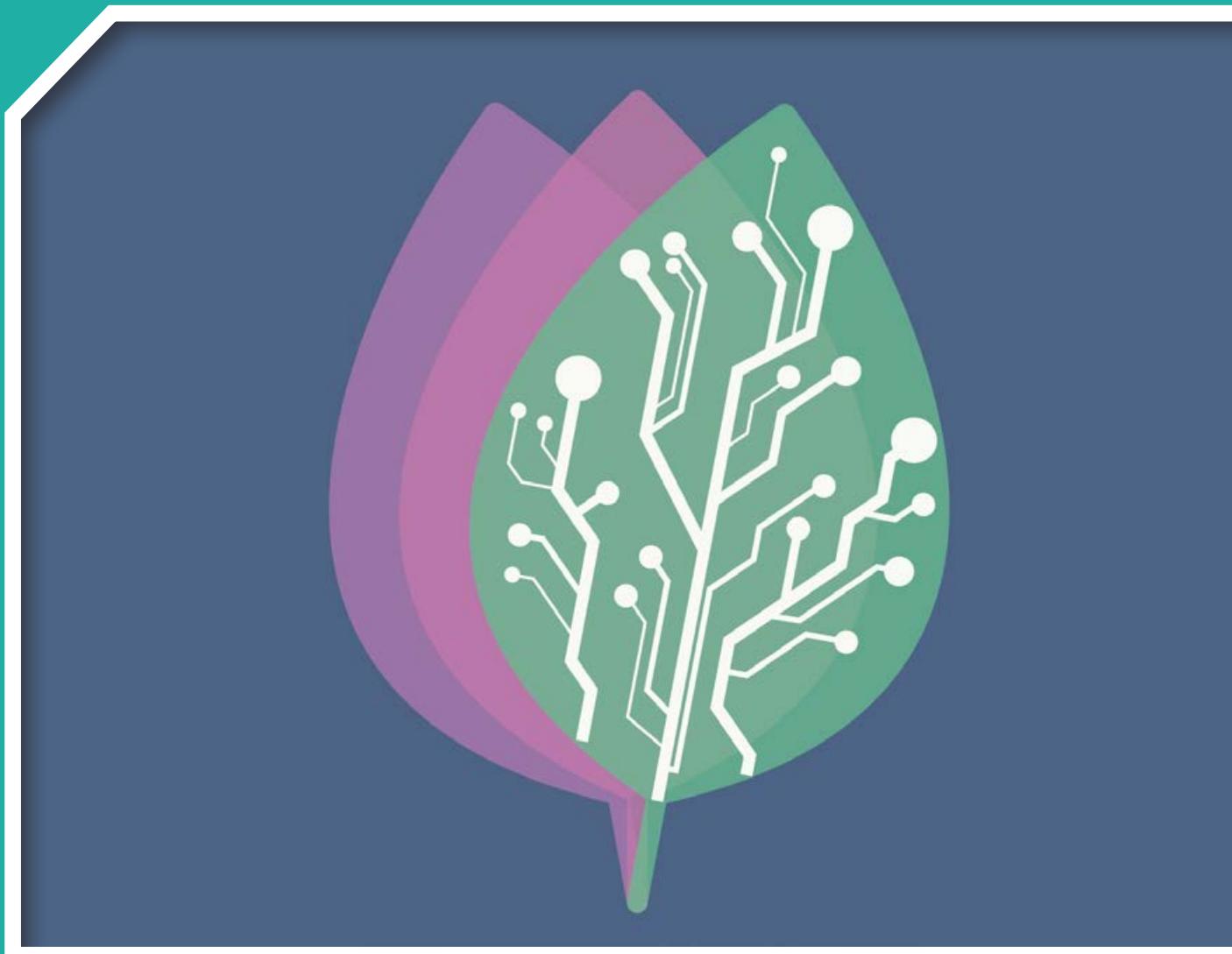


Sensing Our World: How Digital Cultural Practices Can Contribute to Changing Social Norms Around Consumption

Author: Trish Morgan



ENVIRONMENTAL PROTECTION AGENCY

The Environmental Protection Agency (EPA) is responsible for protecting and improving the environment as a valuable asset for the people of Ireland. We are committed to protecting people and the environment from the harmful effects of radiation and pollution.

The work of the EPA can be divided into three main areas:

Regulation: *We implement effective regulation and environmental compliance systems to deliver good environmental outcomes and target those who don't comply.*

Knowledge: *We provide high quality, targeted and timely environmental data, information and assessment to inform decision making at all levels.*

Advocacy: *We work with others to advocate for a clean, productive and well protected environment and for sustainable environmental behaviour.*

Our Responsibilities

Licensing

We regulate the following activities so that they do not endanger human health or harm the environment:

- waste facilities (*e.g. landfills, incinerators, waste transfer stations*);
- large scale industrial activities (*e.g. pharmaceutical, cement manufacturing, power plants*);
- intensive agriculture (*e.g. pigs, poultry*);
- the contained use and controlled release of Genetically Modified Organisms (*GMOs*);
- sources of ionising radiation (*e.g. x-ray and radiotherapy equipment, industrial sources*);
- large petrol storage facilities;
- waste water discharges;
- dumping at sea activities.

National Environmental Enforcement

- Conducting an annual programme of audits and inspections of EPA licensed facilities.
- Overseeing local authorities' environmental protection responsibilities.
- Supervising the supply of drinking water by public water suppliers.
- Working with local authorities and other agencies to tackle environmental crime by co-ordinating a national enforcement network, targeting offenders and overseeing remediation.
- Enforcing Regulations such as Waste Electrical and Electronic Equipment (WEEE), Restriction of Hazardous Substances (RoHS) and substances that deplete the ozone layer.
- Prosecuting those who flout environmental law and damage the environment.

Water Management

- Monitoring and reporting on the quality of rivers, lakes, transitional and coastal waters of Ireland and groundwaters; measuring water levels and river flows.
- National coordination and oversight of the Water Framework Directive.
- Monitoring and reporting on Bathing Water Quality.

Monitoring, Analysing and Reporting on the Environment

- Monitoring air quality and implementing the EU Clean Air for Europe (CAFÉ) Directive.
- Independent reporting to inform decision making by national and local government (*e.g. periodic reporting on the State of Ireland's Environment and Indicator Reports*).

Regulating Ireland's Greenhouse Gas Emissions

- Preparing Ireland's greenhouse gas inventories and projections.
- Implementing the Emissions Trading Directive, for over 100 of the largest producers of carbon dioxide in Ireland.

Environmental Research and Development

- Funding environmental research to identify pressures, inform policy and provide solutions in the areas of climate, water and sustainability.

Strategic Environmental Assessment

- Assessing the impact of proposed plans and programmes on the Irish environment (*e.g. major development plans*).

Radiological Protection

- Monitoring radiation levels, assessing exposure of people in Ireland to ionising radiation.
- Assisting in developing national plans for emergencies arising from nuclear accidents.
- Monitoring developments abroad relating to nuclear installations and radiological safety.
- Providing, or overseeing the provision of, specialist radiation protection services.

Guidance, Accessible Information and Education

- Providing advice and guidance to industry and the public on environmental and radiological protection topics.
- Providing timely and easily accessible environmental information to encourage public participation in environmental decision-making (*e.g. My Local Environment, Radon Maps*).
- Advising Government on matters relating to radiological safety and emergency response.
- Developing a National Hazardous Waste Management Plan to prevent and manage hazardous waste.

Awareness Raising and Behavioural Change

- Generating greater environmental awareness and influencing positive behavioural change by supporting businesses, communities and householders to become more resource efficient.
- Promoting radon testing in homes and workplaces and encouraging remediation where necessary.

Management and structure of the EPA

The EPA is managed by a full time Board, consisting of a Director General and five Directors. The work is carried out across five Offices:

- Office of Environmental Sustainability
- Office of Environmental Enforcement
- Office of Evidence and Assessment
- Office of Radiation Protection and Environmental Monitoring
- Office of Communications and Corporate Services

The EPA is assisted by an Advisory Committee of twelve members who meet regularly to discuss issues of concern and provide advice to the Board.

EPA RESEARCH PROGRAMME 2014–2020

**Sensing Our World: How Digital Cultural
Practices Can Contribute to Changing Social
Norms Around Consumption**

(2018-SE-DS-17)

EPA Research Report

Prepared for the Environmental Protection Agency

by

Dublin City University

Author:

Trish Morgan

ENVIRONMENTAL PROTECTION AGENCY
An Ghníomhaireacht um Chaomhnú Comhshaoil
PO Box 3000, Johnstown Castle, Co. Wexford, Ireland

Telephone: +353 53 916 0600 Fax: +353 53 916 0699
Email: info@epa.ie Website: www.epa.ie

ACKNOWLEDGEMENTS

This report is published as part of the EPA Research Programme 2014–2020. The EPA Research Programme is a Government of Ireland initiative funded by the Department of the Environment, Climate and Communications. It is administered by the Environmental Protection Agency, which has the statutory function of co-ordinating and promoting environmental research.

The author would like to acknowledge the members of the project steering committee, namely Fiona O'Rourke (EPA), Damien Ó Tuama (Independent Mobilities Consultant and Researcher), James Clark (University of York), and Dorothy Stewart (EPA), who have overseen the management of this and the prior research project; and also Oonagh Monahan (Research Project Manager on behalf of the EPA).

DISCLAIMER

Although every effort has been made to ensure the accuracy of the material contained in this publication, complete accuracy cannot be guaranteed. The Environmental Protection Agency, the author and the steering committee members do not accept any responsibility whatsoever for loss or damage occasioned, or claimed to have been occasioned, in part or in full, as a consequence of any person acting, or refraining from acting, as a result of a matter contained in this publication. All or part of this publication may be reproduced without further permission, provided the source is acknowledged.

This report is based on research carried out/data from January 2019 to January 2020. More recent data may have become available since the research was completed.

The EPA Research Programme addresses the need for research in Ireland to inform policymakers and other stakeholders on a range of questions in relation to environmental protection. These reports are intended as contributions to the necessary debate on the protection of the environment.

EPA RESEARCH PROGRAMME 2014–2020

Published by the Environmental Protection Agency, Ireland

ISBN: 978-1-84095-960-4

November 2020

Price: Free

Online version

Project Partners

Trish Morgan

School of Communications

Dublin City University

Glasnevin

Dublin 9

Ireland

Tel.: +353 1 700 7028

Email: trish.morgan@dcu.ie

Contents

Acknowledgements	ii
Disclaimer	ii
Project Partners	iii
List of Figures	vii
Executive Summary	ix
1 Introduction	1
1.1 Overview of the Project	1
1.2 Key Aims and Themes	2
1.3 Project Scope	2
2 Literature Review	3
2.1 Introduction: Six Key Thematic Areas	3
2.2 Theme 1: Environmental Communication	3
2.3 Theme 2: Structural and Institutional Approaches to Knowledge Production	6
2.4 Theme 3: Digital Cultural Production in Non-commercial Contexts	9
2.5 Theme 4: Ecological Art as Pragmatic Environmental Knowledge Production	12
2.6 Theme 5: Concepts of the Nature/Society Relationship	15
2.7 Theme 6: Citizen Sensing, Smart Sensing and the Irish Context	19
2.8 Literature Review Summary	23
3 Archival Analysis	25
3.1 Introduction	25
3.2 Key Findings	25
3.3 Discussion/Highlights	27
4 Policy Review	29
4.1 Introduction: Linking Cultural and Environmental Policy	29
4.2 International Context: Sustainable Development Goals and UNESCO	29
4.3 Irish Cultural Policy Context	31
4.4 Irish Environmental Policy Context	32
4.5 Summary and Recommendations	36

5	Fieldwork	38
5.1	Introduction to the Fieldwork: Rationale and Scope	38
5.2	Site Visits, 6–8 September 2019	38
5.3	Observations and Discussion	39
5.4	Supplementary Fieldwork: <i>Eco-visionaries</i>	40
6	Dissemination of Research: Website and Workshop	41
6.1	Online Platform for Selected Works and Resources	41
6.2	Workshop	41
7	Conclusions and Recommendations	43
7.1	Limitations of Existing Communications Approaches	43
7.2	Expanding Approaches to Environmental Communication	43
7.3	Beyond the Visible: Opportunities for Sensing Environmental Issues	44
7.4	Limitations	44
7.5	Policy Recommendations	44
References		46
Abbreviations		51

List of Figures

Figure 2.1. Bourdieu's field theory, re-annotated by the author

8

Executive Summary

The urgency of immediate action to transform societies towards environmental sustainability is clear. In March 2019, a United Nations meeting warned how global societies have “only 11 years left to prevent irreversible damage from climate change” (United Nations, 2019). A mere 2 months later, the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) released a report that warned of “unprecedented” biodiversity loss, requiring “transformative change” as the “safety net” of nature is “stretched almost to breaking point” (IPBES, 2019a).

Such strong and unprecedented warnings signal the need for rapid and transformative change across all sectors of society. Such change requires new practices across all societal sectors. This project argues that the communication of environmental issues and their solutions is one central dimension to societal transformation (Garnham, 2000). Mainstream media, while affording some strengths in communicating these matters, can be limited by structural dynamics and the need to interact with advertising, thus diluting messages around reduction in unsustainable consumption habits among publics (Morgan, 2017). This project builds on those findings that found challenges and constraints in mainstream media’s ability to report on transformative societal imaginaries. Given the constraints of such knowledge production, this project investigates the potential

for non-commercial production to communicate environmental issues in novel ways to publics.

This report provides a thematic and interdisciplinary literature review that analyses environmental communication, structural barriers to effective communication, the benefits and limitations of non-commercial knowledge production and digital cultural production, the role of environmental sensing, and the nature/society relationship. It conducts a policy analysis of key environmental and cultural policies, and through this analysis proposes how linkages can be strengthened between cultural and environmental policy domains to support the communication of environmental issues. To this end, it calls for the establishment of a joint initiative between environmental and cultural stakeholders to work towards this integration. It outlines key findings from an archival analysis of novel non-commercial environmental communication practices, and it reports on international fieldwork carried out during the project. This primary research revealed that environmental data can not only be made visible, but also be made audible, tactile and even smelly and tasty. It presents an online database that showcases key works from the archival analysis and fieldwork. This database contributes to disseminating the research and providing a resource to a wide range of stakeholders and the general public.

1 Introduction

1.1 Overview of the Project

This report provides a summary of the research project “Sensing Our World: How Digital Cultural Practices Can Contribute to Changing Social Norms Around Consumption”. This project builds on the findings of Environmental Protection Agency (EPA) report *Going Green Digitally? Environmental Crisis, Consumption Patterns and the Evolving Role of Media* (Morgan, 2017), which found limitations in mainstream broadcast media in Ireland in terms of commercial and content-related pressures. That research found that environmental issues were largely treated in isolation and in an episodic way (Morgan, 2017). It acknowledges that the “framing” of environmental stories in the media can be problematic, with issues of “false balance” diluting the perception of the scientific consensus on climate change (House of Commons Science and Technology Committee, 2014). Research has also revealed that fear-mongering in media stories around environmental issues is ineffective at producing behaviour change (O’Neill et al., 2009). Therefore, knowledge gaps in the public’s understanding of environmental matters are complex, with questions around the efficacy of traditional mainstream media to bridge those knowledge gaps.

These communication challenges come not only at a time when Ireland is set to miss its 2020 emissions targets, but also at a time when “strong economic growth”, and therefore increased consumption, is a continuing key driver of emissions (EPA, 2018). This shows a failure in Ireland to decouple growth from resource-intensive consumption. It is evident that resource-intensive consumption is embedded as an unconscious social norm, despite stark warnings from the Intergovernmental Panel on Climate Change (IPCC) about the “severe, pervasive and irreversible” effects of climate change (IPCC, 2014) and biodiversity loss (IPBES, 2019a,b).

Therefore, the need to communicate to publics¹ about the transition to less resource-intensive consumption is a key challenge for actors and stakeholders in the Irish environmental context, not least given the limitations for such communication through traditional channels. However, this comes at a time when unprecedented technological affordances are at the disposal of Irish stakeholders. These technologies allow stakeholders to monitor, manage and communicate environmental data. Exciting technological developments in environmental sensing have potential beneficial impacts on both urban and rural contexts. The “smart” city, predicated on “smart” infrastructure that utilises Internet of Things protocols, is an actually existing technology.

Although these are exciting, timely and needed developments, this project argues that there exists a knowledge gap between the “big” data of environmental sensing and wider publics who are unempowered regarding their resource use and consumption behaviours. The invisibility of this environmental data, although “open” to those with the technical know-how to work with it, is therefore a key concern of this project. Indeed, Gabrys and Yusoff (2012: p. 1) argue that “within climate change debates, writers and scholars have called for expanded methods for producing science, for proposing strategies for mitigation and adaptation, and for engaging with publics”. Likewise, Stengers (2005: p. 994) argues for research to create “an opportunity to arouse a slightly different awareness of the problems and situations mobilizing us”.

To this end, this project argues that there exists an opportunity to bridge a knowledge gap in the public’s understanding of social norms around consumption by presenting relevant information on the state of the environment, in ways that are engaging and informative. The project also argues that the threats

¹ The distinction between the words “public” and “publics” is made to acknowledge that, within what we understand as the “general public”, there are distinctive groups of people with specific interests, e.g. environmental issues. This acknowledges that society is not composed of a homogeneous group of people – a singular public – but can be thought of as multiple groups of people with different interests and priorities.

posed by the ecological crisis are vast enough to challenge any complacency around ideas of the “two cultures” of separate disciplines of the “affective” humanities and the “rational” sciences; rather, they demand and require problem-solving on both fronts. Therefore, there exist opportunities to increase public awareness of social norms around consumption afforded by working with scientific or environmental data in novel ways.

1.2 Key Aims and Themes

The project aims to contribute to bridging the knowledge gaps in the area of novel digital media approaches and environmental communication. It also aims to investigate non-commercial production of knowledge and its affordances² for communicating environmental issues in novel ways while remaining critical of limitations in that area. This is to identify pressures, inform policy and develop novel solutions.

Key themes therefore centre around environmental communication, structural approaches to understanding the production of knowledge, cultural production in non-commercial contexts, concepts of the nature/society relationship, and issues of “smart” sensing. These themes are investigated through an interdisciplinary literature review. A further but closely linked theme concerns how policy can support the communication of environmental issues. To this end, cultural and environmental policy analyses

are conducted to ascertain how linkages between the domains can be strengthened. A further theme concerns existing practices that can be communicated to stakeholders with an interest in communicating environmental issues. These practices are investigated through an archival analysis and fieldwork. Selected works of interest and relevance are identified and presented using a rich-media website, i.e. one that helps the audience experience and understand the practices through the inclusion of images and video.

1.3 Project Scope

The project necessarily adopts a broad scope that acknowledges the need to develop effective communication of environmental issues in general, rather than focus on one environmental issue such as climate change or biodiversity. This is in light of economic modelling that takes account of planetary boundaries, such as Kate Raworth’s *Doughnut Economics* (2017). Raworth’s approach takes account of an “ecological ceiling” that encompasses nine planetary boundaries (Raworth, 2017: p. 45). When environmental issues are viewed in this light, it is evident that, even if one boundary concern such as climate change were resolved, there still exist eight further ecological boundaries that need attention and action to varying degrees. By not specifically focusing on one environmental issue, the scope of this project remains broad so as to be applicable to ongoing multiple and future environmental challenges.

2 The term “affordances” is from the field of interaction design and refers to what a medium or technology “affords” the user in their interaction with the media resource. This term pertains both to “an attribute of an object that allows people to know how to use it” and to design of media resources to invite and promote ease of use (Preece *et al.*, 2002: pp. 25–26). In this report, “affordances” mean distinctive features or attributes of a form of knowledge production that invite audiences and users to learn about environmental issues.

2 Literature Review

2.1 Introduction: Six Key Thematic Areas

The literature review provides the theoretical, conceptual and critical foundations to assess the extent to which digital cultural practices can contribute to behaviour change towards sustainability. By “digital cultural practices”, the report understands not only that cultural practices can use traditional materials, such as paint in art and wood in sculpture, but how culture can also be made using digital media. However, it must be noted that, while a focus on digital practices is the goal of this project, in practice artists and producers frequently work with a mixture of means, thus blurring any theoretical difference between “traditional” and “digital” practices. Therefore, while this research project aims to focus on digital practices, it also contains examples of work beyond the digital realm. The review encompasses material from two key academic disciplines, those of media/communications and geography. In this overview, I outline the scope of each body of literature, the key points of inquiry and key learnings from the literature that inform this project. The review also maintains a critical stance throughout, aiming to steer away from hubris around technology in regard to how it promises “reach”, “likes” and quantifiable but not qualitative measures of “impact” in the form of real-world behaviour change. Instead, it foregrounds the affordances and challenges to behaviour change. The review comprises six main thematic sections.

2.2 Theme 1: Environmental Communication

The first thematic area reviews the literature on environmental communication. It seeks to map the field of existing research on how environmental matters are communicated to publics. A key finding from this review is how the existing scholarship tends to focus on journalistic communication. Yet, as Morgan (2017) observed, there are multiple structural factors that limit the efficacy of this particular domain of knowledge production, many arising from its commercial links to the domain of advertising.

Thus, the journalistic field demonstrates severe and specific constraints when dealing with environmental sustainability, not least because its reliance on the domain of advertising tends to limit or constrain messages concerning major changes or reductions in consumption behaviours (Morgan, 2017). Indeed, this has been borne out by the literature review in this area, with multiple studies calling for structural analyses of the media as necessary to understand how environmental matters are communicated.

Key findings from this section of the literature review comprise the following: (1) how the production of journalism is but one of many ways in which knowledge is produced, yet the journalistic domain tends to be the sole (or predominant) focus of research by the academic field of environmental communication to date; (2) as a specific domain of knowledge production, journalism is highly constrained by its linkages with advertising and marketing interests; and (3) how a gap in the communication of environmental knowledge may be bridged by paying attention to other forms of knowledge production, such as non-commercial production.

Within the research on environmental communication, one subset of the literature considers the relationship between the media and their response to environmental issues. However, this survey of the literature reveals a tendency for the field to concentrate on print and, to a lesser extent, broadcast journalism, taking these as representative of “communication”. Furthermore, there is also a tendency in the field to focus on climate change and presume that to be representative of all environmental issues. There are some notable exceptions to this tendency, however. For example, Cox (2010) provides some interesting insights on the breadth of what is understood by communication. Cox’s work is focused on communication in the public sphere and thus addresses not only mediated communication but also face-to-face interactions, such as marches, videos and “visual and nonverbal symbolic actions” (Cox, 2010: p. 16). It also considers more radical environmental groups in an emancipatory perspective, including acknowledging how some studies in this

area can point to new imaginaries,³ with a reflection on “imagining a different world” (p. 365). Similarly, the author provides a discussion of existing imaginaries that run counter to dominant narratives, citing as one salient example how the Native American cultures have urged consideration of the consequences of environmental actions for seven generations (p. 366).

