of the university" and be discourteous and disrespectful. The science itself will not be analysed by the Judges. That is not their job. That is the job of scientists in universities and science institutions. But if scientists and academics are not allowed to do that, due to codes of conduct that effectively forbid a robust debate, it is easy to lose confidence in some of what we are told about important issues. I think we have a better than average chance of winning. But it will be a tense hearing. It will also likely take a couple of months for the final decisions to be handed down. I have been as surprised as thankful that so many people have shown interest in this case. Thousands of donations totaling over $1.4 million (in addition to the $300K Cheryl and I have chipped in).
12	Advance Australia	Link	3,739	As Peter Ridd said in response: 'tell everybody, especially the children – the Reef is fine. Don't let them scare you with continuous doom and gloom.'
13	The Shovel	Link	3,478	"Australians are sick and tired of all these coloured corals taking over our reef"
14	The Betoota Advocate	Link	3,461	"We blame China for the rest of the world realising that we have ignored scientists for the better part of a decade" said the Environment Minister.
15	The Betoota Advocate	Link	3,437	Sussan Ley has today sneered at the global pressure Australia is facing in regards to our pitiful disregard for the environment.

16	Pauline Hanson's Please Explain	Native Video	3,344	EXPERTS EXPOSE DODGY SCIENCE BEHIND GREAT BARRIER REEF EXTINCTION ALARMISM Many of you would be familiar with former James Cook University Professor Peter Ridd and the persecution he has faced for speaking out about some of the bad science behind some of the more bizarre claims about the health of the Great Barrier Reef. A recent scientific scandal shows how right he was for raising his concerns, with serious allegations of fraud being levelled at some Jame Cook University researchers. It turns out that many of the claims that have been made about the effects of global warming on the Great Barrier Reef and its ecosystem simply cannot be reproduced. Something One Nation has been warning about for many years. It's impossible to tell how much damage has been done to Australia's economy and reputation by the outrageous claims spread by these alarmists but hopefully, as evidence of their dodgy science continues to be exposed, over time we can repair some of the harm. #PaulineHanson #OneNationAus #AndrewBolt #PeterRidd #TheGreatBarrierReef
17	Katter's Australian Party	Photo	3,329	We've said it before and we'll say it again: It's time we left China-controlled UNESCO. Bob Katter has previously called on the Federal Government to cancel its membership with the United Nations Educational, Scientific and Cultural Organization (UNESCO) which he says has become controlled by the dictatorial Chinese regime. Mr Katter's comments came after a push by a China-chaired UN committee to declare the Great Barrier Reef "in danger". The Katter's Australian Party (KAP) Federal MP says the move by UNESCO is not related to environmental concerns but a further bullying move by the Chinese regime. "UNESCO has moved to classify one quarter of Australia's oceans endangered, well how come only five years ago the leading world authority on nature, David Attenborough, said the reef was 'the most magical place on earth'," Mr Katter said. The KAP believes the Great Barrier Reef is being used by international political superpowers as a political 'whipping boy' for a radical environmentalist agenda; and to deflect from their own poor environmental standards. KAP's leader Robbie Katter MP said: "local tourism operators and small businesses that work on the Reef should not have to suffer because a group of foreigners, who mostly have far worse environmental condition than Australia, decide to misrepresent the Great Barrier Reef and cause international implications to our tourism and related industries." #KAP #KAPteam #UNESCO #China #greabarrierreef
18	Rappler	Link	3,132	#FactCheck: GMA News initially released a graphic that mistakenly used an image of the Great Barrier Reef that has been on the internet since 2014. However, the report on Chinese ships dumping human waste in the West PH Sea was a recent analysis by a US-based expert.
