Control of Diffuse Agricultural Pollution and Management of Trans-boundary Waterways

A comparative analysis of the policy making process in Ireland and Northern Ireland

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Abstract

Regulating diffuse agricultural pollution in the island of Ireland's trans-border waterway catchments is a 'wicked problem'. Alongside the need to mitigate agriculture-related water pollution are parallel and competing needs to support a socially and economically important agri-food industry and deliver public 'goods' under a paradigm of multifunctionality. Meeting all these objectives simultaneously is not possible. Thus, finding balance between various competing policy objectives is an important policy goal. Beyond this, co-managing trans-boundary waterways is a significant challenge for policymakers, not least because ecosystem boundaries typically do not align with administrative ones. The United Kingdom's exit from the European Union is set to exacerbate this challenge by vastly increasing administrative complexity on the island.

This research contributes to academic literature on wicked policy problems by helping to improve understanding of the complex social factors that underpin and influence the agri-environmental policymaking process on the island of Ireland, particularly as it relates to the wicked problem of diffuse agricultural water pollution in trans-border catchments. Employing qualitative methods (interviews, focus groups) within a case study methodology, it draws on theories of agricultural post-exceptionalism, policy network analysis and leverage points to describe governance structures and their influence on agri-environmental policymaking. It also presents a modified power framework based on Lukes' (1974) 'three faces' model that describes how actors within the agri-food sector obtain and employ power within the agri-environmental policymaking arena. This thesis argues that the structure of, and power distributions within, agri-environmental policymaking networks on the island of Ireland have significant implications for policy outcomes. It also demonstrates how actors within these networks capitalise on gaps left by multiple competing policy channels and complex administrative environments to advance their interests.

It finds that in Ireland and Northern Ireland, the agri-food sector continues to be treated as exceptional, and agri-food actors remain central within policymaking networks as a result. This means that agri-environmental policy continues to favour agri-food interests, often to the detriment of the island's waterways. It also finds that power distributions *within* the agri-food sector impact water quality. Some agri-food sectors (e.g., dairy, poultry) hold more power than others meaning they can resist important regulation such as water pollution initiatives, rendering such regulation ineffective. Meanwhile, other sectors (e.g., beef and sheep) are left out of the conversation, which compromises potential policy solutions. It argues that for future policies to adequately address the challenge of agriculture‐related water pollution, agri-food system governance must become more equitable and nuanced, allowing for tangible consideration of the challenges that different agriculture sectors face. It also argues that if diffuse agricultural pollution is to be fundamentally addressed, change is required in both the institutional structures that support the current policymaking apparatus, and in the productivist, export-focused logic currently underpinning the Irish agri-food industry.

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Abbreviations

AFBI NI	Agri-Food and Biosciences Institute, Northern Ireland
ASSAP	Agricultural Sustainability and Support Programme
CAP	Common Agriculture Policy
CatchmentCARE	Catchment Community Actions for Resilient Eco-systems
CAFRE	College of Agriculture, Food and Rural Enterprise
DAFM	Department of Agriculture, Food and the Marine (Ireland)
DAERA	Department of Agriculture, Environment and Rural Affairs (NI)
DEFRA	Department of Environment, Food and Rural Affairs (England and Wales)
DfI	Department for Infrastructure (NI)
DII	Dairy Industry Ireland
DUP	Democratic Unionist Party (NI)
eNGO	Environmental Non-Governmental Organisation
EPA	Environmental Protection Agency (Ireland)
EU	European Union
GAP	Good Agricultural Practice (regulations)
GfG	Going for Growth
ICOS	Irish Co-Operative Organisation Society
IBRD	International River Basin District
ICMSA	Irish Creamery Milk Suppliers Association
IFA	Irish Farmers' Association
LAWPRO	Local Authorities Waters Programme
NAP	Nitrates Action Programme
NI	Northern Ireland
NIAPA	Northern Ireland Agricultural Producers Association
NiD	Nitrates Directive
NIEA	Northern Ireland Environment Agency
NVZ	Nitrate Vulnerable Zone
OECD	Organisation for Economic Co-operation and Development
RBD	River Basin District
RBDP	River Basin District Plan
UFU	Ulster Farmers' Union
UK	United Kingdom of Great Britain and Northern Ireland
UN	United Nations
UN FAO	United Nations Food and Agriculture Programme
WFD	Water Framework Directive
WPAC	Water Policy Advisory Committee
WTO	World Trade Organisation

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Chapter 1: Introduction

1.1 Introduction

Diffuse agricultural pollution places significant pressure on waterways globally and is a major challenge for policymakers who attempt to reconcile food security and environmental protection. This challenge becomes especially complicated when waterways traverse regional or international borders as it is difficult to co-manage ecosystems whose natural and administrative boundaries do not align.