Notwithstanding such exceptional work, I suggest that the environmental communication field is marked by many “opportunity lost” moments in terms of enhanced understanding of the communication of pressing ecological pressure points and their remedies. Furthermore, the field displays a marked emphasis and focus on the study of representation. As Anderson (2014) notes, the field is marked by the predominance of “studies that focus exclusively on examining media representations” (Anderson, 2014: p. 166). The prevalence of such studies must be criticised because they “inevitably produce a partial and narrow picture of what is going on; they shed little light on the wider cultural politics of environmental issues” (*ibid.*). This results in the neglect of crucial factors, including issues of power structures within the production of journalistic knowledge, which are “less visible” and “hidden” in the contemporary setting (*ibid.*).

Given that this report is concerned with novel approaches to communicating environmental issues, we must consider those structural factors that potentially impact on what is communicated about environmental issues. This literature review has identified a small subset of studies that point to these more structural issues. This includes the work of Hansen (2011), who articulates the central role and position of the media with respect to climate change, while also noting its challenges. He observes how “much, maybe most, of what we learn and know about ‘the environment’, we know from the media, broadly defined” (p. 8). He thus notes that, in terms of environmental communication, “it appears that the battles over these issues are now as much to do with communication aimed at ‘winning hearts and minds’ as they are to do with communicating science-based or expert evidence” (*ibid.*).

For Hansen, the key challenges in environmental communication fall into three categories: those of “the production/construction of media messages and public communications; the content/messages of media communication; and the impact of media and public communication on audiences” (pp. 8–9). In addition, Hansen calls for the recognition of “a need for media and communications research on environmental issues/controversy to reconnect with traditional sociological concerns about power and inequality in the public sphere and in public communication” (p. 9). Hansen concludes that, although there has been much valuable research that “has made important advances in terms of showing how successful claims-making in society is closely related to the (economic and organizational) resources and political power commanded by key claims-makers” (p. 20), there is also a need to conduct further research “uncovering the deeply ideological nature of public communication, but more particularly … in terms of uncovering how communicative ‘power’ in society is deeply unequally distributed” (pp. 20–21).

The concept of power is also discussed by Hackett *et al.* (2017). While these authors focus on journalism and climate change, they also observe how “public discourses about climate change are being constrained by powerful sections of the media and political establishments” (Hackett *et al.*, 2017: p. 2). These authors stress that “the key problem is not a lack of coverage or information” (*ibid.*) but rather “how journalism presents the issue and what kinds of responses it generates in audiences/publics” (*ibid.*). The authors call for an acknowledgement of both the limitations of commercial journalism and the pressures that financial concerns bring to the domain, while arguing for “democratic media reform”, be that a transformation of ownership structures, regulation, or public investment (p. 16).

The key structural tensions and challenges of communicating climate change are also addressed by Boykoff and Yulsman (2013). They address how, despite overwhelming scientific evidence of anthropogenic climate change, action on the issue

³ The word “imaginaries” refers to “a set of presumptions that people have about their collective life” (Vertovec, 2012: p. 305). For Taylor (2007: p. 23), it is the “ways in which people imagine their social existence, how they fit together with others, how things go on between them and their fellows, the expectations that are normally met, and the deeper normative notions and images that underlie these expectations”.

is "complex and contested" (p. 360). They also recognise that the role of the mass media is key, not only in describing and analysing scientific issues and concrete actions, but also with regard to "imaginaries" (*ibid.*). Indeed, they emphasise that the role of media is crucially important in terms of public engagement with climate change, arguing that the mass media are responsible for interpreting and disseminating scientific research to which the public do not automatically have direct access (*ibid.*). They observe that citizens have significant choice over their media channels, such as "television, newspapers, magazines, radio, online news and aggregation sites, blogs, and social media – to gain access to news and information about climate change" (*ibid.*). However, this choice comes with economic pressures on the production side, with increasing time pressures on journalists to produce knowledge, along with pressures to report on a wider range of topics (*ibid.*). Furthermore, these structural and economic constraints on the field of journalism negatively impact on what can be covered. They conclude by noting that "while the main principle of democratic news production has been that news media serve as a check on the state, and hold those in power accountable to the public, in practice corporate-controlled media have been argued to act systematically in the service of state power" (p. 361). The result of this is of key importance, in that "with the news media being less capable of providing textured coverage of climate science and policy, public understanding and engagement suffer" (*ibid.*).

Notwithstanding the focus on journalism, climate change and representation, and the structural constraints outlined above, positive turns in the field can be noted. For example, there have been multiple calls for the discipline to engage with interdisciplinary research given the scale of environmental issues faced by society. To this end, Smith and Lindenfeld (2014) make the case for transdisciplinary research. They cite the enormity and significance of the issue of climate change, and justify the need to extend studies of media across disciplines "given the urgency and magnitude of creating meaningful adaptation and mitigation strategies to address this pressing, complex challenge" (p. 180). They envisage a potential role for studies of media "to serve on-the-ground decision-making and enhance society's ability to take action" (*ibid.*). Likewise, Olausson and Berglez

(2014) call for an understanding of what they term the "interdisciplinary challenge" involved in researching media and climate change. They observe that the relevant interdisciplinary challenges lie both between the natural and social sciences, and also within aspects of the social sciences (p. 254). They call for an inclusion of social sciences in environmental research, observing that "without functioning communication, public legitimacy for research, and regulations connected to climate change, will be lost" (p. 253).

Another positive turn in the field comprises the attempts by some scholars to broaden the remit of environmental communication research. For example, there is attention being paid to networked, i.e. online, media, such as by Hopke and Hestres (2018), Kaiser (2017), and Jang and Hart (2015). Painter *et al.* (2018) analyse the "digital born" platforms *Vice*, *The Huffington Post* and *Buzzfeed*, finding some contrasts between how those platforms treat denier perspectives in comparison with legacy media. They found that ideas of "uncertainty" about the science have less prominence in these online platforms owing to their "stated policy of not giving voice to sceptics" (Painter *et al.*, 2018: p. 8).

One further development of note concerns increased attention to visual representation of climate change in news media. This is particularly evident in the work of O'Neill *et al.* (2013, 2015) and O'Neill (2013). Hansen and Machin (2013) also consider visual communication, noting that "while scholarly work on media representations of environmental issues had made substantial progress in textual analysis, there had been much less work on visual representations" (p. 151). This tacitly calls for an expansion in environmental communication research beyond works comprising text, as well as beyond journalistic and commercial media. This, I suggest, confirms the observed gap in the knowledge forms favoured by the established field of environmental communication, in that it frequently tends to be synonymous with journalistic communication. However, these particular authors argue for an expanded notion of communication, one in which "we look to the nature of the industries where representations are reproduced" (p. 153). For Hansen and Machin (2013), this includes "the production and the economics that are behind production, such as the way in which individual media outlets are owned by globally operating conglomerates

often interlinked with wider corporate and financial institutions”, along with “how advertisements are the engines of mass media”, and the financing of products (*ibid.*).

A final observation is not confined to the area of environmental communication, but it cannot be ignored or neglected in this context: this concerns the materiality of media production. One significant source for this discussion is the work of Christensen and Nilsson (2018), which draws attention to the limitations of mainstream environmental communication research, not least those focusing on “questions of content and representation” (p. 267). For these authors, this is to the neglect of the materiality of media as infrastructure (*ibid.*). In doing so, they call for the field of environmental communication to consider issues such as the uneven and unfair geopolitics of electronic waste (*ibid.*). According to the authors, consideration of “technological afterlives” (p. 272) needs to take place in media studies:

Analyses of journalistic coverage, framing, political economy of the media, and the role of lobbying – all of which apply to the study of waste and other environmental questions, particularly in a milieu where alternative facts circulate virally – could benefit from such fresh perspectives. (p. 272)

For the authors, considering the materiality of media in the form of electronic waste “challenges the notion of technology – and digital technology in particular – as clean” (p. 271). They also call for “a critical geopolitics of mediation and environmental change” (p. 274) that takes account of these global structural issues of uneven development. Indeed, in the Irish context, electronic and electrical waste per capita is on the rise, from an average of 7.55 kg per person in 2011 to 9.6 kg per person in 2017, the latest year for which the data are available (Eurostat, 2020).

Cubitt (2017) and Maxwell and Miller (2012) have also made some important contributions to this discourse by analysing the environmental costs of the production, use and disposal of electronic devices. This work includes discussions of the metals, plastics and other bioaccumulants involved in the production of contemporary devices used for media production. Miller (2015) takes this discussion further, to involve issues of ethics for media producers and, indeed,

researchers. He calls for recognition of the “lengthy history of environmental despoliation” associated with production of digital technologies (Miller, 2015: p. 653), along with a “comparative audit of the impact of these forms of journalistic research and a transparent declaration of their carbon footprint, along with that of their consumption by readers, as a new principle of the field” (p. 660).

2.2.1 Summary

This section has reviewed a body of prior research in the environmental communication field that reveals significant limitations in coverage of environmental issues in mainstream media along with how journalism and climate change are treated as objects of study. The research in this area includes some explicit calls for attention to the structural and power dynamics that influence how mainstream media cover environmental issues. This review further underlines the need to consider alternative ways of communicating environmental issues, including recent calls for a strengthening of interdisciplinary research.

2.3 Theme 2: Structural and Institutional Approaches to Knowledge Production

This section reviews literature on the production of knowledge, taking a structural and comparative approach to domains of knowledge production. It provides an overview of Bourdieu’s field theory, finding that, while journalistic production is one domain through which knowledge is produced, it is broadly a form of “cultural” or knowledge production, as distinct from material or scientific production. A key finding from this section of the literature review is how the area of cultural production, as a form of knowledge production, comprises many different fields, to include literature, journalism, advertising and art, among others. Such a perspective is especially helpful in revealing how domains of knowledge production are situated within society and are subject to varying tensions and pressures, including economic dimensions. These pressures, in turn, influence what can be produced in the field. This structural schema reveals that different domains of knowledge production can have varying levels of autonomy or constraints over what they produce. These variances in autonomy

can affect what can be communicated. Therefore, there also exist limitations to how environmental matters such as behaviour change towards sustainability can be discussed. A key finding from the body of work reviewed in this section is how issues of autonomy are to the fore when producing knowledge. Such work contends that, because the domain of journalism has limitations to its autonomy, a case can be made for paying attention to other domains of knowledge production for the communication of environmental issues.

2.3.1 Field theory of Pierre Bourdieu

In this section of the literature review, I discuss the field theory of sociologist Pierre Bourdieu. For Bourdieu, society can be analysed by what he terms *fields*. Bourdieu considers a field to be “a social arena within which struggles of manoeuvres take place over specific resources or stakes and access to them” (Jenkins, 2002: p. 84). Such tensions are both hierarchical and relational, and involve individuals acting within their fields “to maximise their control over the social resources specific to that field” (Garnham and Williams, 1986: p. 122). Furthermore, there exist hierarchical tensions between fields. Bourdieu argues that the field of class struggle predominates over other fields, and therefore imbues each other field with the same features of class struggle. This brings to prominence the structural and power issues identified by Anderson (2014) and Boykoff and Yulsman (2013) in relation to environmental communication.

The concept of the field has implications for understanding cultural production such as journalism and non-commercial production as a form of knowledge production. For Bourdieu, a cultural field as a field of knowledge production is a “symbolic” field, as opposed to an economic or intellectual field (Garnham and Williams, 1986: p. 122). Bourdieu does not consider what he terms the “symbolic” field (in which cultural production is embedded) to function any differently to other fields, in that it involves issues of struggle over power (*ibid.*). Indeed, the field of cultural production “is a veritable social universe where, in accordance with its particular laws, there accumulates a particular form of capital and where relations of force of a particular type are exerted” (Bourdieu, 1993: p. 164). While subjective ideas such as those of cultural taste and aesthetic judgement are influenced

by individuals in the field, they are also influenced by the relationship of the field of cultural production to the broader field of power. Therefore, within the hierarchy of a field, there can be dominant and dominated positions, while the field itself can be relatively dominant or dominated when viewed relative to the field of power. I suggest that this sheds light on the constraints on journalistic and commercial production of environmental knowledge as outlined above.

Bourdieu argues that the field of cultural production is itself dominated by the field of power, but to varying degrees. This is because this field “is the economic world reversed” in that “cultural production distinguishes itself from the production of the most common objects in that it must produce not only the object in its materiality, but also the value of this object, that is, the recognition of artistic legitimacy” (*ibid.*). This has implications for production of culture, be that journalistic culture, artistic culture and so forth, in that the production of cultural objects contains a potential for wealth but also requires a social approval within the field. This is important for our understanding of culture and knowledge, and the distinctions within such products, as it helps explain certain strategies employed by members of the field of cultural production involved in the communication of environmental issues, for example journalists and artists.

Bourdieu, along with the analysis of fields operating within hierarchical struggle, also takes the field of capital into consideration. This is evident from Bourdieu’s emphasis on power relations and class struggle in his analysis of fields. He distinguishes between two forms of capital – cultural and economic – for the purposes of analysis of his field theory (Garnham and Williams, 1986: p. 122). For Bourdieu, actors enter fields with the intention of reproducing and, if possible, adding to the capital of that field. Thus, Bourdieu treats cultural production “as ‘position taking’ in a field of possibilities, a market in which symbolic capital or cultural distinction are product, reward and resource: both means and end” (Jenkins, 2002: p. xii). This holds true even for so-called “cultural” capital, because cultural capital functions as a form of symbolic capital that has the potential to be ultimately converted to economic capital. This potentially influences what is communicated in the public realm.

The social space

Bourdieu's field theory introduces a set of actors and their interactions with economic and cultural capital. This field theory is annotated in *The Rules of Art* (Bourdieu, 1996: p. 124) and provides a point of discussion for this report. The annotation is reproduced in Figure 2.1. From this annotation, it is evident that within the social space is a dominant field of power. For Bourdieu, this field is "characterized by high levels of economic capital and low levels of cultural capital" (Hesmondhalgh, 2006: p. 214). This is symbolised using CE+ to represent the high level of economic capital associated with the field and CC- to represent a low level of cultural capital (Bourdieu, 1996: p. 124). Within the field of power are multiple fields (such as science, politics and manufacturing), with Bourdieu focusing on the field of cultural production for his analysis.

For Bourdieu, the field of cultural production is not a homogeneous field, but within it exist contrasts. Bourdieu splits the field into the sub-divisions of

large-scale production and small-scale production. This is of key significance for this discussion, as Bourdieu places journalism into the area of large-scale production. This area is characterised by high levels of economic capital (CE+) but low levels of cultural capital (CC-). Furthermore, he annotates this area to have relatively low levels of autonomy over its productions (AUTON-). This is of importance for the communication of environmental matters, in that it acknowledges the significant economic capital of the domain of journalism but how, in possessing that form of capital, it possesses less cultural capital, and has tensions over autonomy of production also. In contrast, small-scale production such as "art for art's sake" is characterised by high levels of cultural capital (CC+) but low levels of economic capital (CE-) and a high level of autonomy (AUTON+).

I suggest that this perspective can shed light on the potentials and limitations for multiple domains of knowledge production and communication of environmental matters. When field theory is considered, communication strategies can take

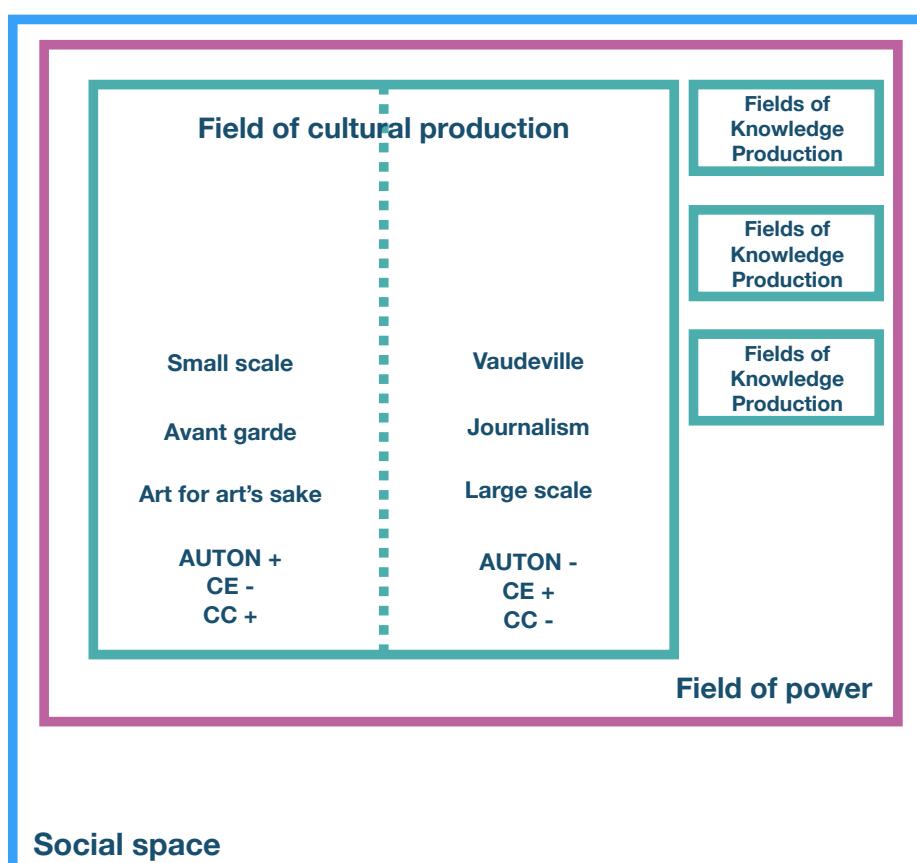


Figure 2.1. Bourdieu's field theory, re-annotated by the author. Source: Bourdieu (1996: p. 124).

account of the relative merits and demerits of communicating through different fields. For example, an affordance of journalistic production is in its high levels of economic capital. This points to the potential to reach a large audience and gain attention. However, there may be some limitations in the discourse owing to lower levels of autonomy. In contrast, an affordance of artistic production can be in the cultural capital of the domain, and greater autonomy of discourse potentially available. However, the extent of reach may be an issue. I also suggest that, in terms of informing publics about environmental issues, the “trade-off” for engaging with either field is in the areas of economic capital (CE), cultural capital (CC) and autonomy (AUTON). This translates into decisions around potential reach (CE), the salience of the message (CC) and the breadth, depth and nuance of what is communicated (AUTON).

2.3.2 *Summary*

This section has analysed some of the structural ways in which the production of cultural artefacts can be schematised. It has found that there exist structured ways of understanding the production of knowledge and culture within social theory. Some conclusions can be drawn from this overview. First is around what we understand by “culture”, which has through this analysis involved an acknowledgement of both commercial and non-commercial production. This leads to a conclusion that culture cannot be conflated to mean either art or commercial production, but it must be analysed with those distinctions in mind.

Second, there exist structured and schematic ways of evaluating fields of production. Field theory is useful in regard to how it situates production within a field of power. However, that power is not only economic, but can also be symbolic and cultural. This allows us to distinguish between cultural domains that are subject to market pressures from those that operate with more cultural and symbolic autonomy. This perspective is therefore particularly useful in helping us evaluate how environmental matters are – and can be – communicated in varying cultural domains, such as those of journalism or art. Bourdieu’s field theory is a useful instrument as it provides a grounded evaluation of the role of culture within society and the relative positioning of various domains of culture (e.g. journalism and art), and therefore can assist with

evaluating the affordances of various forms of culture in communicating environmental issues.

2.4 **Theme 3: Digital Cultural Production in Non-commercial Contexts**

Given that the prior sections of this literature review have found the concept of autonomy of expression to be a key concern in communicating environmental issues and in the need for behaviour change, the literature review now turns to ideas of digital cultural production in non-commercial contexts. It finds that when commercial pressures are less to the fore than in other fields, practitioners in this field can both operate with digital technologies to a sophisticated standard, and yet reveal critical perspectives on their use. Therefore, a key finding from this section is how the use of digital cultural technologies as a tool can facilitate collaborative “critical making”, which can enhance participation on environmental issues among publics.

2.4.1 *Digital cultural practices*

The impact of digital media on cultural practices is salient to this project, as it takes account of the intertwining of technology and cultural and creative knowledge. For Wood (2007), the contributions of digital media to cultural practices are significant in how they enhance the temporal experience of the message, thus challenging the traditionally understood modes of more static visual representation (Wood, 2007: p. 134). The addition of media forms such as sound and moving image means that the purely spatial aspect of traditional art is potentially transformed into spatio-temporal sites of interaction. For Lovejoy (2004), the impact of digital media on culture also encompasses how “computers represent a challenge to conventional notions of visual representation” (Lovejoy, 2004: p. 152). I suggest that this challenge can also be discussed in terms of affordances of digital media to communicate environmental issues in novel ways.

Furthermore, the political economy of digital media is of relevance to this report, which takes a structural approach to communicating environmental issues. Indeed, digital media and their consumption are critiqued through this lens, whereby “apparently

innocent enthusiasm for the ‘latest thing’ is rarely if ever ideologically neutral” (Lister *et al.*, 2009: p. 11). Therefore, the celebration of new media “cannot be dissociated from the globalising neo-liberal forms of production and distribution which have been characteristic of the past twenty years” (*ibid.*). For the purposes of this project, such a perspective can help take account of the affordances of digital media to communicate environmental issues, while also paying attention to how the production, use and disposal of such media also have an environmental impact.

This brief introduction to some of the characteristics, challenges and affordances of digital media has outlined some theoretical perspectives on digital media and cultural production. However, there also exist a cohort of digital practitioners who through their practices engage with digital media in an environmental context through an area of digital practice known as critical making. Insights can be drawn from critical making towards best practices and potential avenues for communicating environmental issues through digital cultural practices.

2.4.2 *Critical making*

Morgan (2013) has observed some of the complexities of working with digital cultural practices. This involved the producer being mindful of the technical complexity of the practice, along with an awareness of the corporate infrastructural and technical arrangements of digital means. However, there are practitioners working in the fields of digital design who actively take a critical approach to working with digital media. Such practitioners use the term “critical making” to critique digital media while using them, in that they use digital technologies to expose limitations and biases in such technologies. Examples of critical making practices are outlined below. This can be expanded, I suggest, to expose environmental issues.

For Ratto (2011), critical making can interrogate perspectives on technology that tend to fall into overly dystopian or utopian perspectives. Ratto observes that the process of critical making through technology can provide an enhanced lens through which critique and reflection on the place of technology in society can be understood. By engaging with critical making practices, Ratto suggests that it can be possible “to reconnect our lived experiences with technologies to social and conceptual critique” (p. 253). I suggest that this key

affordance can be used in environmental contexts to engage publics on issues of concern to them.

Ratto discusses two experiments in which attempts were made to explore pertinent socio-technical issues using engagement through traditional discussion and also making objects. In the first instance, a project aimed to explore theoretical perspectives on how to understand networks, through practice. The project failed to adequately connect the theories to the practices, with the participants not experiencing the value of the making process. However, in the second instance, the participants were adequately able to discuss and analyse network theories, particularly those of enclosure and private ownership of networks. In this workshop, users made digital artefacts that were termed “flwrs” and that could communicate or listen to other flwrs in a “walled garden” network (p. 255). Each flwr could be configured to be better transmitters or receivers of information, but with a set amount of both individual and network energy involved. Therefore, both the individual flwr and the network had to be balanced to ensure an equilibrium and sustainability of the network.