19	George Christensen	Photo	3,009	A UN committee led by Communist China has decided to target Australia claiming the Great Barrier Reef is in danger when in fact the health of the reef is improving. I wonder what environmental assessments Communist China undertook when it built its illegal military islands in the maritime territory of other nations? Story: https://www.theaustralian.com.au/nation/chinaled-ambush-on-health-of-the-great-barrier-reef/news-story/b99813fe30fbc1919325058327980ce6:=:https://www.theaustralian.com.au/remote/check_cookie.html?url=https%3a%2f%2fwww.theaustralian.com.au%2fnation%2fchinaled-ambush-on-health-of-the-great-barrier-reef%2fnews-story%2fb99813fe30fbc1919325058327980ce6
20	The Juice Media	YouTube	2,935	"Yay the Great Barrier Reef is no longer on the endangered list we fixed it!" - Australien Government Our very first Honest Government Ad (2016) sadly still being relevant in 2021. New HGA coming soon
21	Dr Peter Ridd	Photo	2,893	Reef-scientists often claim that coral bleaching is a new phenomenon that only started in the 1970's due to climate change. But a remarkable new paper published by Tomas Cedhagen, of Aarhus University in Denmark has uncovered a very early lithograph showing bleaching in 1862. Before I go on, the High Court hearing went reasonably well but it is impossible to predict the result which could take three months. But back to bleaching. There are actually many other early observations of bleaching, including by Sir Maurice Yonge in the first major science expedition to the Great Barrier Reef in 1929 (if you don't count Captain James Cook's scientific exploration of the reef in 1770). But Eugen von Ransonnet's remarkable lithograph, taken from an incredibly crude diving bell, seems to be the earliest picture. People arguing that bleaching is new might argue that the important point is that there was no MASS coral bleaching before the 1970/80's. Von Ransonnet's lithograph is evidence only of bleaching on a small scale. This argument is incredibly weak for the following reasons. (a) In order to observe mass coral bleaching, it requires a major monitoring effort designed to measure such a large-scale event. Before about 1970, there

				were very few marine biologists and no major institutions capable of doing such monitoring. Von Ransonnet, in his diving bell was certainly not in that position. Marine science is a very new discipline, so it is not surprising that the mass coral death events, and the huge coral spawning events were unknown to science until a few decades ago. The first proper aerial surveys were not carried out until 1998. And would anybody argue that mass coral spawning, that was only discovered in the early 80's, never happened before that date. (b) If a few corals bleached in 1862, or 1929 (Yonge), due to hot or cold water, why would we suppose that the same hot/cold event did not bleach corals elsewhere in the same region? (c) On purely statistical grounds, large scale very hot events must have occurred before 1970. Perhaps not as frequently as today due to the warming climate, but they must have occurred. And its not as though the climate has got very much warmer in the last 100 years (from whatever cause). The reef water is at most just 1oC hotter. Major bleaching events must have occurred in the past unless you believe that all the corals on earth were precariously close to their upper thermal limit. But despite this, Prof Hughes of JCU stated on ABC radio "a critical issue here is that these bleaching events are novel. When I was a PhD student 30 years ago regional scale bleaching events were completely unheard of. They are a human invention due to global warming." This seems highly improbable. References https://km.dmcr.go.th/ckeditor/upload/files/Research%20Bulletin/FullpaperPMBC/06Coral_bleaching_recorded_durin.pdf ABC Radio National. (2016). Widespread coral bleaching detected on the Great Barrier Reef. [online] Available at: https://www.abc.net.au/radionational/programs/breakfast/widespread-coral-bleaching-detected-on-the/7212760.
22	Senator Matthew Canavan	Photo	2,777	A new report shows that coral cover in the reef has completely recovered from the cyclone and bleaching events of the last decade. What great news! We can remove all the ridiculous regulations on our farmers now right? https://www.theaustralian.com.au/science/great-barrier-reef-gets-a-breather-but-its-not-out-of-climate-danger-yet/news-story/e378a6db3862b836eadafc51c19e084b:=:https://www.theaustralian.com.au/remote/check_cookie.html?url=https%3a%2f%2fwww.theaustralian.com.au%2fscience%2fgreat-barrier-reef-gets-a-breather-but-its-not-out-of-climate-danger-yet%2fnews-story%2fe378a6db3862b836eadafc51c19e084b
23	Ocean Conservation Research - OCR	Native Video	2,766	Eastern shovelnose rays are a species of guitarfish, endemic to the east coast of Australia. Guitarfish are a family of rays (Rhinobatidae), with heads shaped similarly to a guitar, and bodies that resemble a cross between a shark and a ray. Eastern shovelnose rays don't have barbs or stingers like some other rays, and are harmless to people! 😷: Jacinta Shackleton Videography and Photography
24	Kevin Rudd	Link	2,762	This says everything about Morrison's priorities whether it's climate, the virus or the treatment of women. It's all about political spin to avoid political embarrassment in elections. It's never about scientific fact, substantive policy or measurable effect
25	Bob Katter	Photo	2,671	It's time we left UNESCO - it has been compromised by the Chinese regime!
26	Richard Poon	Photo	2,394	Chinese Embassy: "Fake news! Just wonder their intention this time. Fanning anti-China sentiments for their own selfish interests!" —— Me: For May 2022?
27	The Australian Greens	Photo	2,357	This government is being wilfully ignorant. Ignoring the science. Ignoring that burning coal, oil and gas fuels the climate crisis. Ignoring that the reef is dying on their watch. It's time to kick them out.