This thesis employs theories of governance and power to consider the 'wicked problem' of how to mitigate diffuse agricultural pollution in the island of Ireland's trans-border waterway catchments. Ireland and Northern Ireland (NI)[1] share two International River Basin Districts under the European Union's Water Framework Directive and more than 120 waterways cross the international border between the two regions (Department of Housing, Planning and Local Government, 2018). Although these water catchments are under pressure from multiple sources of pollution, agriculture is by far the biggest contributor because most land in Ireland and NI is used for agricultural purposes.

The United Kingdom's exit from the European Union is set to exacerbate this wicked problem by vastly increasing administrative complexity. 'Brexit' has triggered significant changes in the agri-food sector between Ireland, Northern Ireland and Great Britain, including shifts in market conditions, industrial organisation, and policy. This may have a disproportionate impact on the island of Ireland due to its highly integrated agri-food sector and shared ecosystems. Resultant challenges, if not properly addressed, have the potential to negatively impact current provision of ecosystem services in agriculture and undermine the overall sustainability of the industry.

In this context, the aim of this research is to contribute to the understanding of how governance structures and power distributions within agri-environmental policymaking impact the quality of the island of Ireland's shared waterways. By expanding this understanding, this research also aims to advance the wider field of knowledge about agri-environmental policymaking and waterway management, not only in trans-boundary water

[1] This thesis uses the terms 'Ireland' and 'Northern Ireland' (NI) to refer to regions south and north of the international border on the island of Ireland because these are the official names of the respective states. However, the research notes that these terms are contentious for some, given the island's political history. 'The island of Ireland' is used to refer to the whole island, including both Ireland and NI.

catchments, but also more broadly. Although this research set out to explore the case of the island's trans-boundary waterways, empirical data from the study reveals much about how governance and power impact waterway management across the island. Looking through an even broader lens, it is clear that, while many of the challenges faced on the island of Ireland are particular to that context, insights into how actors derive and operationalise power within agri-environmental policymaking, and how other governance challenges compromise water pollution mitigation efforts, regional to international, are widely applicable. The remainder of this chapter outlines in greater detail the background and rationale of this research and what its aims and objectives are. It also provides an overview of the structure of the thesis.

1.2 Research background and rationale

The research context: Land use and waterway management on the island of Ireland

In Ireland and NI, as in much of Europe, the landscape remains largely agricultural, even as the relative importance of the agriculture industry to the economy and to rural regions has declined in recent decades. Most land on the island of Ireland is used for agricultural purposes: 67 percent in Ireland (Conroy et al., 2016) and 75 percent in NI (DAERA, 2018). Both north and south a substantial small-scale landholding sector persists (Hannan and Commins, 1992; Commins, 2004; O'Connor and Dunne, 2009) and over 99 percent of farms are family operated (McCormack, 2016; Central Statistics Office, 2018).

Land ownership is, historically, politically contentious on the island, with the struggle for the right to own land grounded in socio-political conflict and the fight for political independence from Britain (Foster, 1998; Lee, 1989; Hannan and Commins, 1992). Far-reaching land ownership transfers, which took place around the turn of the 20th Century, resulted in the landholding pattern still evident today and created a new social order in Ireland. Owning and farming land became culturally very important, and the Irish agriculture industry gained significant political influence, bolstered by a strong 'rural vote' (Foster, 1998; Hannan and Commins, 1992; O'Connor and Dunne, 2009). Agriculture developed into, and remains, a powerful industry worthy of 'special' treatment and 'exceptionalist' policy interventions (Daugbjerg and Feindt, 2017).