Through the material construction of digital artefacts that behaved with some autonomy and variability within a network, the workshop participants were able to “think through different social theories about networks” (p. 257). Ratto found that participants were able to engage with subtle discussions on aspects of networks and enclosure, such as the “gift economy” and “generalized exchange” (*ibid.*). Ratto also noticed “the sense of investment each participant felt for his or her flwr” (*ibid.*). This investment allowed the participants to describe their flwrs in more personal terms that signalled “an affectual relationship to each flwr and a strong desire to understand what participants saw as their ‘motivatons’” (*ibid.*). The conceptual and theoretical understanding of technology and its relationship with society was complemented by the affective dimension afforded by critical making, therefore shedding a nuanced light on the technology/society relationship for the participants. I furthermore suggest that, while in this instance the analogy of “flwrs” and a “walled garden” was used to apply network theories, such practices could be mobilised for discussions of environmental sustainability, for example an understanding of the interconnectedness of our societal practices with impacts on the environment.

In a project more specifically connected with environmental issues, DiSalvo (2014) introduces the *Growbot Garden* project. This was a collaborative workshop that involved a community of small-scale farmers who were concerned about technology use in agriculture. The approach of the workshop was along the principles of participatory design that facilitated “collaborative reimaging of agricultural technologies” (p. 97). The participants made a “BugBot” digital device that was “designed to collect data on insect populations in the fields and report that data to the farmer – in effect, to perform an insect census of sorts” (p. 98).

One affordance of making this prototype lay precisely in the process of developing this device, and features of the device itself “were used to articulate the commitments and desires of the participants with regard to their farming practice” (p. 99). Through the critical making process, the participants were able to discuss their concerns around how agricultural technology is typically designed for large-scale farms devoted to industrial production and excludes small-scale operations such as their own. They were also concerned about a focus of the agricultural technologies on pest control. In contrast, the BugBot was designed by the farmers to “record and report data on insect populations” in such a way as to support permaculture farming practices that are “wary of unwittingly disturbing a cycle by unnecessarily intervening in the doings of any entity” including insects (p. 101). In this instance, the critical making practice enabled a form of alternative environmental politics that encouraged sustainability and biodiversity, against the “big agriculture” trend of promoting monoculture and pesticides:

BugBot is a prototype of an artifact that not only will not force the small-scale farmers to adopt an industrial practice (pesticides), but moreover will allow the small-scale farmers to continue their practices that they themselves characterise as being contrary to those of industrial farming. The BugBot is inherently, and unabashedly, an artifact designed to do a certain set of politics. (p. 103)

Therefore, for DiSalvo, practices of critical making can subvert the accepted use of artefacts and promote agency among participants to find alternative uses for devices. DiSalvo concludes that critical making can be considered as “materializing the politics of design”

(p. 104). I suggest that, for the purposes of engaging publics on environmental matters, such practices can challenge and augment hidden or assumed affordances in environmental technologies.

Wylie *et al.* (2014) outline critical making projects that engage in environmental research and raise certain issues of citizen science, along with “civic technoscience” (p. 116). The authors consider how such practices “enable … citizens to question expert knowledge production through critical making tactics, and creates opportunities to generate credible public science” (*ibid.*). They also note that communities are brought together by such practices as participatory design and civic technoscience, and that “these communities that blend citizen science with critical making are attempting to establish a formal and lasting presence within domains of scientific research and interface with formal experts” (p. 117).

This can be challenging for institutions, however, in that such civic practices can question traditional notions of expertise (*ibid.*). In light of this, Wylie *et al.* (2014) outline a citizen-enabled environmental mapping project, and also an environmental sensing tool. The second project saw an interdisciplinary research group design “modular, open-source environmental sensing devices that could be easily appropriated by local communities” (pp. 121–122). These devices were designed to facilitate participatory community environmental monitoring and are therefore of key interest to this discussion. However, the challenges arose from the academic institutional context, with the authors noting that “despite encouragements to take advantage of readily available and adaptable technologies such as the Arduino microcontroller platform, the [research] team quickly locked into a classic pathology of engineering customized platforms” (p. 122). Thus, despite the availability of open-source technologies, the institution was more enabled for proprietary use, characterised by the requirement of lab administrators to place copyright notices on all documentation and components used, in a move wholly against the spirit and principles of participatory, transparent and public science (*ibid.*). The project itself was a failure. However, the authors note that it engaged a Navajo community through fieldwork. This work had an unintended benefit, in that it uncovered “powerful locations of community-driven knowledge articulation” (p. 123) and provoked the sharing of knowledge

about landscape, environment and heritage among the community. Thus, while the sensing itself fell victim to bureaucracy, even within that perceived failure, the civic and participatory dimension of the project nonetheless reaped benefits in terms of the Navajo community developing and articulating its own traditional ecological knowledge.

2.4.3 Summary

This brief summary of nuanced critical research on digital media and their place in cultural practices indicates that such work implies certain distinctive potentials, key affordances and challenges. It also reveals specific material, technical and ideological dimensions to working with digital media. This brief discussion also does not take account of the environmental impacts of digital media as discussed by Cubitt (2017), Miller (2015) and Maxwell and Miller (2012). However, there also exists a cohort of practitioners in participatory design, who use technologies in practice-based⁴ explorations of the technology/society relationship. Furthermore, when applied to environmental problem solving, such techniques can engage citizens while also finding novel solutions to local environmental issues. Critical making can be a part of participatory design that involves interfacing with technology but in a critical way, with users involved at all stages of design. As shown in the examples above, such critical making and participatory design practices offer potentially fruitful applications for communicating environmental issues in novel ways.

2.5 Theme 4: Ecological Art as Pragmatic Environmental Knowledge Production

This report has established digital cultural practices in the non-commercial context as potentially rich sites for communicating behaviour change to publics. The critical review of the field of environmental communication revealed limitations and challenges for communicating environmental issues. The review also considered the field theory of Pierre

Bourdieu, which foregrounded structural factors, and different dimensions of autonomy as ways to identify and compare domains of knowledge production. This section reviews the domain of ecological art as one important exemplar of a field of non-commercial cultural production suitable for communicating environmental issues. Thus, this part of the review engages with the long-established field of environmental art, whose history can be traced back to landscape painting. While this field has been concerned with the society–environment relationship, it is not necessarily *ecological* in its focus, however. Indeed, certain critiques of environmental art, most notably land art, address how these practices may be environmentally detrimental (Thornes, 2008; Wells, 2015; Cheetham, 2018). Therefore, the key finding from this section of the literature review concerns how any robust analysis of cultural practices in this area needs to be specific about focusing on ecological art. Another key finding highlights that ecological art tends to be pragmatic and even materialist, revealing how an awareness of materials can provide novel insights into sustainable production and consumption.

Environmental art is an important area of cultural practice to define and acknowledge, in that it enables a distinction between itself and *ecological* art. Environmental art can trace its origins to representations of the environment in painting, such as the works of Turner and Constable in the late 18th to mid-19th century (Thornes, 2008; Wells, 2015). Cheetham (2018) charts the evolution from landscape art to environmental art and ecological art, noting some dialectical relationships, tensions and incongruencies in this form of knowledge production.

Key works of environmental art include Michael Heizer's 1969–1970 works *Double Negative* and *Displaced/Replaced Mass*, and Robert Smithson's 1970 work *Spiral Jetty*. These works involved large-scale earth moving, with Heizer's works consisting of trenches and large holes cut into bedrock, concrete lining employed in the works, and even explosions (Thornes, 2008). Smithson's work involved "the movement of 6783 tonnes of rock, earth, and salt crystals using two dump trucks, a tractor, and a

⁴ Practice-based research means that researchers conduct their work through their practice, rather than pursuing research through traditional academic means. For example, rather than writing about art, a practice-based approach would involve the researcher also making art and reflecting on outcomes. The examples in section 2.4.2 are examples of how practices rather than theoretical approaches to learning can elicit distinctive knowledge.

large front loader" (Thornes, 2008: p. 400). Clearly, what is understood as art practice concerned with environmental issues would be critical of such works. Indeed, at the time they were subject to critique "from traditional art critics and other more minimalist artists" (p. 401), with Thornes also noting that "Mother Earth was being violated, and the environmentalists were quick to point out that the environment was becoming increasingly fragile and needed protecting, not violating" (*ibid.*). Cheetham (2018: p. 30) noted how Smithson "eschewed ecological scruples", preferring to use "uprooted trees to do violence to the landscape tradition".

Likewise, Weintraub (2012) also points to the land art movement, along with pop art and conceptual art, as embodying "anthropocentric notions" (Weintraub, 2012: p. 9), singling out Walter DeMaria's land art piece *The Lightning Field* (1977) for critique. This piece saw the installation of 400 stainless steel poles in a remote desert area. The piece was installed to exist in perpetuity. Should lightning damage any of the poles, the contract for the artwork specifies the replacement of the damaged pole (Weintraub, 2012: pp. 11–14). For Weintraub, this work "provides a compelling example of human wilfulness by pitting the grid (the symbol of humanity's logic) against lightning (the symbol of the almighty force of nature) and then ensuring his work's survival" (p. 14). Thus, such works "confirm the anthropocentric values that extend throughout contemporary culture" (*ibid.*). It can be deduced from this brief outline that environmental art may not consist of works that are concerned with environmental protection or restoration.

In light of this, I suggest that we remain mindful of the distinctions between environmental art and *ecological* art. Howard *et al.*, (2013: p. 200) note how theorist Barbara Matilsky "differentiates ecological from environmental art through a moral and ethical relationship". Therefore, while environmental art can potentially act contrary to ecological principles, as evidenced in the large-scale earth-moving projects of the land art movement, or examine the environment without being ecological, ecological art can ethically question contemporary economic and production practices and their impact on the environment. Therefore, given that communicating environmental challenges is a core remit of this project, I suggest that it is helpful to focus on matters of ecological art.

2.5.1 Ecological art

Weintraub (2012: p. 3) describes ecological art as a set of practices that run counter to "the age-old course of human chauvinism". She notes that such notions are "replaced with recognition that humans are merely a type of mammal sharing space on the planet with all other species" (*ibid.*). Thus, the anthropocentrism that centres on ideas of "progress" is countered with an ecocentric outlook. Furthermore, ecological art involves working with distinctive mediums that Weintraub considers appropriate "because the scales, mediums, processes, and themes it is introducing are correlated with compounding environmental woes and humanity's determined efforts to rectify them. Its innovations address the uncertain fate of life currently existing on planet Earth" (Weintraub, 2012: p. 5). A key contemporary example of ecological art can be seen in the work of Edward Burtynsky. Indeed, Burtynsky has "contributed significantly to debates about shifting economic centres, industrial working conditions and uses of natural resources" (Wells, 2015: p. 340) with brutal depictions of polluted lands resulting from industrial "chains of production, use and disposal characteristic of contemporary industrial capitalism" (*ibid.*). For Burtynsky, therefore, the visual is a vehicle to depict the ecological ramifications of all stages of the production cycle, with photography documenting the industrial-scale production, the everyday use, and then the waste generated at the end of life of these products. For his latest project, The Anthropocene Project (ongoing), Burtynsky is turning to mixed media, including digital media such as virtual reality and augmented reality, along with photography and film, to enable him to communicate his concerns and critique of the Anthropocene era. Ecological art can therefore be a suitable form of knowledge production to study for the purposes of this project, which centres on novel ways to communicate environmental issues.

Within the art world, ecological art can embody "a particularly disputed form of innovation" (Weintraub 2012: p. 5) as it is atypical of the more conceptual, aloof and highbrow practices often accepted as legitimate art practices. I suggest that this is also a defining characteristic of ecological art that makes it a suitable medium for communicating interdisciplinary environmental challenges. Indeed, its "pragmatic"

nature (ibid.) enables eco art to communicate “the practical requirements of survival”, while also including “utilitarian strategies regarding pollution, resource depletion, climate change, escalating populations, and so on, because the strategies that sustain us are threatened” (p. 6).

Weintraub (2012: pp. 6–7) describes the characteristics of ecological art in terms of four attributes that are useful for further assessing this particular art form’s potential to communicate the complex challenges of environmental issues. The relevant four characteristics comprise (1) the *topics* considered in ecological art, which allow representation of the myriad topics in ecology and environmentalism; (2) the idea of *interconnection*, whereby ecological art acknowledges “the inescapable law of links and relationships that govern all materials, all processes, and all events on Earth”; (3) the principle of *dynamism*, which takes account of how “anything occupying space also transforms through time”; and (4) the principle of *ecocentrism* that acknowledges that “humans are not more important than other entities on Earth”.

In this light, therefore, ecological art is a flexible discipline that can engage with topics from environmental and ecological sciences. It can acknowledge how environmental, human, social, political and cultural systems are interconnected, and need to be considered as not isolated from each other. It can take account of the dynamism in natural processes instead of stultifying, simplifying or objectifying them. Finally, it can shift the dominant anthropocentric perspective to one that privileges the sometimes ignored or neglected dimensions of nature. I therefore suggest that this flexibility in these four attributes makes ecological art a potentially relevant communication discipline. Added to this are the pragmatic and even utilitarian characteristics of ecological art that run counter to overly conceptual practices. Thus, I contend that ecological art can provide a grounded way of communicating environmental issues and therefore requires serious consideration and analysis.

2.5.2 Affordances of ecological art

Having briefly defined some characteristics of ecological art, this report points to the affordances of ecological art, specifically its pragmatic way of

communicating issues. This is described in how ecological art “expands well beyond … art-world contexts” (Cheetham, 2018: p. 2), in that “more than most contemporary art practices, eco art also transcends conventional borders of inquiry” to include enquiries that involve “scientific and technological evaluations of environmental concerns” (p. 3). Similarly, Weintraub also acknowledges this affordance, noting how ecological artists “typically address issues that non-art professionals claim, create works that function like objects with no pretensions [sic.] as art, conduct processes that do not resemble studio art practices, and share creative responsibility with non-artist collaborators” (Weintraub, 2012: p. xiv).

This affordance is unique in considering a cultural practice that is useful for communicating environmental issues to publics in novel ways. Often, art is seen as niche or hard to understand and, quite often, conceptual art is just that – it deals over-conceptually with material issues. However, a cultural practice such as ecological art can provide audiences with a scientifically connected but culturally novel way of communicating environmental issues. For Cheetham, “Eco art today provides a full spectrum of attitudes toward nature, landscape, and ecology and suggests many responses to questions about its purposes or intended efficacy” (2018: p. 9). This places ecological art in a unique position to be specific in its communication affordances, and expansive and flexible enough a practice to function as a medium of choice for communicating the complexities of environmental issues. This is in part because “eco-art projects seek to be informative in ways that can change people’s behavior toward the environment” (ibid.).

Likewise, Weintraub (2012) suggests how ecological art can both problematise and communicate the relationship with nature to effect behaviour change. This is key for Weintraub in a contemporary context in which “separateness from nature is viewed as a sign of progress and a mark of civilisation” (Weintraub 2012: p. 16). Indeed, such ideology in which society and nature are disconnected has allowed society to “justify behaviors that disrupt nature’s balance and resilience” (ibid.). However, to counter this perspective, Weintraub notes how many ecological artists “apply their communication and visualisation skills to expand the definition of nature” in their practices (ibid.). Therefore, ecological art can critique

current behaviours while also offering insight into potential alternative imaginaries that can point to more ecocentric behaviours.

Furthermore, the focus on materials in ecological art can re-establish the material relationship between society and nature, in a form of “new materialism”. This characteristic of ecological art reintroduces concerns of the material basis of human and non-human activity and relationships (Johns-Putra, 2013; Lettow, 2016; Weintraub, 2019). This focus provides a contrast with overly conceptual ways of imagining societal processes that ignore or downplay the role of the material dimensions to society. Indeed, Barad (2003) argues that materialism contrasts with the focus on language and representation, critiquing these tendencies by noting that “there is an important sense in which the only thing that does not seem to matter anymore is matter” (*ibid.*). Therefore, the focus on materialism in ecological art can invite practitioners to reject overly conceptual work and reintegrate the material into their knowledge production.

2.5.3 Summary

Given these debates about new materialisms, we can nonetheless conclude that, for the purposes of ecological art, new materialisms comprise one potential path to avoid the conceptual and dematerialised turns in the art domain. For Weintraub (2019), this influence of new materialism has been positive. She notes that a consideration of materialism involves a consideration to “the material consequences of making art” (Weintraub, 2019: p. 2). However, the influence of materialist philosophies also influences ecological art in regard to how ecological artworks that consider materialism “attend to the urgency of mounting environmental afflictions” (p. 3). Therefore, there is a move in many ecological artworks to “reacquaint the public with the lapsed wonders of weight, texture, moisture, temperature, fragility, suppleness, elasticity, bulge, hollow, contour, and a host of other physical properties that are being neglected in favour of data, simulations, and digital transmissions, as well as subjected to the causal disregard that surrounds mass-produced commodities” (pp. 3–4). Therefore, when concepts of materialism enter into the ecological art domain, we can say that they further the relationship between communicating environmental concerns and the material impacts of

human life on the ecosystem. However, analysis of physical or other universal characteristics, features and aspects of material analysis must also be related to their evolving relation to the materiality of organised social, political and economic power and influences – a key aspect of the nature/society relationship to which we now turn.

2.6 Theme 5: Concepts of the Nature/Society Relationship

This section acknowledges that a discussion of how to communicate environmental sustainability presumes some understanding among policy, academic and political stakeholders of the relationship between nature and society. This section contends that it is important to investigate if this understanding is helpful towards sustainable decision-making, or if in contemporary society ideas of “nature” are coloured through certain distinctive, even occasionally unhelpful, lenses. Therefore, this section discusses the nature/society relationship from a critical perspective, to provide an understanding of prevalent assumptions about the interaction of environment and society. A key finding from this section is how communicating about environmental matters needs to be grounded in a nuanced understanding of the nature/society relationship. It finds that challenges exist in how nature is distanced as a remote resource, or assumed to be ever-bountiful, and that such assumptions can involve sub-optimal decision-making for sustainable practices.

2.6.1 Political ecology

This section starts by identifying the interdisciplinary domain of political ecology, which provides critical insights on prevailing ideas of how the environment is understood and “managed”. It is a domain that, while “rooted in social and political theory … is also grounded in ecology and has an international scope” (Smith, 2006: p. xiv). This area takes the standpoint that decisions around the management of both urban and non-urban environments are not neutral and, therefore, can embed power dynamics. It is a domain of research that makes a distinction between political and *apolitical* ecologies (Robbins, 2012). Thus, concerns about the contexts, structures and power dynamics of how environmental matters are managed tend to be central to this discipline. I suggest that

critical scholarship in behaviour change can therefore benefit from an understanding of political ecology.

A salient example of political ecological thought is demonstrated by Robbins' description of the East African savannah and its management by both Kenyan and Tanzanian ecological policies (Robbins 2012: pp. 11–13). Robbins observes that the entire Serengeti-Mara savannah is undergoing wildlife and biodiversity depletion, along with other markers of ecological decline (p. 12). However, there is a distinct difference between the ecosystem in Kenya and in Tanzania, with the Kenyan area more widely cultivated for grain and other crops. This is despite the similar baseline ecosystem, revealing that, while "natural" processes such as habitat loss are affecting the area, these challenges are *differentially* affecting the area depending on how they are managed within human-made country borders. Robbins observes that "the wildlife crisis in East Africa is more political and economic than demographic" (*ibid.*) and that "these facts undermine widely held apolitical views about ecological relations in one of the most high-profile wildlife habitats in the world" (*ibid.*).

Robbins suggests that the apolitical accounts of ecosystem crisis are the most prominent in contemporary analysis, with such accounts providing either dystopian accounts of nature as not able to provide for society, or else techno-utopian accounts of how human ingenuity can transcend ecological limits while continuing on growth-based trajectories (p. 14). However, such accounts neglect the influence of political and economic factors on the environment and, moreover, in their normative approach they are inherently political. When other so-called apolitical perspectives are critiqued in this way, political ecology can be viewed as no more political than other approaches. Rather, the domain is "more explicit in its normative goals and more outspoken about the assumptions from which its research is conducted" (p. 19).

2.6.2 Urban political ecology

Although political ecology has theoretical strengths in analysing agrarian societies (Loftus, 2017), it has also been critiqued for this focus. Heynen observes that "many engaged in political ecology have failed to acknowledge the impact of cities within their framing of political ecology" (Heynen, 2014: p. 598).

However, political ecology has also developed a significant corpus of critical work focused on cities, most notably by Swyngedouw (1996), who coined the term "urban political ecology". Indeed, Heynen notes the importance of an urban political ecology, observing that "given the undeniable impact of the social production of urban nature across the globe, arguably setting the stage for the 'urban century' while at the same time directly shaping new geological epochs ('the Anthropocene'), the language and logic of an explicitly urban political ecology seems more prescient than ever" (p. 598). Thus, while the domain of political ecology in its entirety has relevance for the kinds of societal challenges that the environmental crisis presents, a focus on key urban political ecology perspectives can provide an insight into some of the issues of communicating environmental issues to publics. Thus, this report now turns to some of the contributions of the domain of urban political ecology.

The concept of a metabolic relation between society and nature is a key concept mobilised by political ecology for understanding urban socio-ecological relationships (Foster, 2013). We can understand that our own body's metabolism involves a complex set of interactions between digestion, respiration and temperature control, among other functions. If our metabolism is threatened, for example by a virus or a bacterium, it may respond with a range of unpleasant symptoms, such as a high temperature. Similarly, the concept of a metabolic relation between society and nature allows for a consideration of an agent that can unbalance it, such as CO₂, causing temperature fluctuations and other environmental "symptoms". The key contribution of this concept is to allow society and nature to be analysed as part of the same metabolic entity, rather than two distinct and separated spheres.

Heynen *et al.* (2006: p. 2) acknowledge that, within political ecology, "little attention has been paid so far to the urban as a process of socio-ecological *change*, while discussions about global environmental problems and the possibilities for a 'sustainable' future customarily ignore the urban origin of many of these problems". Indeed, aligned with the concept of metabolism is that of circulation, which was historically connected with ideas of "closed circular movement" (Swyngedouw, 2006: p. 31) and in more contemporary times aligned with ideas of "change, growth, and accumulation" (*ibid.*). This is at a time when urbanisation is on the increase, to the extent

that a majority of the global population is now living in cities (Gandy, 2006: p. 70). Therefore, urban political ecology provides insight into sustainability discourses by situating the urban context as sites of interaction, flow and growth, but also deepening contestation and contradiction between society and nature.

One relevant key contribution to urban political ecology concerns the “re-naturing” of urban theory (Heynen et al., 2006: p. 2), which supports understanding that “to the extent that cities are produced through socio-ecological processes, attention has to be paid to the political processes through which particular socio-environmental urban conditions are made and remade” (*ibid.*). In bringing discourses of nature and society together, urban political ecology shows how “cities are built out of natural resources, through socially mediated natural processes” (p. 5). In contemporary contexts, these socially mediated processes are underpinned by the dynamic, innovative and yet growth-prioritising and wasteful economic system (Smith, 2008).