28	Australian Geographic	Link	2,335	"You see this huge, dark shape moving towards you and it's very exciting." ❤
29	MARK MY WORD by Mark Lopez	Link	2,300	Told ya Peeps… Former Amba @Bobi Tiglao writes: PETER Anthony Abaya, the brother of the late former president Benigno Simeon "Noynoy" Aquino 3rd's transport and communications secretary Joseph Abaya, should explain his role in transforming the small tech firm Simularity Inc. into a clever generator of fake news against China in its territorial dispute with the Philippines. This is important to us as a nation, as I hope everyone will realize after reading this column. The tiny Florida-based tech company, Simularity, in the past week, had gone on a campaign to claim that Chinese vessels were heavily polluting the Union Banks area in the Spratlys with what it outrightly referred to – in its supposed scientific paper – as "poop" and "shit." The firm cleverly got to spread its fake news through gullible media, notably GMA 7 and Channel 5's "OneNews," by posting together with its supposedly objective but questionable analysis a photograph taken from a low-flying airplane of a ship with a brownish trail anyone would conclude, because of the report's headline, as human waste discharged by the vessel. The photo, however, was immediately tracked down by

				an alert netizen as one appearing in Australia's Daily Mail in 2014 in the Great Barrier Reef in Cairns. The unidentified ship wasn't even discharging waste. It was undertaking dredging operations with the brown material being the usual sediments at the sea's bottom. Simularity's supposed "analysis" that Chinese vessels were polluting the Spratlys are so seriously flawed that they were obviously fake news disguised as scientific findings. First, there is no proof that the ships were Chinese as fishermen from Vietnam, Taiwan and the Philippines fish in the Spratlys. Satellite images Second, and more importantly, Simularity's "analysis" was based on satellite images from the European Space Agency, which it interpreted solely using its proprietary software it calls "AI-driven satellite image anomaly detection." Simularity has used the technology solely on detecting changes on the earth's surface. Set up in 2011, Simularity has had few takers for its technology with only three clients so far. The firm's claims, in fact, that chlorophyll-a around a ship can be detected from images taken by a satellite hundreds of kilometers in space or even that it automatically means human waste have no scientific basis. In its "shit" report, Simularity listed over 10 scientific articles as references. I plodded tortuously through all of them: none talked about Simularity's way of detecting shit through the presence of chlorophyll-a. In its Twitter account, Simularity claims it was founded in 2011 in Delaware to create the impression it has been that way many years in offering its services. However, it seems to have been struggling all those years because of few clients. It was only in 2018 that it was given a probably life-saving capital infusion when Abaya's Makati-based Shatter Tech Venture Holdings invested $1 million in it on July 17, 2018. Simularity then, for some reason, moved in 2020 to Florida by incorporating a branch there, under the category of "foreign for profit," obviously because all it had was the funding from Abaya's Filipino company Shatter Tech Venture Holdings. Abaya was the third company director after the couple Elizabeth and Raymond Derr. Funding Abaya's fund infusion has been Similarity's sole funding as reported both in its website and by its vice president for media Peter Koning in an email to me. In an email, I asked Koning: "Has the US State Department contracted Similarity to produce these "South China Sea Rapid Alert Reports?" He replied, "Reports are not paid for. Our investor is Shatter Tech and our customers are confidential." What could have happened in 2018 that got Abaya to invest in Simularity? That was the year when Simularity changed its studies ("to demonstrate the power of its software") from a few Middle East countries (apparently to attract US defense contracts) to the Spratlys. After Abaya's investment, Simularity came out with several studies on Mischief Reef, claiming that the Chinese were building massive fortifications there. It set up in 2020 its "South China Sea Rapid Alert Forum," in effect announcing that its focus of studies would be on the disputes in the South China Sea, which turned out to be practically fake news on China's allegedly villainous activities in the South China Sea, such as the alleged invasion, it reported last May of China's maritime militias in Union Banks (which is largely a Vietnam-controlled area). Wittingly or unwittingly confirming that it is part of the massive anti-China campaign on the fifth anniversary of the arbitration award handed down on July 12, 2016, Simularity's fake claim on massive pollution by Chinese vessels in the Spratlys was announced in the virtual forum organized by top Sinophobe Albert del Rosario's dubious institute "ARD-Stratbase" on that day. Pretenses Simularity (truncated)
30	Kevin Rudd	Link	2,275	The Barrier Reef-a priceless natural asset and our responsibility to protect. It's being destroyed by climate change & that's before Barnaby the denialist steps in. And Morrison's only worry? Being politically embarrassed because the UN has called him out!