The strong presence of agriculture on the island of Ireland places considerable pressure on waterways there. This is not only an Irish problem; globally, the social and environmental costs of addressing agriculture-related water pollution exceeds billions of dollars annually

(OECD, 2012; Conroy et al. 2016; UNEP, 2016; Mateo-Sagasta et al., 2017; Graversgaard et al., 2018). In most high-income countries, agricultural production contributes more to the degradation of waterways than do either settlements or other industries (Matteo-Sagasta et al., 2017; Holden et al., ND). In the European Union, 38 percent of water bodies are currently under significant pressure from agricultural pollution (WWAP, 2015).

Although multiple sources of pollution place pressure on waterways across the island, agriculture remains the biggest, as is the case in many countries across Europe (WWAP, 2015). European legislation, including the Water Framework Directive (WFD) and the Nitrates Directive (NiD), has underpinned more than two decades of concerted effort aimed at addressing this problem. Despite this, both Ireland and Northern Ireland are falling far short of meeting the WFD target of having 70 percent of waterbodies reach 'good' status by the end of the programme's second cycle in 2021. In Ireland's most recent (2018) water quality review (O'Boyle et al., 2019), only 53 percent of surface waterbodies were assessed as being either good or high ecological status based on current WFD classifications. In NI, an assessment done the same year revealed this figure to be 36.6 percent (NIEA, 2019). In fact, although the status of the island's worst quality waterbodies has improved during this time, status of some of its highest quality waterbodies continue to decline.

Agriculture-related water pollution represents a classic 'wicked problem': one that is resistant to solution, cannot be understood or addressed in isolation and is grounded in competing value frameworks (Head and Alford, 2013; Candel et al., 2016; Duckett et al., 2016; DeFries and Nagendra, 2017; Kuhmonen, 2018). Because of the complex nature of wicked problems, their potential resolutions are open to conflicting and divergent arguments and it is not possible to develop final, definitive or explicit solutions to them.

Such pollution presents a significant and persistent challenge on the island of Ireland, and, in this research, the 'wicked' nature of this problem evident. There is a clear need to mitigate agriculture-related water pollution, given its ongoing contribution to declining water quality in both Ireland and NI. Alongside this is a parallel and competing need to support a socially and economically important agri-food industry. on both sides of the border, tensions are evident between the drive to support the expansion of intensive dairy and poultry industries in an export-focused economy; a socio-cultural need to keep an economically unviable drystock industry on the land; and a social and legal obligation to address diffuse pollution created by all these industries. On top of this are EU policy-derived objectives related to

'multifunctional' agriculture and the 'multifunctional' countryside (Hall et al., 2004; Renting et al., 2009; McDonagh et al., 2013). Agriculture is no longer just about food and fibre production, but also about providing an important range of public 'goods' such as ecosystem services. Meeting all these competing objectives simultaneously is not possible. Thus, finding a 'multi-dimensional social optimum', that is, balance between various competing policy objectives, is an important policy goal (chapters two and three).

This challenge is exacerbated by administrative complexities. Because hydrological boundaries and administrative boundaries do not typically correspond, administrative collaboration between jurisdictions is critical if trans-boundary watersheds are to be effectively managed (Graversgaard et al., 2018). Ireland and NI share two international river basin districts under the EU WFD, and WFD legislation has been instrumental in helping facilitate cross-border collaboration on the island of Ireland (Murphy and Glasgow, 2009; Department of Housing, Planning and Local Government, 2018). Early stages of WFD implementation were deemed particularly successful (McNally, 2009; Murphy and Glasgow, 2009). However, Ireland experienced delays in implementing the second stage of the WFD, resulting in north-south collaboration becoming less co-ordinated after 2015 – an issue highlighted by participants in this research (see chapter nine). Empirical data from this research's trans-border case study of the Ulster Blackwater catchment also reveals that other factors hinder cross-border collaboration. Multiple agencies are responsible for regulating both waterways and the agri-food industry, and communication among these agencies is often poor. Such agencies are also often under-resourced. This has provided opportunities for different agri-food interests to advance their interests at the expense of the island's natural environment (chapter nine).