Thus, the political ecology context weaves ideas of the “natural” with the social conditions of production and reproduction of nature. It can therefore shed nuanced light not only on the issues of environmental crisis but also on the lenses through which solutions are proffered. If environmental crisis is seen as merely “natural”, it absolves society, and particularly the economy, from action. However, if environmental distress is seen as partially social, then the political contexts of action and inaction can be better understood. This perspective of taking account of a metabolism between the social and natural has benefits for this discussion in that “it simultaneously problematises the relationship with nature and refuses the knee-jerk apocalypticism that marks so much left environmental response today” (Smith, 2006: p. xiii).

2.6.3 Production of nature as external and universal

The work of Neil Smith has contributed to the domain of urban political ecology in ways that resonate with the scope of this particular review. Smith has contributed on two counts that I deem relevant to this literature review: (1) how nature is conceived under contemporary socio-economic arrangements; and (2) the concept of the *production of nature* itself. I start with a brief overview of Smith’s (2008) thesis on the

“ideology of nature”. This is to reveal the strengths of a political ecology approach as to how nature is conceptualised in contemporary thought. This then lends itself to an analysis of how nature is produced under current economic arrangements.

In relation to the first contribution, Smith emphasises that capitalism has strongly influenced how nature is viewed in contemporary contexts (Smith, 2008: p. 10). He observes that:

for apologist and detractor alike, the global transformation of nature wrought by industrial capitalism dominates both the physical and intellectual consumption of nature. This experience filters out incompatible conceptions of nature and precipitates new ones. The domination of nature is a generally accepted reality, whether it is viewed in awe as a measure of human progress or in fear as a tragic warning of imminent disaster. (*ibid.*)

For Smith, this impact from economic activity has been such as to “cut into the accumulated meanings of nature so that they can be shaped and fashioned into concepts of nature appropriate for the present era” (p. 11). Therefore, a key assumed meaning of nature lies in how it is viewed in contemporary economies as a resource for extraction, use and profit.

Smith’s second contribution on the production of nature draws on how nature is conceptualised in contemporary times, which centres on a fundamental reduction of the complexity of the nature/society relationship to a dualism (Smith, 2008: p. 11). This dualism is, on the one hand, between the idea of nature as “*external*, a thing, the realm of extra human objects and processes existing outside society” and, on the other hand, “*universal*” (*ibid.*). Nature is universal because it includes humans, and, therefore, in the contemporary setting “ecological treatments of human society situate the human species as one among many in the totality of nature” (p. 12). Smith observes that this is a contradictory dualism, in that, on the one hand, nature is external to human society when considered in some domains of knowledge, but on the other hand, because humans are also conceived of as being part of nature, nature therefore has to be thought of as universal. As Smith notes, “*external* and *universal* nature are not entirely reconcilable, for at the same time that nature is held

to be external to human existence, it is simultaneously both external and internal" (ibid.). I suggest that this perspective is helpful, as, if nature is external, it can be mobilised and subject to "subjugation" or exploitation (pp. 28–29). On the other hand, if nature is universal, it can become a vehicle for ideology (p. 29) that can "justify the conquest of external nature" (ibid.). This "ideology" is evident in the justification of contemporary practices of land use appropriation, resource extraction, and indeed the exploitation of natural resources for both production and disposal of societal products.

Drawing on these two contributions, Smith notes that the idea of the production of nature is "paradoxical" to the point of absurdity in contemporary thought, because "nature is generally seen as precisely that which cannot be produced; it is the antithesis of human productive activity" (Smith, 2008: p. 49). Therefore, dominant assumptions about nature include how it is pristine, untouched by human activity, and therefore not touched by production. However, Smith observes that, as the economic system has expanded and required new markets to continue its accumulation, this "explosion of ecological commodification and capitalization has significantly deepened the production of nature" (Smith, 2007: p. 25). Therefore, rather than gazing on a landscape and associating it with concepts of the "natural", Smith argues that such a vista can be produced by human activity, such as farming, land management, deliberate planting and tending, and even the overtopping of old landfill sites with grassland and pasture. This production is to the point that "it is the regulation and production of nature that threatens to penetrate "all the way down"" (ibid.). Thus, in financial areas, the production of nature is extending, while at the same time, "the fantasy guiding the biotechnological conquest of nature" (p. 26) is also of concern, in that it "involves nothing less than an effort to bypass the very externality of nature that capitalism itself promulgated" (ibid.). Thus, Smith warns that production "all the way down" to genetic materials has an aim of distancing society's dependencies on nature. Yet this "vertical capitalisation of nature makes the fate of capitalism more dependent on nature, not less" (p. 33). He notes that "the same credit system that supposedly protects a wetland or forest can lead to its destruction when the credit system itself

collapses" (p. 34). Therefore, while contemporary economic solutions promising "green growth" are to the fore, Smith's work argues for a need for caution regarding how environmental issues are dealt with through economic instruments.

2.6.4 Epistemic communities and nature

Castree (2014) also acknowledges the dualisms and contradictions of the human relationship with nature, with nature both "out there", while humans "consider ourselves to be *part of nature*" (Castree, 2014: p. 4). He also extends Smith's observations by analysing how concepts of "nature" are "a significant preoccupation of a surprisingly large and diverse set of epistemic communities", that is a community bearing particular knowledge that purports to speak from its position of expertise (Castree, 2014: p. xviii). This broadens the scope of environmental concern from the domain of environmental sciences and, indeed, political ecologists to include domains that include advertising and media (ibid.).

While for Smith the capitalist system was responsible for the formulations of nature in contemporary society, for Castree nature is categorised and represented through various fields. Thus, his concerns lie in "how those various things convention teaches us to call 'natural' are represented by us and to us, and with what implications" (p. 6). His inquiry is on the basis of what can be known about nature through the various channels that both mobilise concepts of nature and act as experts on the subject. He notes that "most of what we know and feel about nature derives from the claims made by myriad others, for instance wildlife film-makers, journalists, chemists, environmental activists and professional ecologists" (ibid.). Therefore, how concepts of nature are communicated is dependent on the practices of these domains.

Castree furthers his analysis of nature by observing that nature can be considered in spatial and temporal ways (pp. 11–13). Thus, what we understand as nature can be, "in terms of specific locations", both separate from human impact and therefore pristine, or manufactured and constructed, such as in a zoo or a botanical garden (p. 11). Furthermore, temporalising nature can provide insight, with Castree asking a seemingly straightforward question "when is nature?"

(p. 12). In exploring this question, it becomes salient that “we think these days that it’s ever more a thing of the past” (*ibid.*). Indeed, by both spatialising and temporalising nature, we can conclude that “because there are, today, more people, more industry, more consumption, more pollution, more travel and more ‘invasive’ technologies than ever before, then there’s therefore less ‘nature’ – it seems to be a zero-sum game in which the natural world is the clear loser” (p. 13).

Of relevance to our discussion is how Castree identifies the mass media as “nature’s principal public representative” (p. 210) and a key epistemic community. For Castree, different epistemic communities can represent nature in varying ways, involving how they “make sense of the world in various ways and then concretise these sense-making acts in forms that can be shared with others” (p. 47). Thus, in environmental matters for example, the media as an epistemic community can distort notions of “balance” to become a form of “bias” when reporting climate change (p. 240; see also Boykoff and Boykoff, 2004). Thus, in giving equal weighting to perspectives lacking in scientific credibility, the so-called balanced reporting “amounts to *decontextualizing* them and thus preventing consumers of news from understanding how much (or little) importance to attach to dissenting views” (p. 240).

I suggest that Castree’s work provides a helpful formulation from the domain of political ecology to understand how the interrelationship between society and nature is contested, contradictory but also dependent on various communities to communicate the relationship. In terms of communicating these ideas, therefore, it is of interest that the domain of political ecology can critique and challenge notions of separateness from nature, while acknowledging that some domains of knowledge production may be more or less likely to adopt that stance. Furthermore, when considering where and when nature exists, we can develop pathways to action before nature is irrevocably *away* or *in the past*. Thus, by “denaturalising” nature (p. 282), assumptions about nature and, indeed, the place of society within it, rather than external to it, become easier to discuss in nuanced terms, and it is easier to develop policies and practices that take account of these complexities and assumptions.

2.6.5 Summary

Political ecology foregrounds the political and power contexts in which environments are imagined and indeed managed in contemporary societies. The research concurs with Robbins’ observation that “environmental research that cannot reflexively locate its relationship to power is self-evidently dangerous and has indeed proven truly violent in a world of urgent environmental justice challenges. The pursuit of one seems, almost inevitably, to give rise to the prodding of the other” (Robbins, 2015: p. 98). In summary, therefore, political ecology challenges notions of what is considered “natural” with respect to environmental practices, while embedding society within a complex and interdependent metabolism comprising representations, imaginaries, knowledge communities and ourselves. Next, the report analyses environmental sensing with these frameworks in mind.

2.7 Theme 6: Citizen Sensing, Smart Sensing and the Irish Context

Given that this project focuses on digital cultural practices, the next section assesses the literature on citizen environmental sensing. It finds that there exist affordances for citizens to become engaged with matters of localised environmental concern. A key finding is how non-commercial digital practices have an actually existing track record of performance. However, another key finding from the literature review is how such sensing practices can be ignored by authorities owing to calibration issues. This final section in the literature review also discusses sensing in urban contexts such as “smart” cities, and notes that the affordances of sensing may be compromised by the co-option of such practices by large corporate entities. It makes mention of practices in Ireland, in order to situate the project in its immediate context.

2.7.1 Environmental sensing and citizen sensing

As seen previously, in section 2.4.2, there exist affordances of working with digital media in cultural contexts that enable citizen participation. Through a brief description of case studies, the section also pointed to affordances with respect to environmental sensing. When considering the role of environmental sensing in terms of the extent to which it enables an

understanding of the nature/society relationship, along with participatory citizen practices, the work of Jennifer Gabrys is pertinent. Gabrys seeks to investigate “environments, material processes and communication technologies through theoretical and practice-based work” (Gabrys, no date). Therefore, her work is closely aligned with the core concerns of this project.

According to Gabrys, environmental sensing is not a recent product of the internet age, or indeed the “Internet of Things” (Gabrys, 2016: p. 3). However, the availability of contemporary sensing enables a “programmability” of the Earth. This affordance “yields processes for making new environments not necessarily as extensions of humans, but rather as new configurations or ‘techno-geographies’ that concretize across technologies, people, practices, and nonhuman entities” (p. 4). The idea of “earth donning an electronic skin” (p. 6) is therefore of importance for Gabrys, with the affordances of this including how “networked environmental sensors make it possible to listen in on a planet that has always been ‘talking to us’, but which we can only now begin to hear” (p. 7). For the purposes of this project, the idea of sensors enabling society to “hear” or, more broadly, “sense” the planet reveals a potential affordance of sensors to reconnect citizens with veiled or hidden aspects of their environments. Therefore, it is important to recognise the role of sensors and sensing in environmental matters, with the environment “now a shifting entity that typically becomes visible – and manageable – as information” (p. 15). Gabrys argues that “in this way, such ecologies inform our lived material, political, and ethical engagements, and they contribute to the scope of our environmental practices” (ibid.). Such a perspective calls for a consideration of contemporary environmental matters that takes account of how boundaries between human, non-human and ecosystem are not as defined as traditionally assumed in modern (or post-Enlightenment) thinking.

Notwithstanding the affordances of sensing, caution is also required when considering the role of sensing with respect to the manageability of ecosystems. Policies enacted to “manage” ecosystems are not necessarily neutral, beneficial for the managed ecosystem, or planned in a long-term, sustainable way. Merely introducing more sensory data into such management strategies can reify ecosystems, running contrary to the purported benefits of expanded sensing.

Indeed, Gabrys notes the challenges of using media technology in this way, observing that “a practice of attending to the milieus of media technology does not automatically translate into an environmentalist encounter with media” (p. 16). However, the process of becoming environmental through sensing holds affordances (*ibid.*), in that, although sensing may not start out as environmentalist, the act of monitoring can raise environmentalist questions and thus provoke environmentalist responses. Furthermore, an environmentalist perspective “might provide the impetus to monitor in the first place” (*ibid.*) contexts in which “sensors are tuned to looking for patterns of change or disturbance, and where data is seen as the necessary resource for motivating political action” (*ibid.*).

A key point of relevance, therefore, is how environments are co-created between humans, ecosystems and sensors. Gabrys stresses that this is an evolving and interconnected expanded ecosystem. The implications for this line of thinking stem from how borders between human/societal actors, ecosystems and their myriad forms of life, and computational sensors are not as discrete as traditionally formulated. Rather, they are in constant evolving processes that are inherently dynamic.

Indeed, Morehouse (2019) discusses the significance of Gabrys’ observations on this, observing how Gabrys (2016) “asks us to rethink relationships between technology and environment” (Morehouse, 2019: p. 110). Furthermore, she notes the strengths of showcasing speculative practices while maintaining a critical stance about sensors and how they are potentially co-opted by large corporations. This is articulated by an observation that “approaches to the contemporary environmental condition … often hinge on a ‘technological fix’” (*ibid.*), which merely diverts environmental crisis or challenges, rather than resolving them (Harvey, 2010; Morgan, 2018).

Approaches such as those highlighted in Gabrys’ work therefore “question linear and managerial approaches to technology–environment relations” (Morehouse, 2019: p. 111), while also offering “the possibility for attuning to new ways of seeing, hearing, feeling, and so on” through environmental sensing (*ibid.*). Morehouse is careful to point out that, despite the potentials in this regard, “there are considerable challenges involved in steering vast sensor technology

networks away from technocratic managerialism and toward liberating ends", that involve "significant shifts in our understandings of technology–environment relations" (p. 112).

2.7.2 *Participatory practices*

Sensing pollution

While the above works have enabled us to consider the role and affordances of environmental sensing, Gabrys' practice-based approach involves engaging with citizens in environmental matters of concern for communities. One citizen sensing project engaged a community in an area of south-east London with its concerns about air pollution (Pritchard *et al.*, 2018). The project involved engaging with citizens on two fronts, to include an "Air Walk" and an "Urban Sensing" installation (p. 4534).

The project revealed a tension between the democratising potential of citizen sensing and the validity of the data that are not calibrated to "official data" (p. 4534). Thus, the role of calibrating the citizen "DIY" sensing kits became a significant factor in the project (*ibid.*). While a key challenge centred around the alignment of the "Dustbox" sensors with "official" data from the Marylebone Road Atmospheric Observatory (p. 4545), the project problem-solved this by placing the Dustboxes alongside the official sensors in order to calibrate them as accurately as possible. This gave the project more validity in that "this process of calibration recognized the situatedness of the sensors, much more than so-called blind calibration, where sensors are calibrated in ways that are not responsive to the conditions and environments where they will be used" (p. 4546). This had a two-fold effect of both "tuning in to the established scientific infrastructure that informs policy and legislative action on air quality" and "taking seriously the initiatives of the urban communities with whom we were working, where sensors might be more aligned with understanding London air" (p. 4546).

I suggest that, as an example of non-commercial practices around citizen sensing, this showcases a nuanced approach that not only accepts the validity of official data but also enables citizens to work alongside official data to engage in environmental matters that are of concern to them. From this example of a

participatory project, much can be learned in the Irish context from such an approach.

Sensing energy

Gabrys (2014) has researched the affordances of practice-based approaches to making energy consumption visible. She acknowledges the already existing instruments that citizens can use to monitor their energy use, manifesting as "a visible (and digital) display at the site of smart meters, energy monitors, and other home appliances" (p. 2095), to "eco-teapots" (p. 2097) and "illuminated power cords" (p. 2098) that light up or change colour depending on energy use, signalling energy consumption of everyday acts such as making a cup of tea. However, rather than considering these objects as visual reminders to reduce consumption, Gabrys contends that such devices can potentially reconfigure the relationship beyond reducing consumption. Indeed, in the case of the eco-teapot, it "may have the initial objective of signaling individual and collective energy use, but in its materialization in the home and in relation to numerous other actions the teapot may also be intersecting with numerous other effects that are not so easily managed" (pp. 2097–2098). Perhaps Gabrys imagines that users may derive some joy from the visual feedback from their teapot and offset energy saving benefits due to overuse.

For Gabrys, creative practice can extend such an inquiry, noting that "creative practitioners take up these materialities as explicit sites in which to actively materialize energy in order to develop deliberative encounters that may lead to reduced consumption" (p. 2098). She is:

compelled to explore these questions related to the materiality of energy since the monitor-based approach to energy demand reduction is at times referred to as a "failed" project: while considerable investment has been made in this technology and emerging infrastructure, energy monitors and the practical strategies that they explicitly and implicitly advocate have yet to achieve an appreciable reduction in energy use (and may primarily be best placed to "balance" demands on energy grids, rather than achieve overall reductions in energy use as such). (p. 2096)

She thus introduces a number of creative works with the intention to highlight how they function “as projects that depart from materialities focused on consumption and reduction to perform other materialities and material engagements” (*ibid.*). For Gabrys, such practices do not provide a one-stop solution to the problem of energy consumption, but open up avenues of inquiry that may not be obvious in traditional formulations of energy monitoring and consumption reduction:

such practices – rather than offering up final solutions to energy use – interrupt the usual state of affairs and ways of addressing energy use in order to experiment with alternative energy practices as speculative “political fictions”. (pp. 2096–2097)

The outcome of such speculative creative practices can have varying outputs such as “atmospheric residue, geopolitical tour, DIY production site, or community-radio experiment” (p. 2102), rather than official metrics and consumption measures. Such efforts potentially engage citizens in multiple ways, rather than assuming that more data alone promotes behaviour change. Thus, behaviour change initiatives may not only involve monitoring, to “nudge” citizens into reducing their energy consumption. That, as Gabrys has pointed out, may have a “rebound effect” (p. 2099). Instead, creative, and arguably more conceptually “messy”, practices can produce new and different interrogations and complexities about energy and other environmental issues. Given the overly managerial tendencies of contemporary monitoring, it may be necessary to explore alternative practices. Thus, there is not one magic bullet for behaviour change but, alongside technical and managerial practices, citizen engagement through novel, experimental and alternative practices can be an important driver of behaviour change. In the Irish context I recommend that, at a policy level, such practices be considered as valid approaches towards engaging citizens in behaviour change. It is to the Irish context that this review now turns.

2.7.3 Smart sensing in cities and implications for Ireland

As the Irish context is of relevance to this project, I now turn to briefly consider some recent work on sensing

and the “smart” city, in particular that of Rob Kitchin and associate authors at Maynooth University. For Coletta and Kitchin (2017), smart city infrastructures can facilitate a form of “algorithmic” or “algorhythmic” governance, whereby smart infrastructures monitor and map urban patterns or rhythmic flows, and actively alter and dynamically manage such flows. Indeed, drawing on Lefebvre’s work on rhythmanalysis, and citing Conlon (2010: pp. 72–73), they note that “people are often encountering and co-producing several of rhythms simultaneously such that cities host a series of ‘intersecting rhythms, including the polyrhythmic [multiple], eurhythmic [harmonious and stable], isorhythmic [equal and in sync] and even arrhythmic [out of sync and disruptive] measures as well as secret, public, internal and external beats that comprise the symphonic everyday’” (Coletta and Kitchin, 2017: p. 2). Such work suggests that sensing infrastructures can have an impact on the experience or meaning of urban environments in multiple ways.

As March *et al.* (2016: p. 817) note, “we can conceptualise the Smart City as a set of complex socio-ecological, technological and economic processes, which are not only infused by, but also reshape, power relations in the city”. Such work suggests that sensors form part of a broader assemblage of hardware and software used for both passive monitoring and active intervention in urban contexts. This is not without critique. Loftus (2017: p. 174) observes how “it is little surprise that powerful critiques of emerging political ecologies of smart urbanization have also developed”. This links to wider concerns about how “this idea that ICT solutions can solve urban dilemmas has been mostly uncritically celebrated by the academic, policymaking and think-tank literature” (March *et al.*, 2016: p. 817).

However, many critiques of smart infrastructure emphasise how the deployment of such technologies needs to be considered in terms of who or which particular interests they serve. Critics point to how smart city initiatives may be little more than a “smart sustainable fix” (Keil and Boudreau, 2006). Furthermore, Cardullo and Kitchin (2018) point out the neoliberal logic that lies behind some smart city initiatives. In their observations on the 2017 Smart City Expo and World Congress, they note how “it appeared clear to us that private companies are ultimately, if not exclusively, relying on public money to expand their smart initiatives” (Cardullo and Kitchin, 2018: p. 4).

However, owing to how this is enacted, by the use of “corporate ecosystems such as Google-Android, Apple-iPhone or Amazon-Echo”, such choices are mediated through “contracts with private network providers, and exploited by vast trans-national platform economies” (p. 5). This reveals that the democratic and participatory promise of low-cost sensors may not necessarily be mobilised in smart city infrastructures, and instead provide opportunities for data monitoring by large multinational monopolies, themselves subject to critique for their data collection and aggressive surveillance of citizens.

The last critique of relevance is the financing of the smart city. The concern for critics is how it is assumed that, at the very least, there are public-private partnerships with big information and communications technology companies to operationalise smart city infrastructure. Furthermore, in the case of some European cities such as Barcelona, “the rhetoric of the Smart City in Barcelona, intentionally or unintentionally, obliterates any deep reflection on how capital flows will sustain the project” (March *et al.*, 2016: p. 824). Instead of the smart infrastructure being designed as a public good, “private capital is silently but relentlessly permeating into the different layers that structure the Smart City, from the ubiquitous sensors to the network level and beyond” (p. 24). In terms of sustainability, the rhetoric of sustainability can be deployed to justify such developments, the authors concerned with how “new (depoliticised) techno-natures, under the guise of ‘services’, can be produced and handed out to the private sphere without much debate, all for the sake of having a so-called more sustainable city” (*ibid.*).

Thus, the various spatial and temporal fixes needed by capital to move crises around can now be mobilised into an “urban sustainability fix” (p. 824). Indeed, as March *et al.* note, “the Smart City risks becoming – or at least being seen as – a project that mobilises the environment for the ‘legitimisation’ of urban redevelopment. The wider political economy is based on the capturing of new monopoly rents on the one hand, and on the other on securing an urban sustainability fix for the inherent problems of sustained growth in contemporary capitalism by utility and ICT companies” (p. 825). Thus, as Gabrys (2014: p. 45) notes, “smart-city projects require an attention to – and critique of – the ways of life that are generated and sustained in these proposals and developments”.

The review of this strand of research literature

concludes that the use of sensor technology needs to be evaluated in a considered and critical way, while also noting the potentials and affordances of such technologies for citizen engagement.

2.7.4 Summary

The increasing ability for the Earth to be “sensed” holds several potentially exciting affordances. This is particularly the case when sensing is applied in creative and community-based activities. However, ideas of the governance of “smart” infrastructure need to be considered in their many rhythmic permutations and power relations. Furthermore, there is a vast difference between the open-source practices encouraged by Gabrys’ projects and the enclosed technologies being deployed in cities such as Barcelona and indeed Dublin. Therefore, while the affordances of environmental sensing are significant, the structural issues of control of such devices need to be considered critically, in order to support open practices that are citizen-engaged.

2.8 Literature Review Summary

From this review of prior literature, this report identifies a number of interlinked themes. First, mainstream media can be compromised in terms of transformative imaginaries towards reducing consumption, owing to the nexus between “serious” media and consumption-oriented advertising. Second, a structural analysis shows that these issues apply to varying degrees in different domains of knowledge production. Third, non-commercial production, owing to its relative autonomy from the pressures of advertising and commercialism, may possess different affordances with respect to communicating in novel ways about environmental issues. Fourth, within the domain of non-commercial production we can identify the domain of ecological art, one that foregrounds pragmatic and materialist concerns over conceptual or abstract ones. Fifth, the literature review considered key aspects of the society/nature relationship. This enabled us to consider what is likely to be understood about this relationship, and what societal assumptions are made about that relationship. Here, the review points to contradictions in the perception of that relationship, often treating nature as either external to society or providing universal resources to it. Sixth, the literature review addressed work on issues pertaining to citizen

engagement in working with environmental data, not only revealing certain potentials or opportunities for publics to become engaged in working with

environmental data, but also raising various concerns about the appropriation and control of such data by commercial interests.

3 Archival Analysis

3.1 Introduction

Given that the literature review revealed the potential affordances of ecological art practices and citizen science practices to engage publics, this report now proceeds to survey some actually existing non-commercial practices that engage with environmental issues. This survey indicates how such practices can offer distinctive contributions to the local knowledge base in Ireland, not least concerning the potential to mobilise such practices for the Irish public. This original study of practices captures and analyses emerging digital forms of cultural production.

The key methodological approach for this analysis is an aspect of internet research methodology known as document analysis (Hewson *et al.*, 2015). This type of research takes account of the internet as a source of data, and also reflects how emerging practices may not be captured by traditional academic means such as journal articles and books. Indeed, this type of research “involves looking at static, published documents and media placed on the Internet as an authored, final product (e.g. a published article, webpage, song, photo album, a virtual exhibition of an artist’s works, or the virtual tours of museum collections …)” (Hewson *et al.*, 2015: p. 53). It is an unobtrusive form of research (p. 37) as it involves not interacting with participants or processes, but reviewing the completed outputs of digital works. Furthermore, the researcher does not have any influence over the production of the online work (Salmons, 2016) and, in such document or archival analysis, the researcher does not communicate with producers or users of the media (Salmons, 2016: p. 7). Therefore, it is deemed an efficient way of gathering data on the extent of existing practices suitable for this project.

The scope of this archival analysis focuses on the international context, surveying key written works, as well as online resources, for relevant practices. Therefore, the key sources include:

- the digital, electronic and new media periodical *Neural* (<http://neural.it>) – this periodical has been curating relevant works since 1993 and is a key

publication in the field of new and emerging media;

- the blog *We Make Money Not Art* (<https://we-make-money-not-art.com>), established in 2004 and curated by Régine Debatty;
- the *Creative Applications Network* blog (<https://www.creativeapplications.net>), established in 2008 and concerned with documenting practices at the intersection of art, technology and media.

The overall findings from this tranche of the research are outlined below, with examples of key works presented in an online database at www.sowdata.ie. This database is discussed later in the report.

3.2 Key Findings

3.2.1 Neural

The systematic study of the *Neural* digital periodical was carried out between 4 June and 21 June 2019. There are 62 issues in total, some of which are available in a digital archive. Each digital issue was read and analysed for content that matches the project’s focus on cultural practices that use environmental datasets and/or communicates about environmental issues.

Neural website

As a first step to uncovering potentially novel cultural practices that communicate environmental matters, the *Neural* website was reviewed as part of the archival analysis methodology. This initial review revealed that the home page of the *Neural* website has an extensive set of keywords on the right-hand side of the page, and these guide the reader to articles showcasing works pertaining to that keyword. Examples of these 125 keywords include “circuit bending”, “drone” and “plunderphonics”. It must be noted, however, that there is no mention of words pertaining to environmental issues, such as “environmental art”, “ecology” and “climate”, or other expected related words. The *Neural* website also has a searchable archive of

1544 publications. For the next part of the archival analysis, a search was performed by using keywords such as “ecology”, “ecological”, “environment” and “environmental” to analyse this website function.

These searches yielded some 47 results. However, while the keyword “environment” accounted for most of these results, the hits do not necessarily identify works or practices that are specifically *ecological* in their intent, as the search also pointed to works concerned with the “information environment” and “virtual environments”. This short survey of archival material held by *Neural* reveals a rather striking feature of the overall agenda or *zeitgeist* of the digital culture realm, namely that environmental and/or ecological concerns are less to the fore than other matters such as information integrity, surveillance, data “hacking” and creative and critical coding.

These findings show that overtly or directly ecological or environmental matters are not accorded any priority in the case of a well-established online, digital and print repository for digital culture. For example, having found the article “Phytoacoustics – Listening To Trees”, which describes a form of data sonification, the keywords associated with this were “audio art”, “emusic”, “experimental” and “field recordings”. However, a more detailed survey of the periodicals themselves did reveal certain practitioners dealing with environmental matters in their digital works. Thus, this report now considers such findings.

Neural periodicals

This part of the survey of the *Neural* digital culture platform comprises a review of a relevant selection of the periodicals in digital format. It was decided to start the analysis from 2013. This is because, first, the IPCC Fifth Assessment Report (AR5) was released starting in 2013 and was a “focusing event” for environmental matters (Kingdon, 2003: p. 94), particularly climate change and systemic approaches to its mitigation and adaptation. Second, in building on EPA report 215 (Morgan, 2017), this current project acknowledges that this was also the timeframe for media analysis in that report. However, unlike EPA report 215, which analysed broadcast news, current affairs programming and advertisements, this project takes a longer-term view from that initial focusing device of the IPCC AR5 and reviews all the *Neural*

periodicals up until the current issue (issue 62). Thus, the contents of some 19 periodicals were reviewed for this exercise.

This survey of the periodicals sheds important light on the question of whether or how significant ecological focusing devices such as (1) the IPCC AR5 reports in 2013–2014, (2) the 2015 United Nations Climate Change Conference – COP21 – in Paris and subsequent Paris Agreement in 2015 and (3) the WWF reports on biodiversity loss in 2017 may be, or would be, expected to influence the focus or content of such periodicals. Apart from some exceptional items and generalised mentions of environmental issues, the overall findings of this review reveal a predominant tendency to focus on economic issues and concerns, including those related to the financial crash of 2008, followed by issues of data privacy and surveillance.

These findings indicate that the “focusing event” of the IPCC AR5, and others, were deprioritised in favour of the focusing devices associated with matters such as Edward Snowden’s leaking of National Security Agency data in 2013 and the ongoing political and alleged criminal status of WikiLeaks founder Julian Assange. Potentially, this reflects the differential timeframe in producing artistic and cultural works, rather than the timeframe of the news cycle. However, even given this, it would be expected that at the time of analysis (2019) a form of an “ecological focusing device” could be visible from the ones outlined here.

The second broad finding from the survey of the periodicals is how to categorise the cultural works that were documented in the periodical. With an awareness that this project is titled “Sensing Our World”, this implies that visibilising not only environmental data but other sensory practices may be relevant. As such, the project contends that, in cultural practices that use environmental data, they do so in a way that turns “rational”, “abstract”, “remote” and “cold” environmental data into works that are sensible to publics, that is, not just visibilising, but sonifying, making tactile, tasty and smelly, the matters of environmental concern to artists. This was indeed borne out by some of the works identified in this survey. Thus, a key finding is how environmental data can be not only visibilised but also utilised in multi-sensory ways. This second finding echoes the work of Weintraub (2019) and her observations, as flagged

earlier in the literature review, about the materiality of ecological art practices. Thus, a useful categorisation of key works includes taking account of how they engage the senses of sight, sound, touch, taste and smell, as well as their subject matter, such as waste, biodiversity and pollution.

3.2.2 We Make Money Not Art

This project's archival analysis of the *We Make Money Not Art* website functioned differently to that of *Neural*. This blog is a site for curated works of art that intersect with science and technology. There is no associated publication or archive. While each account of works is associated with keywords, there is no thorough way to identify all the keywords on the site. For example, on the search page is a "tag cloud" of indicative works. However, the archival analysis of the website revealed that the keyword "Anthropocene" was prevalent in individual posts but not in the keyword list on the search page. Therefore, a manual search of the website proved necessary and this was conducted in conjunction with the keyword function.

First, drawing on the existing keywords "Anthropocene" and "Green" yielded some works. However, to augment this, manual searches using the four terms used in the *Neural* search (environment, environmental, ecology, ecological) were also conducted. The keyword search is a purely quantitative method for assessing the volume of works. Just as seen in the searches of the *Neural* publication, it is not necessarily an indication of relevant work, in that an "ecological" work can refer to "media ecology" rather than the human/nature relationship. Furthermore, there can be overlap between keywords, with works appearing in multiple searches. Therefore, the survey of practices does not attempt to describe all works that resulted from the search. It selectively analyses relevant works from the timeframe 2013–2019, again categorising by sense and by topic. This is in order to perform a curation of works deemed most relevant for informing this project.

3.2.3 Creative Applications Network

In the archival analysis of the *Creative Applications Network* website it was noted that, while this is a site for curated works of art that intersect with technology, it is also a resource for education, events and jobs.

Therefore, a manual search in this area potentially could yield results related to education or employment, and not necessarily production of culture. However, with this in mind, the results for the manual searches also yielded complementary insights to the other sites. With this website, it was not possible to conduct this search by date – thus, the search term yielded results not sorted by date, since the blog started in 2008. This somewhat skews the results of this tranche of research. However, given that the "environment" category has shown itself to be excessively broad, it does not detract from the curation aspect of this archival research. As with the archival research of the other publications, the survey of the *Creative Applications Network* does not attempt to describe all works. Rather, it selectively analyses key works from the timeframe 2013–2019, categorising by sense and by topic with a curatorial focus.

3.3 Discussion/Highlights

This tranche of the research concerned an inquiry into the potential affordances of digital cultural practices to communicate environmental issues in novel ways. While the archival analysis revealed that keywords associated with environmental matters did not feature prominently on the selected websites, the present author suggests that this could easily be remedied. Furthermore, a manual analysis of works from the sites revealed a consistent presence of artworks. This shows that, despite the tendency to foreground surveillance, artificial intelligence (AI) and data issues in the genre of digital art practices, there are artists working with environmental issues and data.

Notwithstanding the potential affordances of digital practices to communicate environmental issues in novel ways, using the five senses, a considered approach needs to be taken for the potential of these practices to inform publics. In the main, the one-off nature of these pieces is a challenge, as such practices do not provide a sustained voice for changing the default imaginaries around key issues of the nature/society relationship, unsustainable consumption and associated environmental issues. However, the societal challenges associated with environmental issues are multi-scalar, showing a pressing need to avoid a one-dimensional approach. Therefore, I suggest that these practices are to be encouraged and supported, in that they can act

as cultural focusing devices that can help issues rise to prominence. To this end, the findings from the archival analysis are presented on the website

www.sowdata.ie, in order that wider publics and interested stakeholders can avail themselves of a repository for such practices.

4 Policy Review

4.1 Introduction: Linking Cultural and Environmental Policy

So far, this report has shown through a literature review and archival analysis a number of affordances and challenges of communicating environmental issues to publics. The literature review revealed default assumptions about the environment, along with structural constraints on mass or mainstream media that apply differently to non-commercial production. The archival analysis revealed alternative practices that can hold affordances to differently engage audiences, but with the caveat that such actions may not be sustained or have extensive reach.

With these factors in mind, the report now turns to the area of policy in the Irish context, specifically environmental and cultural policy. It reviews high-level policy in both the cultural and environmental contexts to assess the extent to which each policy domain considers the other domain, i.e. to what extent the affordances of culture are present in environmental policy, and to what extent environmental issues are considered in cultural policy. First, however, the report situates the Irish policy context to international contexts.

4.2 International Context: Sustainable Development Goals and UNESCO

4.2.1 Sustainable Development Goals

In terms of broad international policy that impacts on the Irish context, it is important to acknowledge the United Nations Sustainable Development Goals (SDGs). These 17 goals impact across policy in environmental areas such as sustainable cities and communities, responsible consumption and production, and climate action (goals 11–13).⁵ It is important to see these goals as interconnected, and more of “a network of targets” (Le Blanc, 2015: p. 176)

rather than isolated goals in different policy areas. Indeed, they are to be thought of as an “integrated system” that for policymakers requires consideration to how they “may facilitate policy integration across sectors” (*ibid.*).

This networked framework is, however, limited by the extent to which individual policy areas in the network are connected. For example, the SDGs fail to connect matters concerning the challenges of energy with those of industrialisation (Le Blanc, 2015). This lack of connection between industrial development and energy use impacts on action on environmental issues because “it has long been recognized that use of energy in economic infrastructure drives overall energy consumption, which in turn correlates with climate change drivers and impacts on ecosystems” (Le Blanc, 2015: p. 185). The absence of links between these key areas potentially impacts the ability of a society to act effectively on environmental issues. This also impacts the links between energy, climate change and life below water. Therefore, “any strategy to limit CO₂ emissions” requires broadening the links of the relationship between industrialisation and energy production to include matters of ocean acidification and CO₂ also (Le Blanc, 2015: p. 185). This shows that, while the SDGs can be considered as a network of actions, some areas are currently better developed than others. Notwithstanding this, the SDGs can offer a “favorable environment for policy integration” (Le Blanc, 2015: p. 186). This policy integration is not necessarily a given, in that such cross-sectoral collaboration is not usual in certain policy areas such as development work (Le Blanc, 2015: p. 186). Therefore, such integration “across sectors and policy advice represents a challenge to the way development work is usually conducted” (*ibid.*). Thus, efforts towards the de-siloing of policy require “capacity building efforts” (*ibid.*). Indeed, in the Irish policy context, calls have been made for “policy bridging” (Flynn and O’hUiginn, 2009: p. 11) and a “Green Bridging Fund” (p. 12) to help with linkages.

5 The UN has developed a knowledge platform for informing publics and stakeholders on the 17 goals. It is available at: <https://sustainabledevelopment.un.org/?menu=1300> (accessed 21 August 2020).

Blythe *et al.* (2018) provide an analysis of the SDGs from the perspective of risk. While they acknowledge positive potentials for societal transformation supported by the SDGs, they call for a critique of this assumed positive stance around transformation discourses, observing that “as scientists, policy-makers, and practitioners mainstream the idea across sustainable development agendas, ambiguities in the framing, justification, and practice of transformative change may create tensions and implementation challenges” (Blythe *et al.*, 2018: p. 1208). Indeed, they observe how “the risks associated with discourse and practice that constructs transformation as apolitical, inevitable, or universally beneficial, has the potential to produce significant material and discursive consequences” (p. 1218). In short, ideas of transformation can be politically loaded with varying agendas and knock-on effects. Therefore, ideas of societal transformation through the SDGs need to be analysed in ways that maintain criticality and promote fairness and justice in implementing the goals.

To this end, the authors identify five risks associated with the transformation discourse. They relate to how the “burden of response” becomes “shifted” to “vulnerable parties”; how discourse on transformation “may be used to justify business-as-usual”; how such discourse can pay “insufficient attention to social differentiation”; how it “can exclude the possibility of non-transformation or resistance”; and, finally, how the “insufficient treatment of power and politics threatens the legitimacy” of such discourse (pp. 1211–1216). Therefore, the discourses around transformation can be adopted in ways that ignore how uneven transformation can cause societal challenges. The discourse on transformation needs to be viewed critically so that inadvertent shifts of responsibility to the vulnerable are minimised and a just transition is ensured. This involves paying attention to economic inequality within societal transition. Furthermore, the risks point to both business as usual economics and inadequate attention paid to power. For successful policy implementation, discourses of transformation are better served by paying attention to these factors and minimising their impacts.

Overall, the SDGs represent a positive intervention into the international policy landscape. They provide a way of assessing policy that takes account of multiple

stakeholders across policy areas. Their network of targets promotes cross-sectoral cooperation and can support novel linkages between policy areas. However, these affordances are not a given, and hold risks depending on how the SDGs are interpreted and how “transformation” is considered in a particular societal context.

4.2.2 UNESCO

The report now turns to an overview of the international policy landscape for the domain of culture. This discussion centres on the United Nations Educational, Scientific and Cultural Organization (UNESCO) and its part in highlighting the role of culture for sustainable development.⁶ For UNESCO, the role of culture is central to the successful adoption of the SDGs among Member States (UNESCO, 2019a), observing that “culture is who we are and what shapes our identity. No development can be sustainable without including culture” (*ibid.*). In considering culture and its connection to identity, it is evident that culture and national or regional identity have the potential to mobilise publics towards a care of ecosystems. For UNESCO, the value of “intangible cultural heritage” is identified in particular national cultural practices, such as, in the Irish case, uilleann piping and hurling (*ibid.*).

UNESCO has also launched a concept around “living heritage and nature” (UNESCO, 2019b), with an interactive visualisation of cultural heritage and its interaction with natural processes. This is an attempt to link cultural heritage and practices to natural process. To this end, eight biomes are presented (sea, inland wetlands, forests, grasslands, agro-ecosystems, drylands, urban areas and mountains), along with a category for non-ecosystem-specific cultural practices. The modelling of cultural practices and heritage in this way provides an attempt to link what are seen as separate spheres: those of society in the form of culture, and those of nature. For example, when uilleann piping is investigated through this tool, it is connected to the *sea*, *islands*, *agro-ecosystems* and *urban areas* biomes. While these links are not analysed explicitly, it helps form an imaginary that connects the cultural practice of uilleann piping with its links to maritime and island areas, and urban spaces. The extent to which those biomes are subject to

⁶ <https://en.unesco.org/themes/culture-sustainable-development> (accessed 21 August 2020).

change under conditions of environmental degradation can have an impact on the continuation of the cultural practice of uilleann piping in those areas. Thus, the conversation around a cultural matter can be brought towards an ecological dimension. For example, if climate change affects sea levels in Ireland, valued cultural practices such as uilleann piping are potentially threatened.

Within scientific narratives on cultural sustainability, discourse follows certain thematic patterns (Soini and Birkeland, 2014: p. 213). Furthermore, these discourses broadly centre around “four political and ideological contexts, conservative, neoliberal, communitarian, and environmentalist” (*ibid.*). This shows that not only are the discourses themselves varied, but also the ideological ways in which they can be used can vary. This has implications for policy, depending on how culture for sustainable development is categorised in the policy context. For example, an environmentalist perspective may promote linkages between cultural policy and environmental policy. In contrast, a neoliberal context may foreground culture as useful for “branding” a country, showcasing its economic impacts or measuring its economic value as the so-called “creative and cultural industries” (Hesmondhalgh, 2007). Furthermore, notions of “eco tourism” are frequently mobilised as ways to ensure the sustainable development of intangible heritage sites (e.g. Liburd and Becken, 2017; Wearne, 2018; Mondino and Beery, 2019), with positive economic benefits touted, while encouraging the unsustainable consumption of space (North, 2010).

In summary, the aims of the SDGs and the role of UNESCO in promoting culture for sustainable development are two international contexts through which imaginaries and perspectives towards encouraging sustainability can be promoted. While such linkages can be encouraged in environmentalist perspectives, caution needs to be taken if potential implementation is in neoliberal contexts. Therefore, while culture is a potentially significant site for driving behaviour change towards the SDGs, how this is achieved depends on the local interpretation at a policy level.

4.3 Irish Cultural Policy Context

In the Irish context, of salience to this report is the Culture 2025 framework that was launched in 2016.

It is touted as “our first ever national cultural policy” and encompasses various “values” and “pillars” through which culture can be supported (DCHG, 2016). The sixth value is of particular importance to this discussion. It acknowledges “the value of culture as a means of fostering a more sustainable future for Ireland, including through economic and social policy” (DAHRRGA, 2016: p. 3). Additionally, the “intrinsic value of culture” is also identified as a value (*ibid.*). This shows a tentative move in cultural policy to link with environmental policy, while also nominally hinting at an environmentalist discourse, rather than a neoliberal one (Soini and Birkeland, 2014).

Among the seven pillars identified, the third one, concerning “celebrating our cultural heritage and traditions” (DAHRRGA, 2016: p. 10), observes that “our natural and built heritages are key components in framing our cultural identity and experience”, outlining a connection to “natural parks and reserves”, their “unique habitats, flora and fauna”. This overt linking of cultural heritage with the natural world provides an opportunity for policymakers to develop connections between these key areas, affording policy linkages between the cultural sector and environmental issues. However, there are no set goals or outcomes by which progress on the framework can be measured, leaving it unclear how such initiatives may be supported in practice. However, the implementation document for the framework, Creative Ireland, was launched in 2016 and is identified as “the main implementation vehicle for the priorities identified in Culture 2025/Éire Ildánach” (p. 7). It is therefore of relevance to this report, given that it outlines the ways in which various aspects of Culture 2025 are implemented, and the values and pillars pertaining to the role of culture in environmental matters and sustainability that were seen in Culture 2025. It is to the implementation document related to Culture 2025 that we now turn.

A key finding from this implementation document is that no references to the role of culture with respect to environmental issues or sustainability were found. This is despite an acknowledgement in the framework document that Culture 2025 explicitly focuses on engagement with the environment: “Culture 2025/Éire Ildánach states that arts and culture are intrinsic to the Irish State, acknowledges the need to increase access to, and participation in, the arts, boost our creative industries, and preserve our heritage with a particular

focus on language, landscape and the environment" (*ibid.*).

Therefore, the Culture 2025 framework document remains aspirational in terms of the role of culture in foregrounding environmental matters. Furthermore, while the framework attempts to link cultural and environmental heritage, the implementation document does not adopt the environmental aspect of the pillars and values for implementation. This is disappointing from the perspective of linking cultural and environmental policy. The lack of adoption of the environmental aspects of the pillars and values is evidence of a deferral of the environmental dimension to the next implementation document, leaving the implementation of the environmental aspects of Culture 2025 to the last years of its remit.

In light of this, a positive policy intervention would be to explicitly include environmental issues as part of future cultural policy initiatives. For example, Arts Council policy currently does not make any explicit calls to support artists working on environmental matters. This is not surprising, given its broader remit to support and fund the arts, and not particular subject matter. However, objective 20 of its *Making Great Art* (2016–2025) policy document states that "we will develop a strategy to address our statutory function to promote the arts and to demonstrate their distinctive value across a range of measures: cultural, social and economic" (Arts Council of Ireland, 2015: p. 40). I suggest that, given the contemporary environmental challenges faced by society, and the dependence of culture, society and economy on a healthy environment, this remit can be expanded to include environmental measures. This would be in line with practices of linking policies between domains, it would be in line with Culture 2025 and it would serve as good practice in accounting for environmental impacts just as economic, social and cultural impacts are measured.

I thus conclude this brief summary of cultural policy in Ireland by noting how, in general, cultural policy in Ireland is taking a potentially positive turn towards environmentalist cultural discourse. This is most evident in the Culture 2025 framework document, which sets a broad agenda for the intrinsic value of culture and the place of culture in sustainability and environmental discourses. However, while this is aspirational, the actual implementation to date,

as evidenced by the Creative Ireland policy, has not yet brought those key values and pillars to the implementation phase. A key recommendation, therefore, is to inform policy for the next iteration of the Creative Ireland policy, so that the environmental pillars and values of Culture 2025 are adopted and foregrounded as a matter of priority. Furthermore, the analysis of Arts Council policy shows that it has a role to play in supporting the measurement of environmental impacts just as it measures economic, social and cultural impacts of funded work. Therefore, a key recommendation for Arts Council policy is to integrate ways of evaluating potential environmental dimensions of the arts, through environmental impacts, and also how funding decisions are made.