The UK's exit from the EU is set to exacerbate these challenges because it has significantly altered the legislative environment on the island of Ireland and in the UK, thereby increasing administrative complexity. The Northern Ireland Protocol aims to mitigate the worst of these challenges by preserving the integrity of the EU's single market while simultaneously maintaining unfettered access trade in goods between NI and Great Britain (nidirect, 2021; UK Cabinet Office, 2021). As a result of the protocol, NI remains under the supervision of EU institutions for compliance with relevant rules, including those related to agri-food standards and the environment (Gravey and Whitten, 2021; nidirect, 2021). However, despite agreement of the Protocol, the exact nature of NI's future relationship with Great Britain,

Ireland and the rest of the EU remains contested, making it exceptionally difficult for concrete policy decisions to be taken (chapter four). On top of this, within the UK, devolved nations (NI, Scotland and Wales) continue to be allowed to pursue divergent agri-environmental policies. But this freedom to diverge is constrained by, international law, new UK-EU relationship, and domestic UK legislation (Gravey and Whitten, 2021). In short, the UK's exit from the EU has introduced an even greater number of competing policy channels than already existed (chapter four).

Governance and Power in Agri-Environmental Policymaking on the island of Ireland

Together, administrative complexity and competing policy channels present opportunities for different actors to exploit policy 'gaps' to advance their own interests (Skogstad, 1998). This is often to the detriment of other actors, not least because it can result in the development of ineffective policies (Greer, 2017; Attorp and McAreavey, 2020). Without a clear understanding of governance structures and of how different actors influence the policymaking process and operationalise their power within complex policy environments, it is difficult to arrive at solutions that are indeed 'optimum' (chapter three).

In the UK, Ireland and Europe generally, governance and policy literature has historically been focused on describing and understanding the close policymaking relationship between farmers unions and governments (e.g., Smith, 1990; Clunies-Ross et al., 1994; Jordan et al., 1994; Daugbjerg, 1998; Woods, 2005). More recently, much of the literature on power in the agri-food system focuses on how, globally, power is increasingly concentrated in the hands of agri-food corporations (Lang et al., 2001; Barling et al., 2002; Patel, 2007; Clapp and Fuchs, 2009; Foord, 2017). Alongside this is interest in how new policy objectives, such as market-based priorities, concern for the environment and multi-functional agriculture are impacting the policymaking process. Daugbjerg and Fendt (2017) have coined the term agricultural 'post-exceptionalism' to describe these shifts.

Less attention has been paid to how power is distributed *within* the agriculture sector, and what implications this has for policy. The influence of multi-national corporations, coupled with a general drive towards larger, more 'efficient' farming operations is undoubtedly changing the landscape of food production around the world. However, in many European countries, including Ireland and much of the UK, a legacy of small 'family farms' remains and, as this thesis argues, undoubtedly influences policy outcomes.

To describe the ways in which different actors interact in the policymaking sphere, it is helpful to conceptualise these relationships as a network, or community. Policy networks exist on a continuum ranging from 'closed' networks in which a limited number of actors represents a narrow range of views, to 'open' networks, which include a wide range of actors and interests. Most policymaking networks occupy a position somewhere along the spectrum between the two (Daugbjerg, 1998; Daugbjerg and Fawcett, 2017). In an 'exceptionalist' environment, we can expect to find a 'closed' policy network'. In a 'post-exceptionalist' environment, policy networks are likely to be more 'open'.

The structure of such networks affects policy outcomes: closed networks tend to create stability and predictability in the policymaking process, something which benefits both interest groups and state actors but prevents fundamental policy change. Within more 'open' networks, absence of a strong, central coalition within the network means there is less opposition to change and policy innovation is more likely to occur (Daugbjerg, 1998). This research combines this concept with that of leverage points, created by Meadows (1999) and developed by Abson et al. (2016). Meadows (1999) and Abson et al. (2016) describe 'shallow' leverage points, where interventions are relatively easy to implement but effect little change in a system's overall functioning, to 'deep' points, where change is difficult to make, but results may be transformational. This thesis argues that closed policy networks are more likely to implement 'shallow' policies, while open networks increase the likelihood of 'deep' polices being developed. In the context of agri-environmental policy and waterway management, it is argued here that exceptionalist networks are more likely to develop 'shallow' policies that favour the agri-food industry and do not fundamentally address its contribution to water pollution.