4.4 Irish Environmental Policy Context

4.4.1 Irish spatial and regional strategy in Project Ireland 2040

In this section, the Irish policy context for environmental matters is introduced by an overview of the Project Ireland 2040 policy framework. This policy framework is important owing to its role as an "overarching strategy" (Government of Ireland, no date) for infrastructural development and spatial planning. A brief analysis of the first report from this policy framework is analysed. However, national spatial strategy also has a lineage that adds complexities into interactions between development and environmental concerns, with Kitchin (2015) noting that the previous National Spatial Strategy (NSS) 2002–2020 (Department of Environment and Local Government, 2002) was "initially perceived to be a success", and was even "considered best practice by other countries" (Kitchin, 2015). Key aspects of this strategy focused on a "consolidation" of the Dublin region but with attention paid to more balanced development throughout the country, with the introduction of "hubs" and "gateways" in a spatial plan focused on regions (Department of Environment and Local Government, 2002). However, the political climate at the time was one of "clientelist, cronyist, localist planning system and an attitude of 'any development, in any location and at any time' by the public and politicians" (Kitchin, 2015). Thus, such attitudes interfered with the implementation of the plan.

A review of the NSS revealed a consideration of environmental matters, with the plan acknowledging how “the environment encompasses the natural and cultural heritage”, while also stating that “it is part of our national endowment” and that “its form and characteristics derive from both natural and human processes” (Department of Environment and Local Government, 2002: p. 112). It stressed “an international responsibility to present and future generations which combines the concepts of sustainability and good stewardship” (p. 114). Furthermore, the NSS also acknowledged how “the various components of that environment have to be safeguarded for their own intrinsic values” (*ibid.*), specifying that economic policy aims “should be to ensure that the resources are used in sustainable ways that put as much emphasis as possible on their renewability” (*ibid.*)

Although the environmental aspirations of the NSS were laudable, a lesson needs to be drawn from the failure of the NSS, which was scrapped in 2013 in the midst of the global economic crisis. This lesson is on how economic pressures derailed many of the NSS plans, including plans for balanced and sustainable development with regard to national ecosystems, and international cooperation on environmental matters. Therefore, the backdrop of the current plan, Project Ireland 2040, requires consideration of those factors – economic and political – that can interfere with the integrity of the environmental measures within spatial planning.

The new spatial strategy, Project Ireland 2040, was launched in 2017, and in May 2019 the first annual report was released. This outlines the key strategic outcomes for the entire project, which include compact growth; enhanced regional accessibility; strengthened rural economies and communities; sustainable mobility; a strong economy supported by enterprise, innovation and skills; international connectivity; enhanced amenity and heritage; low carbon, climate resilience; sustainable water and environmental resources management; and quality childcare, education and health (DPER, 2019: p. 3). Of particular importance to this report are the outcomes relating to low carbon, climate resilience, and sustainable water and environmental resources management.

In relation to the outcome regarding more low carbon and climate resilience, the annual report notes that this outcome is “the single largest investment priority

under Project Ireland 2040”, which “represent[s] a step-change in Ireland’s delivery of climate-action objectives which are designed to substantially reduce carbon emissions over the period to 2030” (p. 14). While this is to be welcomed, it also recognises the scale of the challenge, namely that “the reliance solely on Exchequer expenditure schemes is neither affordable nor adequate to meet the scale of the challenge to be addressed” (*ibid.*). To this end, the document outlines how “climate mitigation action will require a targeted balance between Exchequer-supported expenditure, taxation measures, regulation and behavioural change” (*ibid.*). This is of salience to our discussion, because it adopts a rounded approach to the multi-scalar and multi-sectoral challenges of climate mitigation. Along with other measures, behaviour change is acknowledged as an important pillar in climate mitigation action. For the purposes of this report, concerned with how cultural practices can be mobilised towards more sustainable practices, I suggest that this policy acknowledges a “soft” form of behaviour change towards more sustainable practices by publics. Furthermore, in finding novel ways to communicate environmental issues, the policy potentially supports informing publics in new ways towards new ecological imaginaries.

Another part of the environmental strategy in Project Ireland 2040 involves the decarbonisation of the built environment through increased energy efficiency of buildings (DPER, 2019: p. 15). This is to be welcomed, although the need for publics to be informed through multiple channels about the need and benefits of this plan should be noted. However, in relation to environmental resource management (pp. 16–17), of concern is the mobilisation of “better geological understanding” to “significantly de-risk and encourage private investment in Ireland’s natural resources” (p. 17). This requires further efforts to communicate with publics, in that it goes against the previously stated aims in the NSS, which foregrounded the intrinsic value of such resources and the ideas of inter-relatedness of such ecological assets. Arguably, if natural resources are privatised, this stands at odds with such aims, and is not in the public interest.

4.4.2 Select Irish environmental policies

This report now considers select environmental policies in Ireland. This is to identify challenges and opportunities for policy actors, that is, those involved

with policymaking such as governments, NGOs, and citizen and community representatives, to strengthen the nascent linkages between environmental and cultural policy as identified in the Culture 2025 framework, Arts Council policy and the Project Ireland 2040 strategy. Given that the overarching international policy landscape was that of the SDGs, this section focuses on the *Our Sustainable Future* policy plan and the SDGs National Implementation Plan 2018–2020. The *Our Sustainable Future* plan acts as a framework document, with the implementation plan selecting specific aspects of the overall framework for development.

Our Sustainable Future

The *Our Sustainable Future* policy document sets out the broad policy agendas towards sustainable development and includes a discussion of challenges faced, how the policy is implemented, and how progress on the implementation is measured (DECLG, 2012). Included in the framework is a section pertaining to “Education, Communication and Behaviour Change” (DECLG, 2012: p. 77). Of importance to this report, it acknowledges that “public communication is vital for sustainable development to be better understood and appreciated”, while also acknowledging that “raising awareness does not always lead to changes in behaviour and more sustainable outcomes” (*ibid.*). The inclusion of communication as a factor in behaviour change shows the scope for potential linkages between environmental policy implementation and cultural policy.

Indeed, the framework document advises that public authorities need to consider partnerships “with non-governmental organisations and civil society groups [which] have a crucial role in advocating for a more sustainable society” (*ibid.*). This shows that the policy recognises the value of including a variety of stakeholders through which sustainability discourses can be developed and communicated to publics. This is an important environmental policy in terms of developing solutions for communicating environmental issues. Furthermore, it acknowledges that behaviour change is connected to engaging publics, while not guaranteeing measurable success.

While the framework shows broadly positive intentions to communicating environmental issues, the implementation plan 2018–2020 is more specific on the current timeline for translating the policy aspirations around communication and education into action. The analysis of the implementation plan found a chapter on “Communications and Awareness Raising” (DCCAE, 2018: p. 26). This shows that, in this instance, there is some translation from the broad *Our Sustainable Future* framework into the implementation plan. The chapter is important for this report on two counts: it deals with both what to communicate and how to communicate the issues of salience.

For the first area, on what to communicate, the implementation plan outlines “three key questions which an SDG communication and awareness strategy must address” (p. 26). These questions are (1) “What are the SDGs?”, (2) “What is Government doing to implement the SDGs?” and (3) “How can the public help achieve the SDGs?” (*ibid.*). These three key questions set out the agenda for what is deemed important to communicate about the SDGs to publics in Ireland. The questions therefore foreground a need for public awareness on what the SDGs are, the role of the government in Ireland in implementing the goals and, finally, the role of the public in working towards achieving the goals. These questions set a broad agenda for the challenge of communicating issues of behaviour change. Second, the goal of developing public awareness of the SDGs to include the role of government is also remarkably broad for an effective communications strategy. There are potential challenges in communicating all 17 of the SDGs to publics at the one time. I therefore suggest that the third question on how the public can achieve the SDGs may lead to implementation of a vague communications strategy that may not target individual goals effectively without flooding the public with information.

Notwithstanding this potential challenge, the implementation plan suggests the development of “a strategy around communicating Ireland’s key SDG priorities” (p. 26). This allows for a more focused approach, whereby various priorities are developed and communicated to publics over time. This potentially offsets the risks associated with communicating such a large set of goals. Furthermore, the implementation plan also suggests an online

platform for communicating the SDGs (p. 27). This is a positive development that may allow publics to explore resources pertaining to the SDGs over time. A third strategy in the plan is to select “SDG champions” for awareness raising (p. 27). The fourth strategy concerns a participatory attitude (p. 28) and a “leave no one behind” approach.

Overall, the plan shows that some attention has been paid to the need to communicate a transition towards sustainability to publics. While there is some risk in communicating a complex set of goals, the implementation plan also suggests a prioritisation of goals over time, which may reduce the risk. However, a concern of this discussion is how issues of the “attention economy” need to be considered in the contemporary media and cultural landscape (Franck, 2019). The attention economy concerns how, in order to keep an audience engaged in an era of divergence of media platforms, choice and proliferation of media devices, increasingly new ways to keep attention need to be developed (Tassi, 2018). It also needs to be acknowledged that the volume of media content available to audiences also influences the amount of impact a piece of content may have. The implementation plan suggests mobilising NGO champions, which, while laudable for its inclusivity, potentially places a responsibility on the champions to sustain audience attention across devices, channels and platforms. Another potential risk is in the reliance on a website to communicate the goals. This is a potential risk given that there already exists a wealth of environmental data, for example on websites such as city dashboards and council websites. However, given the overall positive scope of the implementation plan, this report contends that the communication of these data could benefit from more novel approaches beyond these (now) traditional channels.

National Biodiversity Action Plan

At the time of writing this report, the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) released its global assessment report on biodiversity and ecosystem services (IPBES, 2019b). This report was stark in its findings about the socio-ecological relationship, with key messages for publics and policymakers including how “nature across most of the globe has now been

significantly altered by multiple human drivers, with the great majority of indicators of ecosystems and biodiversity showing rapid decline” (IPBES, 2019b: p. 11). Some statistics include the loss of 85% of global wetlands (*ibid.*) and the future loss of around 25% of all species currently threatened with extinction (p. 12). Contributory factors include a fourfold expansion of the global economy and a tenfold increase in trade over the last 50 years (p. 13), along with “economic incentives” that have “generally favoured expanding economic activity, and often environmental harm, over conservation or restoration” (p. 14). Given these extensive environmental challenges, I suggest that a key policy in the contemporary Irish context is the National Biodiversity Action Plan 2017–2021 (DCHG, 2017: pp. 6–7). The third stated objective is to “increase awareness and appreciation of biodiversity and ecosystems services” (*ibid.*). This call to increase awareness has relevance for this report, in that communication strategies can be mobilised to provide the desired awareness raising. The key target for this objective is “enhanced appreciation of the value of biodiversity and ecosystem services” (*ibid.*) and is aimed at a wide range of groups, such as “policymakers, businesses, stakeholders, local communities” and “the general public” (p. 6). The plan also acknowledges the “key partners” (p. 20) involved in biodiversity, with a need to mobilise a range of stakeholders from local and national government, education, and NGOs. Given the multi-scalar aspect of this challenge, therefore, it is important to foreground how awareness and communication of biodiversity issues are also framed in this document.

The analysis of the plan showed “strong support from the Irish and European public for the conservation of biodiversity and the services it provides” (p. 40). However, the plan also revealed a knowledge gap, evidenced in the statistic that “in 2015 35% of the Irish people interviewed for Eurobarometer had never heard of the term biodiversity and more than 90% would like better information about the importance of biodiversity” (p. 40). This shows that, while there is a general interest in biodiversity as one aspect of the environmental challenges faced by Irish society, there is a gap in public understanding of biodiversity concerns. This gap highlights an opportunity to communicate these issues in engaging ways to publics.

The plan assumes that the communication of biodiversity issues takes place in mainstream channels, for example “social media, web-based, radio, TV etc” (p. 42). It also proposes that “a communication campaign is foreseen aimed at increasing public and sectoral understanding of the value of biodiversity” (*ibid.*). Given existing challenges of the attention economy, I would argue that, if the same channels and formats of communication that have to date not bridged the knowledge gap are proposed for this campaign, there is a question over the extent to which they will be adequate to address that knowledge gap in the future, and with an increasingly saturated attention economy.

As well as objectives, the plan introduces eight desired targets (pp. 43–44). The seventh target, to “develop and implement a communications campaign in support of public and sectoral understanding of the value of biodiversity and full implementation of this NBAP [National Biodiversity Action Plan]” (p. 44), is of particular relevance to this report. The lead partners for this target include “relevant government departments and agencies” along with local authorities. Its performance indicators are identified in some detail:

- number of media mentions for launch, achievements and future actions;
- reach of dedicated media attention (how many people are reached);
- number of Department of Culture, Heritage and the Gaeltacht staff assigned as communication officers;
- number of events in National Biodiversity Week;
- Eurobarometer.

While these indicators are laudable, I suggest that, given the concerns of this report about the need to communicate in novel ways to publics, the prioritising of “mentions” and “reach” in a saturated attention economy may not fully address the required objectives. Measuring awareness by volume can show that social media audiences are receiving the messages. However, there is no indication of the quality of the interaction, in that in a media context of “infinite scrolling” on major platforms such as Facebook, Twitter and Instagram, the user may quickly alight on a message only to decide they will keep scrolling. Therefore, the plan needs to show caution to not over-emphasise “reach” as an indicator of

real-world action. However, it must also be noted that target seven is only one of eight targets, the others involving education, training, community engagement and awards.

The analysis showed that target four is of interest in its remit to “support radio, TV, web-based and other media products that emphasise or are centred around showcasing biodiversity, its importance, and current or future challenges” (DCHG, 2017: p. 43). The measures for this target include the “number of media products centred around biodiversity” (*ibid.*). In this case, a quantitative measure of the number of products that include radio and TV is appropriate because a more sustained message run across these platforms may provide increased knowledge to sectors of the public who are not targeted by social media. Furthermore, radio and TV provide certain affordances, such as the opportunity to deliver more in-depth coverage of biodiversity issues. These approaches can complement the social media approach. Of note is RTÉ’s recent initiative to launch a climate week, which increased coverage across all its platforms; this can serve as an exemplar of this kind of multi-channel coverage (RTÉ, 2019). However, this report advises that, in line with the findings from Morgan (2017) and Bourdieu (1993), the structural constraints of mainstream media can be, and need to be, complemented by other novel approaches.

4.5 Summary and Recommendations

This section analysed the broad international contexts of the SDGs and UNESCO to situate select Irish cultural and environmental policies. This was with a view to ascertaining the extent to which support for novel ways of communicating environmental issues can be supported by cultural policy, and to what extent environmental policy considers culture as a driver of environmental awareness to publics. The report can outline some observations and recommendations for policy.

The main observation from this analysis is a broadly hopeful one, in that both environmental and cultural policies refer to each other’s domains to some extent. For environmental policy in particular, the SDGs implementation plan and the biodiversity implementation plan both acknowledged the need to communicate to multiple stakeholders, including publics, using a variety of means and platforms. This,

at least in principle, supports the findings of this report around communicating in novel ways to differently engage publics.

However, while the policies themselves show some progressiveness around communicating environmental issues, the contemporary economic context is uncertain. Ireland has not overcome its vulnerability to the “boom–bust cycle”, with the Organisation for Economic Co-operation and Development (OECD) warning that a disorderly Brexit “could plunge the Irish economy into a recession”, and added to this threat is that “further surges in Irish property prices could lead to another boom-to-bust cycle” (O’Donoghue, 2019). This potentially jeopardises the current and future implementation of the plans laid out by the policies analysed, as happened with the NSS.

With this caveat in mind, the report nonetheless makes three recommendations based on this selected policy analysis. The first recommendation foregrounds the need to continue to link cultural and environmental policies. As noted above, I recommend that the Arts Council include an environmental measurement on its funded projects just as it currently includes economic, social and cultural measures.

The second recommendation is for environmental policy and continues the theme of linking policies. I suggest the development of an environmental arts initiative run in conjunction with the Arts Council. An international exemplar of this is the Invisible Dust

organisation, funded by the Arts Council in the UK and whose role is to “work with leading artists and scientists to produce unique and exciting works of contemporary art and new scientific ideas exploring our environment and climate change” (Invisible Dust, no date). Given the nascent linkages already existing between cultural and environmental policy, a small-scale initiative can be developed in Ireland that uses existing expertise and research on communicating environmental issues in novel ways, and cultural policy/Arts Council stakeholders.

A final recommendation for the communication of environmental matters is in the consideration of the scope of environmental communication policy. The report therefore recommends the need to include communication beyond traditional and social media, given a saturated attention economy. This can be achieved by the above recommendation for a new art/environment initiative. This initiative can have a broad remit to inform environmental actors concerned with communicating issues of salience, using novel methods and strategies, as well as engaging a variety of stakeholders in problem-solving how best to communicate selected issues in novel and engaging ways. For example, an EPA/Arts Council initiative can mobilise joint expertise to provide grounded and pragmatic solutions to expand the suite of environmental communication tools available in Ireland.

5 Fieldwork

5.1 Introduction to the Fieldwork: Rationale and Scope

Having conducted the literature review and an archival review of international cultural practices, the Ars Electronica centre in Linz, Austria, emerged as a suitable site for fieldwork. Ars Electronica has “been analysing and commenting on the digital revolution” since 1979. Its website states that “the focus is always on current developments and possible future scenarios and the question of how these will change our lives.

Ars Electronica is a worldwide unique platform for art, technology and society” (Ars Electronica, 2019a). The centre, built in 2009, provides a multi-storey space for experimental laboratories, an “8K Deep Space” room for experimental animation, exhibition spaces and spaces for the research of AI and machine learning (Ars Electronica, 2019b). In this respect, it can be seen as an exemplar for experimental cultural practices and thus can be reasonably assumed to also hold potential for exploring cultural practices that pertain to environmental communication.

Ars Electronica runs a festival each year that showcases work in the area of emerging cultural practices. The festival is noted as “an occasion to scrutinize potential futures and to focus these inquiries on the nexus of art, technology and society” (Ars Electronica, 2019c: p. 16). In 2019, the festival ran from 5 to 9 September, with over 500 events taking place during those days. The title of the festival for 2019 was “Out of the Box: the midlife crisis of the digital revolution” (*ibid.*). For Ars Electronica, artistic practice is seen as “a critical thinker’s ‘second opinion’ on the digital revolution” (*ibid.*). The exhibition catalogue foregrounds how the festival is one for “art, technology and society” and how “artistic thought and action” involves “making the invisible visible” (p. 16). Thus, in the context of this research project, Ars Electronica in its remit as an art space and its festival held significant promise of both relevance to contemporary societal matters such as environmental crisis and a means of communicating such matters in novel ways. This is especially so in light of Ars Electronica observing that societal observations that are possible through art methods allow artists “to

observe and analyse possible future transformations as well as those currently happening, and to come to conclusions about their cultural and social dimensions and their consequences” (*ibid.*). Therefore, the field trip to the festival was a means of complementing the desk survey of international practices, placing the research project directly in contact with peer-reviewed emerging media practices, and assessing the digital media work that currently exists internationally and which engages in communicating environmental data in novel ways.

Furthermore, 2019 represented a key year for Ars Electronica itself – it was the 40th anniversary of its founding. Therefore, it situates itself as a historically significant actor in the area of digital media history. Indeed, it notes not only the “40 years of digital revolution” but also that “in truth we have only just begun” (p. 17). It cites the achievements of the Apollo space programme, the introduction of the “PC” by IBM as seminal to the adoption of the “personalisation of computers” (*ibid.*), through to the deployment of the world wide web and to current concerns around AI, “digital assistance” (p. 18) and indeed the outsourcing of thought in the form of how we “digitise our thinking and decision-making” (*ibid.*).

I suggest that these are indeed key concerns of our time. However, what is manifestly lacking from this commentary on the Ars Electronica history and direction is the environmental dimension to the contemporary condition. Thus, while the Ars Electronica “self-talk” was interested in investigating matters of AI and big data, the site visit would confirm if similar concerns were to the fore in contemporary digital art practice, or whether individual artists and institutions alike were concerned with environmental matters.

5.2 Site Visits, 6–8 September 2019

It is important to stress the scale of the Ars Electronica festival, which takes place in multiple venues across the entire city of Linz, Austria. Furthermore, within the festival are multiple exhibitions, and representations by various academic institutions and other organisations concerned with digital media. In total

there were 16 locations of exhibitions or associated exhibitions, with the main exhibitions taking place in the POSTCITY building. Thus, two separate visits were paid to the POSTCITY building, with further visits to the Ars Electronica building, the University of Art and Design, and the Atelierhaus Salzamt. Other venues contained various associated events that were not relevant to this research, such as places for experimental music and tributes for artists/art movements.

Within the POSTCITY building, the main exhibitions were held on the first floor and the “bunker” basement area. On 6 September, the first floor was visited. Within this space were a multitude of exhibitions, with a main showcase from the European Platform for Digital Humanism. This showcase included AI music, the European ARTificial Intelligence Lab, a hackathon space and a “Starts” section. This floor also included a “Campus” exhibition of work from academic institutions and a “Create your world” section for younger audiences. Thus, on this one floor were several individual sections and exhibitions. On 8 September the bunker floor was visited. This floor held the exhibition “Human Limitations – Limited Humanity” and some gallery spaces.

As discussed, the POSTCITY was the main venue for the festival, and therefore many of the initial findings are drawn from the sample exhibits at that venue. However, on 7 September, a further site visit was conducted to the University of Art and Design, and the Atelierhaus Salzamt. The first site was of particular relevance for its “Shared Habitats” exhibition, and the Atelierhaus Salzamt contained an exhibition by artists Station Rose titled *#Urbana Natura in_hancing_The_Augmented (U><N>/<<T>>A)*, deemed relevant as it “shows the already existing deep interweaving of these seemingly independent levels and forms of life” (Ars Electronica, 2019c: p. 387), i.e. those of the urban, natural and augmented. Given the scale of the fieldwork, a full account of findings including photos and videos taken during the site visits is available on the project website: www.sowdata.ie. However, this report provides below a short overview of key observations from the fieldwork.

5.3 Observations and Discussion

Key to the practice of fieldwork is observation, which is “an active method in which the fieldworker is central

to the data collection process” (Pole and Hillyard, 2016: p. 13). It requires “on the spot judgement about the way data should be gathered [and] the identification of actions and events which are important and those which are not” (p. 31). Therefore, the aim of conducting observation in a setting such as Ars Electronica was to ascertain the key themes that are assumed to be worthy of display at their festival. As per Pole and Hillard’s work, the process of observation through fieldwork can elicit the “interior world” of Ars Electronica (p. 60) and allow fieldworkers to “observe and experience at first hand what is happening in the field” (*ibid.*). Observation of the themes that emerged in the exhibitions can provide a perspective on both what Ars Electronica foregrounds as a “valid” subject matter and, within the multitude of exhibitions, what individual gatekeepers, and indeed artists, currently consider as themes to focus on, including the extent to which environmental themes are present.

In total, observations were found from five exhibits: the CAMPUS exhibit; the European Platform for Digital Humanism; Human Limitations – Limited Humanity; Shared Habitats; and *U><N>/<<T>>A*. The observational analysis included documenting key examples of work using photo and video. Given the rich media aspect of the documentation, the full analysis of each exhibition is available under the *Fieldwork* section of the project website at www.sowdata.ie/fieldwork.

Key themes emerged from the observation of the exhibits, particularly in the POSTCITY venue, which showcased a wide variety of work. The first theme that emerged was a concern with AI and machine learning. Showcase projects included the *A-MINT* artificial music intelligence project by Alex Braga, which, according to the on-site abstract for the work, was “a metaphor for a sustainable future, where man and machines work together in perfect symbiosis to cross a frontier that man alone could not dare”. The key feature of the work was that it used AI to improvise music along with a human performer. I suggest that, as an exemplar of the focus on AI, this piece inadequately explores ideas of sustainability as described. These themes focusing on AI and machine learning were also adopted by the *Ai-Da* robot project and the *TeleAgriCulture_Rhizomatic Bias* by Julian Stadon, Daniel Artamendi and V2 Lab for Unstable Media. The full analysis of these works is available on www.sowdata.ie/fieldwork.

Another theme that emerged from observation was around bio-art, which is art that works with plants and other flora. However, when bio-art processes were used, there was a tendency to use the biological processes as a form of data input. It was also observed that, when bio-art was present, it was with a sense of finding new ways to alter genes and harness plant/flora for exotic human use, for example in extreme locations such as outer space. This theme was also linked to ideas of inhabiting space and working on making types of worms/organisms survive in space. There were also examples of growing plants in space to support humans in that environment.

I suggest that these key themes show a certain concern with a somewhat mechanistic and distant relationship with the ecosystem. In light of the literature review findings on the nature/society relationship, this is unwelcome, in that it situates nature as “external” by foregrounding what society can obtain from plants and what can be done to harness the ecosystem. Therefore, the societal questions raised by such works were more around the harnessing of ecosystems for services and human gain and exploitation rather than working with it, or finding critical solutions to socio-ecological issues.

Notwithstanding this, there were exemplars of work that treated the human/nature relationship with consideration. A key work that problematised various aspects of environmental crisis was *In 100 years* by Cristoph Breiner. *Noise Eater* by Bill (BiCheng) Zhou also worked well to sonify environmental data. A third example of effective work on environmental sustainability and “green technology” was *Flora* by Pim Boreel. A full analysis and documentation of these works is available on the project website at www.sowdata.ie/fieldwork/campus.

The Shared Habitats exhibition was predominantly focused on “the role of organisms within their environment, the effects humans have on their living spaces, interactions between human and non-human beings, and the relationships between humans and machines” (Damm, 2019). Several of the most salient works are discussed on the project website at www.sowdata.ie/fieldwork/shared-habitats, with a note to the reader that the website <http://shared-habitats.eu/> also provides information about the exhibition.

In summing up the site visits, it must be noted that the analysis is not exhaustive, in that a representative sample of work was considered. This is done to identify the key themes and foci of the exhibitions as perceived by the researcher on the field trip. An exhaustive analysis of each artwork would be beyond the scope of this work, but it is noted that some of the works are also presented on the Ars Electronica festival website. However, the advantage of the site visits was understanding how to present the overall sense of what the festival prioritised.

In the case of some of the exhibitions, AI, machine learning, data and digital surveillance were prioritised over issues of environmental concern. This to an extent mirrors the archival analysis and points to a focus gap in this area. However, there were examples of work that show an opportunity to develop solutions to connect with environmental/ecological thought and that showcase how novel practices can engage publics on environmental matters. This was particularly the case for the *CAMPUS* and *Shared Habitats* exhibits, which are documented on the project website as a public resource for interested stakeholders. As noted in the policy section, this may require novel linkages between cultural and environmental policy.

5.4 Supplementary Fieldwork: Eco-visionaries

During the course of the project, another exhibition of key environmental works emerged. This exhibition, *Eco-visionaries*, was to take place in London between November 2019 and February 2020. In contrast to Ars Electronica, which was a general showcase of electronic art, this exhibition focused on ecological art in particular, its theme “confronting a planet in a state of emergency” directly relevant to this project (Royal Academy of Arts, 2019).

The project consisted of 21 works of ecological art, ranging from video pieces to installation work and documentation of environmental activism. The work also included speculative design installations, acknowledging and exemplifying the structural need for transformative and radical imaginaries towards sustainability. A selection of works is analysed on the project website www.sowdata.ie/fieldwork.

6 Dissemination of Research: Website and Workshop

6.1 Online Platform for Selected Works and Resources

Based on the archival analysis which surveyed three websites that showcased non-commercial contemporary and digital practices, this project was able to identify a relevant set of key or exemplary works. Each of these key works was analysed and critiqued for potential relevance to this project, and for communicating environmental issues or data to publics. It was decided that these practices would be best presented on a website, as images of the works could be viewed along with the analysis and, if possible, links to the artists' own discussion of their works.

Given that a key theme for this project concerned how environmental data could not only be made visible but also incorporate other senses, the works were categorised by both the environmental issue(s) they address and the sense(s) they evoke. This was to communicate to interested stakeholders the potential of using multiple senses to communicate environmental issues.

The website is hosted at www.sowdata.ie and contains the set of practices identified in the archival analysis and the outcomes of the fieldwork. The practices are categorised in multiple ways. They can be viewed by year but, given that the findings of the archival analysis revealed subject matter and the use of multiple senses, the catalogue of works can be browsed by keywords. These keywords correspond to subject matter of the works and the senses that they engage.

A key recommendation from this aspect of the research is to consider the value of keeping this resource maintained as an ongoing resource for stakeholders such as teachers, data producers, environmental scientists and artists. This database provides a resource for such stakeholders to consider how stories of environmental crisis can be told through engaging a variety of practices using a variety of materials, and dealing with multiple environmental issues through all five senses.

6.2 Workshop

Given that in Ireland there exist multiple datasets that provide insight into environmental issues, a workshop was offered that would focus on enabling producers of environmental data to consider how "knowledge gaps" in communicating environmental data could be potentially bridged. The workshop took place on 8 January 2020. A total of 35 participants registered from various agencies that produce environmental data, such as the EPA, An Taisce, the Department of the Taoiseach and Dublin Cycling Campaign. The public were also allowed to register for the workshop. The workshop was held in a city centre location to aid accessibility for participants.

The workshop was structured in two halves, with each half consisting of a presentation, activity and discussion. The first half of the workshop was focused on identifying the key themes and frameworks from the research that were most relevant for the participants. This involved an overview of Bourdieu's field theory, in order that participants could consider how fields of knowledge production were organised, and how that may influence the communication of environmental data or issues.

Next, a knowledge-sharing exercise was introduced in which participants reflected on their recent work with communicating environmental data. Participants who did not work directly with environmental data were encouraged to consider an example of an environmental issue that they worked on or had seen recently. The participants were next asked to identify (1) the issue or data, (2) the form/channel of communication, (3) the limitations of the form of communication and (4) the benefits of the form of communication. They were facilitated in this by the inclusion in their participants' pack of the annotation of Bourdieu's field theory. Their knowledge was "crowdsourced" by the use of Post-its to note the results of each of their answers. The facilitation of knowledge sharing was done through a "gallery walk", during which the Post-its were displayed in four areas so that participants could gain knowledge on existing practices, their benefits and their limitations.

The second half of the workshop was concerned with speculative and transformative practices. The presentation for this half of the workshop consisted of the research finds on novel practices, including the research on sensing and sensors (Gabrys, 2016), and the findings from the archival analysis and field research. Examples of practices were introduced under the five senses, showcasing the multiple ways in which environmental data could be communicated.

The activity for this part of the workshop involved planning for environmental communication, with a scoping exercise around novel environmental communication in which participants imagined a scenario of spending a budget allocated for environmental communication. Based on the presentation, participants were asked to plan for communicating and were facilitated in this by the provision of a handout that asked specific questions. The discussion on this exercise consisted of short presentations during which participants pitched their ideas for novel communication of environmental data, including the identification of stakeholders that may need inclusion. The materials were made available on the project website under the “resources” section

so that other stakeholders may participate in the exercises.

The workshop revealed through activities and discussions an acknowledgement of the limitations of “traditional” communication channels, and the potentially exciting and engaging ways of using the five senses to inform and educate citizens about behaviour change. Yet, participants also observed that organisations can be somewhat convinced by the benefits of using those more traditional channels only, particularly social media. Therefore, while participants were enthusiastic about the potentials of engaging citizens in novel ways, with meaningful outcomes, there was a sense that it would be difficult to convince decision-makers or provide “proof” that novel engagements and interventions can perform as well as or, indeed, potentially better than quantitative practices such as measuring “reach” in social media. A potential avenue for future research would be to engage such decision-makers in organisations, to ask about their current attitudes to their communication practices and to collect their beliefs and attitudes towards these more novel practices.

7 Conclusions and Recommendations

This research project, through a combination of desk research, primary research and dissemination, has provided insight into the place of non-commercial cultural practices to communicate environmental issues and environmental data to publics in Ireland. It has acknowledged the potential for a knowledge gap to be bridged between “big” environmental data, including sensor data, and wider publics who may be unempowered about the environmental impacts of consumerist behaviour. The project adopted a broad scope, acknowledging the need to develop effective communication of environmental issues in general, rather than a focus on one environmental issue such as climate change or biodiversity. By not specifically focusing on one environmental issue, the project aimed to be applicable to ongoing multiple and future environmental challenges.

7.1 Limitations of Existing Communications Approaches

This report has revealed key findings about the communication of environmental issues. It found that the academic field of environmental communication focused mainly on factual, journalistic communication as an assumed way of communicating to publics, while also focusing on climate change as representative of environmental issues. This report suggests that there are limitations to understanding how to communicate environmental issues to publics if such a focus is taken, in that it potentially misses opportunities for engaging publics in novel ways, and with a more holistic approach to environmental issues. Indeed, mainstream media can give audiences mixed messages around consumerism by “bundling” serious journalistic content with advertising content (Morgan, 2017), thus pointing to a need to consider other, complementary, ways of communicating to publics.

Furthermore, the contemporary media landscape is characterised by an “attention economy” in which the attention of audiences forms a type of currency to be exchanged for advertising revenue. Organisations are increasingly pressured in their traditional and social media communications to engage “eyeballs” and find more “reach” for their messages. However, this report

suggests that considering audience engagement by quantitative measures alone can veil questions about the quality of engagement. A quick scroll and “like” of an environmental message, for example, may show up as “reach”, but there is little evidence as to whether this translates into one-time or sustained behaviour change. This report takes the backdrop of these limitations and expands what may be understood about environmental communication.

7.2 Expanding Approaches to Environmental Communication

This report is concerned with an expanded understanding of approaches to the communication of environmental matters. It considers environmental communication as a form of knowledge production that takes place within distinct fields such as advertising, journalism and art. By thinking of communication as taking place in these distinct fields, the report reveals that there are multiple ways to communicate environmental knowledge, beyond what is currently expected in organisations.

This report therefore takes an expanded approach to considering the many ways in which knowledge production takes place. In most instances in contemporary settings, mainstream and social media are the default channels of communication. However, these are largely commercialised, leading to tensions between the fields of factual knowledge production and the embedded advertising content whose role it is to encourage consumption. However, an expanded understanding of “communication” allows for an analysis of non-commercial forms of knowledge production that function differently to mainstream media, offering different potentials to traditional channels of communication.

One aspect of knowledge production in contemporary societies is that it is mostly produced using digital means. This report therefore takes account of both non-commercial production and how it is produced using digital means. The report observes that digital practitioners can use digital media in distinctive ways, such as through “critical making”. This is a process

whereby, through technology use, digital practitioners can reveal critical insights into issues in society. The report therefore suggests that there is potential within the non-commercial, digital production domain to communicate environmental issues in critical, novel and engaging ways using technologies such as environmental sensors.

7.3 Beyond the Visible: Opportunities for Sensing Environmental Issues

As noted above, the attention economy focuses on “reach” and engaging “eyeballs”, leading to a focus on making environmental issues visible. While this is a key opportunity for communicating environmental issues, the report has found that within the field of non-commercial digital production there exist practices that directly engage with environmental issues in an expanded way. This form of ecological art was found to be distinctive in regard to how it approached complex environmental subjects in a pragmatic and easy to understand way, and that could potentially reach audiences different from those reached by traditional media. Furthermore, it found that this area paid attention to materials used in production and, in doing so, provided a model of how to think about production of commodities in contemporary society. Such practices regularly use sensing technologies to translate “big” data into easy to understand media outputs, thus potentially aligning in ways that can use environmental datasets to engage publics.

The report found examples of non-commercial, digital practices that served as exemplars for effective environmental communication. The project found that such practices potentially engage citizens in citizen science and art collaborations. A key finding was how such practices not only “visibilise” environmental data and issues, but also sonify data through music and sound, can make data tactile through wearable devices, and even make environmental issues smelly and tasty. Therefore, this report suggests that a key opportunity for communicating environmental issues lies in how to differently engage publics by evoking the five senses. Thus, by engaging stakeholders who are concerned with novel ways to communicate environmental issues, potentially different and expanded outcomes for communication can occur.

7.4 Limitations

Just as there are limitations in mainstream media with regard to communicating environmental issues, there are also limitations among digital practices, which, at present, tend to focus more on privacy and surveillance issues than on environmental issues. Furthermore, the benefits of mainstream media, such as audience reach, may not be replicated by niche practices, unless there is a concerted effort to bring such work to publics. However, the findings from the fieldwork and examples of practices were made available in an online database – www.sowdata.ie – to provide a resource of potential practices to stakeholders so that they could communicate these practices to a broader, non-academic or specialist audience. The database also holds sample activities that were conducted during the project workshop that could be adapted for other audiences.

7.5 Policy Recommendations

Key recommendation 1

Make more explicit the linkages between policy domains, especially in the implementation documents.

This is to ensure that cultural matters are taken seriously in environmental communication policy, and indeed that environmental measures are included in impact assessments of cultural works.

The research project conducted a policy analysis covering key policies in two policy domains – those of cultural and environmental policy. This was to identify potential policy gaps and opportunities for linkages between environmental and cultural policy. The analysis found a degree of aspirational aims in both policy areas to link to the other policy area, i.e. there were mentions of environmental issues in cultural policy documents and mentions of the importance of culture in environmental policy documents. However, it found that, once these policy frameworks became grounded in their respective implementation documents, the strategies for implementation tended to ignore the other domain, thus deprioritising possibilities for policy linkages.

Key recommendation 2

Include measures of environmental impacts of cultural works, as these can be accounted for in arts funding calls.

A specific finding in this area was how economic, cultural and societal impacts are currently accounted for in arts policy. Therefore, when art is publicly funded, the art is evaluated in terms of its potential economic, cultural and societal impacts. However, environmental impacts are not currently evaluated.

Key recommendation 3

Establish a joint EPA/Arts Council initiative.

A second recommendation calls for the establishment of a joint EPA/Arts Council initiative. This initiative would engage expertise from stakeholders with knowledge in the specific areas of non-commercial and novel environmental communication practices, public engagement and citizen science. This initiative would serve to provide grounded and pragmatic solutions to expand the suite of environmental communication tools available in Ireland. The report outlines an already existing model of cooperation between the cultural and environmental sector, with the Invisible Dust organisation in the UK supporting collaboration on environmental pollution between academics, scientists, technical experts and artists. It recommends that a similar organisation be established in the Irish context.

References

- Anderson, A.G., 2014. *Media, Environment and the Network Society*. Palgrave Macmillan, London.
- Ars Electronica, 2019a. Ars Electronica Center. Available online: <https://ars.electronica.art/news/en/> (accessed 31 January 2020).
- Ars Electronica, 2019b. Compass – navigating the future. Available online: <https://ars.electronica.art/center/en/> (accessed 31 January 2020).
- Ars Electronica, 2019c. Out of the box: the midlife crisis of the digital revolution. Exhibition catalogue, 5–9 September, Linz, Austria.
- Arts Council of Ireland, 2015. *Making Great Art Work – Leading the Development of the Arts in Ireland*. Arts Council of Ireland, Dublin.
- Barad, K., 2003. Posthumanist performativity: toward an understanding of how matter comes to matter. *Signs: Journal of Women in Culture and Society* 28(3): 801–831.
- Blythe, J., Silver, J., Evans, L., Armitage, D., Bennett, N.J., Moore, M-L., Morrison, T.H. and Brown, K., 2018. The dark side of transformation: latent risks in contemporary sustainability discourse. *Antipode* 50(5): 1206–1223.
- Bourdieu, P., 1993. *The Field of Cultural Production: Essays on Art and Literature*. Polity Press, Cambridge, UK.
- Bourdieu, P., 1996. *The Rules of Art: Genesis and Structure of the Literary Field*. Polity Press, Cambridge, UK.
- Boykoff, M. and Boykoff, J., 2004. Bias as balance: global warming and the U.S. prestige press. *Global Environmental Change* 14(2): 125–136.
- Boykoff, M.T. and Yulsman, T., 2013. Political economy, media, and climate change: sinews of modern life. *Wiley Interdisciplinary Reviews: Climate Change* 4(5): 359–371.
- Cardullo, P. and Kitchin, R., 2018. Smart urbanism and smart citizenship: the neoliberal logic of 'citizen-focused' smart cities in Europe. *Environment and Planning C: Politics and Space* 35(4): 2–18.
- Castree, N., 2014. *Making Sense of Nature*. Routledge, Abingdon, UK.
- Cheetham, M.A., 2018. *Landscape into Eco Art*. The Pennsylvania State University Press, University Park, PA.
- Christensen, M. and Nilsson, A.E., 2018. Media, communication, and the environment in precarious times. *Journal of Communication* 68(2): 267–277.
- Coletta, C. and Kitchin, R., 2017. Algorhythmic governance: regulating the "heartbeat" of a city using the Internet of Things. *Big Data & Society* 4(2): 2–16.
- Conlon, D., 2010. Fascinatin' rhythm(s): polyrhythmia and the syncopated echoes of the everyday. In Edensor, T. (ed.), *Geographies of Rhythm: Nature, Place, Mobilities and Bodies*. Ashgate Publishing, Farnham, UK, pp. 71–81.
- Cox, R., 2010. *Environmental Communication and the Public Sphere*. 2nd edn. Sage, London.
- Cubitt, S., 2017. *Finite Media: Environmental Implications of Digital Technologies*. Duke University Press, Durham, NC.
- DAHRRGA (Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs), 2016. *Culture 2025 – Éire Ildánach*. DAHRRGA, Dublin.
- Damm, U., 2019. Shared habitats. Exhibition catalogue, 5–9 September, Linz, Austria.
- DCCAE (Department of Communications, Climate Action and Environment), 2018. *The Sustainable Development Goals National Implementation Plan 2018–2020*. Available online: <https://www.dccae.gov.ie/en-ie/environment/topics/sustainable-development/sustainable-development-goals/Pages/National-Implementation-Plan-2018--2020.aspx> (accessed 21 August 2020).
- DCHG (Department of Culture, Heritage and the Gaeltacht), 2016. Minister Humphreys publishes draft framework policy for Culture 2025/Éire Ildánach. Available online: <https://www.chg.gov.ie/minister-humphreys-publishes-draft-framework-policy-for-culture-2025eire-ildanach/> (accessed 20 November 2019).
- DCHG (Department of Culture, Heritage and the Gaeltacht), 2017. *National Biodiversity Action Plan*. Government Publications Office, Dublin.
- DECLG (Department of Environment, Community and Local Government), 2012. *Our Sustainable Future: A Framework for Sustainable Development for Ireland*. Available online: <https://www.dccae.gov.ie/en-ie/environment/topics/sustainable-development/our-sustainable-future/Pages/default.aspx> (accessed 21 August 2020).

- Department of Environment and Local Government, 2002. *The National Spatial Strategy (NSS) 2002–2020*. Government Publications Office, Dublin.
- DiSalvo, C., 2014. Critical making as materializing the politics of design. *The Information Society* 30(2): 96–105.
- DPER (Department of Public Expenditure and Reform), 2019. *Project Ireland 2040: Annual Report 2018*. Available online: <https://www.gov.ie/en/publication/b684c6-project-ireland-2040-annual-report-2019/> (accessed 20 November 2019).
- EPA (Environmental Protection Agency), 2018. *Ireland's Greenhouse Gas Emissions Projections 2017–2035*. Available online: http://www.epa.ie/pubs/reports/air_airemissions/ghgprojections2017-2035/EPA_2018_GHG_Emissions_Projections_Summary_Report.pdf (accessed 21 August 2020).
- Eurostat, 2020. Waste electrical and electronic equipment (WEEE) by waste management operations. Available online: https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=env_waselee&lang=en (accessed 21 August 2020).
- Flynn, B. and Ó hUiginn, P., 2019. *Environmental Policy Integration: Innovation and Change*. Environmental Protection Agency. Available online: http://www.epa.ie/pubs/reports/research/econ/Research_Report_290.pdf (accessed 21 August 2020).
- Foster, J.B., 2013. Marx and the rift in the universal metabolism of nature. *Monthly Review* 65(7): 1–20.
- Franck, G., 2019. The economy of attention. *Journal of Sociology* 55(1): 8–19. <https://doi.org/10.1177/1440783318811778>
- Gabrys, J., no date. Professional website. Available online: <https://www.jennifergabrys.net/about/> (accessed 21 August 2020).
- Gabrys, J., 2014. A cosmopolitics of energy: diverging materialities and hesitating practices. *Environment and Planning A* 46(9): 2095–2109.
- Gabrys, J., 2016. *Program Earth*. University of Minnesota Press, Minneapolis, MN.
- Gabrys, J. and Yusoff, K., 2012. Arts, sciences and climate change: practices and politics at the threshold. *Science as Culture* 21(1): 1–24.
- Gandy, M., 2006. Urban nature and the ecological imaginary. In Henyen, N., Kaika, M. and Swyngedouw, E. (eds), *In the Nature of Cities: Urban Political Ecology and the Politics of Urban Metabolism*. Routledge, Abingdon, UK.
- Garnham, N., 2000. *Emancipation, the Media, and Modernity*. Oxford University Press, Oxford, UK.
- Garnham, N. and Williams, R., 1986. *Media, Culture and Society: A Critical Reader*. Sage, London.
- Government of Ireland, no date. *Project Ireland 2040*. Available online: <https://www.gov.ie/en/campaigns/09022006-project-ireland-2040/> (accessed 20 November 2019).
- Hackett, R.A., Forde, S., Gunster, S. and Foxwell-Norton, K., 2017. *Journalism and Climate Crisis: Public Engagement, Media Alternatives*. Routledge, Abingdon, UK.
- Hansen, A., 2011. Communication, media and environment: towards reconnecting research on the production, content and social implications of environmental communication. *International Communication Gazette* 73(1–2): 7–25.
- Hansen, A. and Machin, D., 2013. Researching visual environmental communication. *Environmental Communication* 7(2): 151–168.
- Harvey, D., 2010. *The Enigma of Capital*. Oxford University Press, Oxford, UK.
- Hesmondhalgh, D., 2006. Bourdieu, the media and cultural production. *Media, Culture & Society* 28(211).
- Hesmondhalgh, D., 2007. *The Cultural Industries*. 2nd edn. Sage, London.
- Hewson, C., Vogel, C. and Laurent, D., 2015. *Internet Research Methods*. Sage, London.
- Heynen, N., 2014. Urban political ecology I. *Progress in Human Geography* 38(4): 598–604.
- Heynen, N., Kaika, M. and Swyngedouw, E., 2006. *In the Nature of Cities: Urban Political Ecology and the Politics of Urban Metabolism*. Routledge, Abingdon, UK.
- Hopke, J.E. and Hestres, L.E., 2018. Vizualizing the Paris climate talks on Twitter: media and climate stakeholder visual social media during COP21. *Social Media + Society* 4(3): 2–15.
- House of Commons Science and Technology Committee, 2014. *Communicating Climate Science. Eighth Report of Session 2013–2014*. House of Commons, London.
- Howard, P., Thompson, I. and Waterton, E., 2013. *The Routledge Companion to Landscape Studies*. Routledge, Abingdon, UK.
- Invisible Dust, no date. *Invisible Dust: About Us*. Available online: <https://invisibledust.com/about-us> (accessed 20 November 2019).

- IPBES (Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services), 2019a. Nature's dangerous decline 'unprecedented' – species extinction rates 'accelerating'. Media release. Available online: <https://ipbes.net/news/Media-Release-Global-Assessment> (accessed 3 February 2020).
- IPBES (Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services), 2019b. *Summary for Policymakers of the Global Assessment Report on Biodiversity and Ecosystem Services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services*. Díaz, S., Settele, J., Brondízio, E.S. et al. (eds). IPBES Secretariat, Bonn, Germany.
- IPCC (Intergovernmental Panel on Climate Change), 2014. Summary for policymakers. In Edenhofer, O., Pichs-Madruga, R., Sokona, Y. et al. (eds), *Climate Change 2014, Mitigation of Climate Change*. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge, UK, pp. 1–32.
- Jang, S.M. and Hart, P.S., 2015. Polarised frames on 'climate change' and 'global warming' across countries and states: evidence from Twitter big data. *Global Environmental Change* 32: 11–17.
- Jenkins, R., 2002. *Pierre Bourdieu*. Revised edn. Routledge, Abingdon, UK.
- Johns-Putra, A., 2013. Environmental care ethics: notes toward a new materialist critique. *symploke* 21(1–2): 125–135.
- Kaiser, J., 2017. Public spheres of skepticism: climate skeptics' online comments in the German networked public sphere. *International Journal of Communication* 11: 1661–1682.
- Keil, R. and Boudreau, J., 2006. Metropolitics and metabolism: rolling out environmentalism in Toronto. In Heynen, N., Kaika, M. and Swyngedouw, E. (eds), *In the Nature of Cities*. Routledge, New York, NY, pp. 41–62.
- Kingdon, J.W., 2003. *Agendas, Alternatives, and Public Policies*. Longman, New York, NY.
- Kitchin, R., 2015. *Why the National Spatial Strategy Failed and Prospects for the National Planning Framework*. Ireland after NAMA. Available online: <https://irelandafternama.wordpress.com/2015/07/24/why-the-national-spatial-strategy-failed-and-prospects-for-the-national-planning-framework/> (accessed 20 November 2019).
- Le Blanc, D., 2015. Towards integration at last? The Sustainable Development Goals as a network of targets. *Sustainable Development* 23(3): 176–187.
- Lettow, S., 2016. Turning the turn. *Thesis Eleven* 140(1): 106–121.
- Liburd, J.J. and Beeken, S., 2017. Values in nature conservation, tourism and UNESCO World Heritage Site stewardship. *Journal of Sustainable Tourism* 25(12): 1719–1735.
- Lister, M., Dovey, J., Giddings, S., Grant, I. and Kelly, K., 2009. *New Media: A Critical Introduction*. 2nd edn. Routledge, London.
- Loftus, A., 2017. Political ecology I: where is political ecology? *Progress in Human Geography* 43(1): 172–182.
- Lovejoy, M., 2004. *Digital Currents: Art in the Electronic Age*. 3rd expanded edn. Routledge, New York, NY.
- March, H. and Ribera-Fumaz, R., 2016. Smart contradictions: the politics of making Barcelona a self-sufficient city. *European Urban and Regional Studies* 23(4): 816–830.
- Maxwell, R. and Miller, T., 2012. *Greening the Media*. Oxford University Press, Oxford, UK.
- Miller, T., 2015. Unsustainable journalism. *Digital Journalism* 3: 653–663.
- Mondino, E. and Beery, T., 2019. Ecotourism as a learning tool for sustainable development. The case of Monviso Transboundary Biosphere Reserve, Italy. *Journal of Ecotourism* 18(2): 107–121.
- Morehouse, H., 2019. On the political and speculative promises of Gabrys' Program Earth. *Dialogues in Human Geography* 9(1): 110–112.
- Morgan, T., 2013. Sharing, hacking, helping: towards an understanding of digital aesthetics through a survey of digital art practices in Ireland. *Journal of Media Practice* 14(2): 147–160.
- Morgan, T., 2017. *Going Green Digitally? Environmental Crisis, Consumption Patterns and the Evolving Role of Media*. Environmental Protection Agency, Johnstown Castle, Ireland. Available online: <https://www.epa.ie/pubs/reports/research/econ/research215.html> (accessed 21 August 2020).
- Morgan, T., 2018. The techno-finance fix: a critical analysis of international and regional environmental policy documents and their implications for planning. *Progress in Planning* 119: 1–29. <http://doi.org/10.1016/j.progress.2016.06.001>
- North, P., 2010. Eco-localisation as a progressive response to peak oil and climate change – a sympathetic critique. *Geoforum* 41(4): 585–594.

- O'Donoghue, D., 2019. OECD: rising property prices and "disorderly Brexit" could push Ireland into recession. *Irish Examiner*, 21 May 2019. Available online: <https://www.irishexaminer.com/breakingnews/business/oecd-rising-property-prices-and-disorderly-brexit-could-push-ireland-into-recession-925718.html> (accessed 20 November 2019).
- Olausson, U. and Berglez, P., 2014. Media and climate change: four long-standing research challenges revisited. *Environmental Communication* 8(2): 249–265.
- O'Neill, S.J., 2013. Image matters: climate change imagery in US, UK and Australian newspapers. *Geoforum* 49(C): 10–19.
- O'Neill, S. and Nicholson-Cole, S., 2009. "Fear won't do it": promoting positive engagement with climate change through visual and iconic representations. *Science Communication* 30(3): 355–379.
- O'Neill, S.J., Boykoff, M., Niemeyer, S. and Day, S.A., 2013. On the use of imagery for climate change engagement. *Global Environmental Change* 23(2): 413–421.
- O'Neill, S., Williams, H.T.P., Kurz, T., Wiersma, B. and Boykoff, M., 2015. Dominant frames in legacy and social media coverage of the IPCC Fifth Assessment Report. *Nature Climate Change* 5(4): 380–385.
- Painter, J., Kristiansen, S. and Schäfer, M.S., 2018. How "digital-born" media cover climate change in comparison to legacy media: a case study of the COP 21 summit in Paris. *Global Environmental Change* 48: 1–10.
- Pole, C. and Hillyard, S., 2016. *Doing Fieldwork*. Sage, London.
- Pritchard, H., Gabrys, J. and Houston, L., 2018. Re-calibrating DIY: testing digital participation across dust sensors, fry pans and environmental pollution. *New Media & Society* 20(12): 4533–4552.
- Ratto, M., 2011. Critical making: conceptual and material studies in technology and social life. *The Information Society* 27(4): 252–260.
- Raworth, K., 2017. *Doughnut Economics: Seven Ways to Think Like a 21st-Century Economist*. Random House Business Books, London.
- Robbins, P., 2012. *Political Ecology*. Wiley Blackwell, Oxford, UK.
- Robbins, P., 2015. The trickster science. In Perreault, T., Bridge, G. and McCarthy, J. (eds), *The Routledge Handbook of Political Ecology*. Routledge, Abingdon, UK, pp. 89–101.
- Royal Academy of Arts, 2019. *Eco-Visionaries: Conversations on a Planet in a State of Emergency*. Exhibition publication. Royal Academy of Arts, London.
- RTÉ, 2019. RTÉ begins a week-long focus on climate change. Available online: <https://www.rte.ie/news/ireland/2019/1024/1085433-rte-climate-change/> (accessed 21 August 2020).
- Salmons, J., 2016. *Doing Qualitative Research Online*. Sage, Los Angeles, CA.
- Smith N., 2006. Foreword. In Henyen, N., Kaika, M. and Swyngedouw, E. (eds), *In the Nature of Cities: Urban Political Ecology and the Politics of Urban Metabolism*. Routledge, Abingdon, UK.
- Smith, N., 2007. Nature as accumulation strategy. In Panitch, L. and Leys, C. (eds), *Coming to Terms with Nature: Social Register 2007*, Monthly Review Press, New York, NY.
- Smith, N., 2008. *Uneven Development*. University of Georgia Press, Athens, GA.
- Smith, H.M. and Lindenfeld, L., 2014. Integrating media studies of climate change into transdisciplinary research: which direction should we be heading? *Environmental Communication: A Journal of Nature and Culture* 8(2): 179–196.
- Soini, K. and Birkeland, I., 2014. Exploring the scientific discourse on cultural sustainability. *Geoforum*, 51(C): 213–223.
- Stengers, I., 2005. The cosmopolitan proposal. In Latour, B. and Weibel, P. (eds), *Making Things Public: Atmospheres of Democracy*. MIT Press, Cambridge, MA, pp. 994–1003.
- Swyngedouw, E., 1996. The city as a hybrid: on nature, society and cyborg urbanization. *Capitalism Nature Socialism* 7(2): 65–80.
- Swyngedouw, E., 2006. Metabolic urbanization: the making of cyborg cities. In Henyen, N., Kaika, M. and Swyngedouw, E. (eds), *In the Nature of Cities: Urban Political Ecology and the Politics of Urban Metabolism*. Routledge, Abingdon, UK.
- Tassi, P., 2018. Media: from the contact economy to the attention economy. *International Journal of Arts Management* 20(3): 49–59.
- Taylor, C., 2007. *Modern Social Imaginaries*. Duke University Press, Durham, NC.
- Thornes, J.E., 2008. A rough guide to environmental art. *Annual Review of Environment and Resources* 33(1): 391–411.

- UNESCO (United Nations Educational, Scientific and Cultural Organization), 2019a. Culture for sustainable development. Available online: <https://en.unesco.org/themes/culture-sustainable-development> (accessed 20 November 2019).
- UNESCO (United Nations Educational, Scientific and Cultural Organization), 2019b. Dive into intangible cultural heritage. Available online: <https://ich.unesco.org/en/dive&display=biome> (accessed 31 January 2020).
- United Nations, 2019. Only 11 years left to prevent irreversible damage from climate change, speakers warn during General Assembly high-level meeting. Meetings Coverage. Available online: <https://www.un.org/press/en/2019/ga12131.doc.htm> (accessed 3 February 2020).
- Vertovec, S., 2012. "Diversity" and the social imaginary. *European Journal of Sociology* 53(3): 287–312. <https://doi.org/10.1017/S000397561200015X>
- Wearne, S., 2018. Tourism development and whaling – heritage as sustainable future. *Tourism Planning & Development* 15(1): 89–95.
- Weintraub, L., 2012. *To Life! Eco Art in Pursuit of a Sustainable Planet*. University of California Press, Berkeley, CA.
- Weintraub, L., 2019. *What's Next? Eco Materialism and Contemporary Art*. Intellect, Bristol, UK.
- Wells, L., 2015. *Photography: A Critical Introduction*. 5th edn. Routledge, Abingdon, UK.
- Wood, A., 2007. *Digital Encounters*. Routledge, London.
- Wylie, S.A., Jalbert, K., Dosemagen, S. and Ratto, M., 2014. Institutions for civic technoscience: how critical making is transforming environmental research. *The Information Society* 30(2): 116–126.

Abbreviations

AI	Artificial intelligence
AR5	Fifth Assessment Report
DPER	Department of Public Expenditure and Reform
EPA	Environmental Protection Agency
IPCC	Intergovernmental Panel on Climate Change
NSS	National Spatial Strategy
SDG	Sustainable Development Goal
UNESCO	United Nations Educational, Scientific and Cultural Organization

AN GHNÍOMHAIREACHT UM CHAOMHNÚ COMHSHAOIL

Tá an Gníomhaireacht um Chaomhnú Comhshaoil (GCC) freagrach as an gcomhshaoil a chaomhnú agus a fheabhsú mar shócmhainn luachmhar do mhuintir na hÉireann. Táimid tiomanta do dhaoine agus don chomhshaoil a chosaint ó éifeachtaí diobhálacha na radaiochta agus an truallithe.

Is féidir obair na Gníomhaireachta a roinnt ina trí phríomhréimse:

Rialú: Déanaimid córais éifeachtacha rialaithe agus comhlionta comhshaoil a chur i bhfeidhm chun torthai maiithe comhshaoil a sholáthar agus chun diriú orthu siúd nach geloionn leis na córais sin.

Eolas: Soláthraímid sonrai, faisnéis agus measúnú comhshaoil atá ar ardchaighdeán, spriocdhírithe agus tráthúil chun bonn eolais a chur faoin gcinnteoireacht ar gach leibhéal.

Tacaíocht: Bímid ag saothrú i geomhar le grúpaí eile chun tacú le comhshaoil atá glan, tárgiúil agus cosanta go maith, agus le hiompar a chuirfidh le comhshaoil inbhuanaithe.

Ár bhFreaghrachtaí

Ceadúnú

Déanaimid na gníomhaíochtaí seo a leanas a rialú ionas nach ndéanann siad dochar do shláinte an phobail ná don chomhshaoil:

- saoráidí dramhaíola (m.sh. láithreán líonta talún, loisceoirí, stáisiúin aistrithe dramhaíola);
- gníomhaíochtaí tionsclaíocha ar scála mór (m.sh. déantúsáiocht cóbhaisíochta, déantúsáiocht stroighne, stáisiúin chumhachta);
- an diantalmhaíocht (m.sh. muca, éanlaith);
- úsáid shrianta agus scoileadh rialaithe Órgánach Géimhodhnaithe (OGM);
- foinsí radaíochta ianúcháin (m.sh. trealamh x-gha agus radaiteiripe, foinsí tionsclaíocha);
- áiseanna móra stórála peitril;
- scardadh dramhuisce;
- gníomhaíochtaí dumpála ar farraige.

Forfheidhmiú Náisiúnta i leith Cúrsaí Comhshaoil

- Clár náisiúnta iniúchtaí agus cigireachtá a dhéanamh gach bliain ar shaoráidí a bhfuil ceadúnas ón nGníomhaireacht acu.
- Maoirseacht a dhéanamh ar fhreaghrachtaí cosanta comhshaoil na n-údarás áitiúil.
- Caighdeán an uisce óil, arna sholáthar ag soláthraithe uisce phoiblí, a mhaoriú.
- Obair le húdaráis áitiúla agus le gníomhaireachtaí eile chun dul i ngleic le coireanna comhshaoil trí chomhordú a dhéanamh ar líníonra forfheidhmiúcháin náisiúnta, trí dhíriú ar chiontóirí, agus trí mhaoriú a dhéanamh ar leasúchán.
- Cur i bhfeidhm rialachán ar nós na Rialachán um Dhramhthrealamh Leictreach agus Leictreonach (DTLL), um Shrian ar Shubstaintí Guaiseacha agus na Rialachán um rialú ar shubstaintí a ídionn an ciseal ózóin.
- An dlí a chur orthu siúd a bhriseann dlí an chomhshaoil agus a dhéanamh dochar don chomhshaoil.

Bainistíocht Uisce

- Monatóireacht agus tuairisciú a dhéanamh ar cháiilochtaí aibhneacha, lochanna, uiscí idirchriosacha agus cósta na hÉireann, agus screamhuiscí; leibhéal uisce agus sruthanna aibhneacha a thomhas.
- Comhordú náisiúnta agus maoiriú a dhéanamh ar an gCreat-Treoir Uisce.
- Monatóireacht agus tuairisciú a dhéanamh ar Cháiilochtaí an Uisce Snámha.

Monatóireacht, Anailís agus Tuairisciú ar an gComhshaoil

- Monatóireacht a dhéanamh ar cháiilochtaí an aer agus Treoir an AE maidir le hAer Glan don Eoraip (CAFÉ) a chur chun feidhme.
- Tuairisciú neamhspleách le cabhrú le cinnteoireacht an rialtais náisiúnta agus na n-údarás áitiúil (m.sh. tuairisciú tréimhsíúil ar staid Chomhshaoil na hÉireann agus Tuarascálacha ar Tháscairí).

Rialú Astaíochtaí na nGás Ceaptha Teasa in Éirinn

- Fardail agus réamh-mheastachán na hÉireann maidir le gáis cheaptha teasa a ullmhú.
- An Treoir maidir le Trádáil Astaíochtaí a chur chun feidhme i gcomhair breis agus 100 de na táirgeoirí dé-ocsaide carbóin is mó in Éirinn.

Taighde agus Forbairt Comhshaoil

- Taighde comhshaoil a chistiú chun brúna a shainainthint, bonn eolais a chur faoi bheartais, agus réitigh a sholáthar i réimsí na haeráide, an uisce agus na hinbhuanaitheachta.

Measúnacht Straitéiseach Timpeallachta

- Measúnacht a dhéanamh ar thionchar pleannanna agus clár beartaithe ar an gcomhshaoil in Éirinn (m.sh. mórphleananna forbartha).

Cosaint Raideolaíoch

- Monatóireacht a dhéanamh ar leibhéal radaíochta, measúnacht a dhéanamh ar nochtdadh mhuintir na hÉireann don radaíocht ianúcháin.
- Cabhrú le pleannanna náisiúnta a fhorbairt le haghaidh éigeandálaí ag eascair as taismí núicléacha.
- Monatóireacht a dhéanamh ar fhorbairtí thar lear a bhaineann le saoráidí núicléacha agus leis an tsábháilteach ráideolaíochta.
- Sainseirbhísí cosanta ar an radaíochta a sholáthar, nó maoirsíú a dhéanamh ar sholáthar na seirbhísí sin.

Treoir, Faisnéis Inrochtana agus Oideachas

- Comhairle agus treoir a chur ar fáil d'earnáil na tionsclaíochta agus don phobal maidir le hábhair a bhaineann le caomhnú an chomhshaoil agus leis an gcosaint ráideolaíoch.
- Faisnéis thráthúil ar an gcomhshaoil ar a bhfuil fáil éasca a chur ar fáil chun ranpnáirtíocht an phobail a spreagadh sa chinnteoireacht i ndáil leis an gcomhshaoil (m.sh. Timpeall an Tí, léarscáileanna radóin).
- Comhairle a chur ar fáil don Rialtas maidir le hábhair a bhaineann leis an tsábháilteach ráideolaíoch agus le cursaí práinnfhreagartha.
- Plean Náisiúnta Bainistíochta Dramhaíola Guaisí a fhorbairt chun dramhaíl ghuaiseach a chosc agus a bhainistiú.

Múscailt Feasachta agus Athrú Iompraíochta

- Feasacht comhshaoil níos fearr a ghiniúint agus dul i bhfeidhm ar athrú iompraíochta dearfach trí thacú le gnóthais, le pobail agus le teaghlaigh a bheith níos éifeachtúla ar acmhainní.
- Tá stáil le haghaidh radóin a chur chun cinn i dtithe agus in ionaid oibre, agus gníomhartha leasúchán a spreagadh nuair is gá.

Bainistíocht agus struchtúr na Gníomhaireachta um Chaomhnú Comhshaoil

Tá an ghníomhaíocht á bainistiú ag Bord lánimseartha, ar a bhfuil Ard-Stiúrthóir agus cúigear Stiúrthóirí. Déantar an obair ar fud cúig cinn d'Oifigí:

- An Oifig um Inmharthanacht Comhshaoil
- An Oifig Forfheidhmithe i leith cúrsaí Comhshaoil
- An Oifig um Fianaise is Measúnú
- Oifig um Chosaíont Radaíochta agus Monatóireachta Comhshaoil
- An Oifig Cumarsáide agus Seirbhísí Corparáideacha

Tá Coiste Comhairleach ag an nGníomhaireacht le cabhrú léi. Tá dáréag comhaltaí air agus tagann siad le chéile go rialta le plé a dhéanamh ar ábhair imní agus le comhairle a chur ar an mBord.

Sensing Our World: How Digital Cultural Practices Can Contribute to Changing Social Norms Around Consumption



Author: Trish Morgan

Identifying pressures

The “Sensing Our World” research project assesses the potential for novel cultural practices to communicate environmental data and issues to the public in Ireland against the backdrop of local and international environmental pressures. International governing bodies such as the United Nations and the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services have warned of impending societal disruption unless transformative pathways away from environmentally unsound ways of life are found. The urgency with which global societal transformation needs to occur is therefore a key pressure informing this project. The project acknowledges that transformation occurs in part through idea-making and imaginaries (i.e. a set of understandings and values that a society might hold) that can encourage and inspire publics to make changes to unsustainable behaviours. Communication of environmental data to publics therefore plays a significant potential role in societal transformation. However, in the Irish context, prior research has found that mainstream media can be limited in its abilities to communicate such transformative pathways. Therefore, the key pressures identified are around how to communicate novel imaginaries about the environment/society relationship to publics in Ireland, in such a way as to engage them in environmental issues.

Informing policy

The “Sensing Our World” project conducted a review of policy literature in the areas of environmental and cultural policy. This was to assess the extent to which these policy domains can inform each other and mutually support novel communication practices that engage publics. The policy review found aspirations in both environmental and cultural policy framework documents to seriously consider the communication of environmental issues specific to the Irish context

and to consider communication channels to promote sustainable futures in Irish society. However, the policy review also found that these environmental dimensions in the framework documents were omitted from implementation documents, potentially deprioritising the communication of environmental issues at a time when urgent and sustained policy implementation is required. It has been identified, therefore, that there is scope within environmental and cultural policy to encourage and implement novel communication practices, with the project identifying an already existing model from which policy in Ireland can be informed.

Developing solutions

Having found that potential for increased linkages between environmental and cultural policy that can encourage novel communication of environmental data and issues exists, the “Sensing Our World” project makes recommendations towards developing solutions to the communication of environmental data to publics. This project developed a solution in the form of an online database of novel cultural practices that provides stakeholders, such as environmental scientists, data producers, artists and teachers, with a resource from which to draw inspiration from already existing international practices (www.sowdata.ie). It is recommended that this resource continues to be maintained and developed further. From the broader cultural policy side, it is recommended that Arts Council policy takes account of the environmental impacts of works, just as it currently does with social, economic and cultural impacts of work. From the environmental policy side, the project calls for the application in Ireland of an already existing model in the UK that directly links environmental scientists, technical experts and artists in an organisation with a specific remit to communicate environmental data in novel ways to publics.