This research contributes to the literature on wicked environmental problems by shedding light on the ways different actors in the agri-environmental policymaking arena interact to both develop and implement water policies on the island of Ireland (chapters seven and eight). It draws on theories of agricultural post-exceptionalism, policy network analysis and leverage points to describe governance structures and their influence on agri-environmental policymaking. It also presents an adaptation of a framework of power that describes how actors within the agri-food sector obtain and employ power within the agri-environmental policymaking arena (see chapter three).

This framework, built on Luke's 'three faces' model, describes power as being derived from multiple sources – ideological, organisational, institutional and economic – and argues that these interact to reinforce each other and produce outcomes that are not always immediately obvious. This thesis argues that such a model allows us to move beyond shallow descriptions of policy network structure to develop more complex and nuanced understandings of why networks are structured as they are and how actors within them influence policy outcomes. It contends that much policy analysis fails to do this, and therefore arrives at incomplete conclusions about policy outcomes and their impact. As a result, it is difficult for such analysis to effectively critique policies and develop sound policy solutions. The model of power developed for this thesis, detailed in chapter three, helps address this challenge.

This research further contributes to theoretical debates about agri-environmental policy by arguing that, to properly understand how such policy is developed and implemented, it is important to move beyond meso-level policy analysis, which typically considers 'farmers' or 'the agriculture lobby' to be a monolith. Empirical data reveals that power distributions within Ireland and NI's agri-food industry also determine how water pollution is regulated (chapter eight).

Relevance of this research: The island of Ireland's trans-border waterways and beyond

Although this research set out to understand the challenges faced in co-managing the island of Ireland's trans-border waterways, empirical findings reveal much about agri-environmental governance and waterway management in both Ireland and NI. As is discussed in chapter six of this thesis, while the central case study in this research is the trans-border Ulster Blackwater catchment, to fully understand the factors affecting waterway management in the catchment, it was necessary to consider the situation on island of Ireland as a whole. Although catchment-specific factors affect how trans-border waterways are managed, the policies that underpin this management are developed at national and international levels. Thus, in effect, the Ulster Blackwater case study is nested within a wider case study of the island of Ireland. As such, two of this thesis' three empirical chapters focus on governance and power in agri-environmental policymaking and their implications for land use and waterway management across Ireland and NI (see chapter seven and eight). They do not consider the trans-border element. It is only the final empirical chapter (chapter nine) that does this, bringing together findings detailed in the previous two

to do so. This means that this research has relevance not only to trans-border waterway management, but also to waterway management on the island of Ireland more generally.

Importantly, both the theoretical model applied in this research and this research's empirical findings are applicable beyond the Irish context – mainly elsewhere in Europe, but also globally. Ireland and NI have socio-political and historical characteristics that are undoubtedly unique (see chapter four), there remain various commonalities with other European countries. First, because of their EU membership (Ireland, still; NI, until recently), they have shared an administrative context with other EU countries for nearly 50 years. Further, many countries across the continent are home to strong agricultural lobbies that continue to actively influence agri-environmental policy at both EU and national levels (e.g., France [Minford, 2005; Gordon, 2005], The Netherlands [Schaart, 2019] and Denmark [Daugbjerg, 1998]). Moreover, like in Ireland and NI, the agriculture sectors in many European countries remain characterised by relatively small 'family farms'. While industrialised farming practices undoubtedly continue to gain prominence across the continent (e.g., Rogge and Dessein, 2015; Pedroli et al., 2016, Winders and Ransom, 2019), and are likely responsible for more agriculture-related water pollution than smaller farmers (WWAP, 2015), the contribution of the latter to the problem cannot be overlooked if Europe's declining water quality is to be adequately addressed.

Finally, while Ireland and NI may have fewer socio-political and historical similarities with countries and regions outside of Europe, the challenge of agriculture-related water pollution is a global one. In particular, lessons may be learned from this research's findings about how administrative complexity at regional, national and international levels compromises water pollution mitigation. Indeed, such lessons may be applied not just to the challenge of water pollution, but other environmental problems as well. This is considered in further detail in this thesis' conclusions (chapter ten).

1.3 Research aims and objectives

This research aim is to contribute to the understanding of how agri-environmental policy impacts the quality of Ireland's shared waterways by investigating the governance structures of policymaking processes on the island of Ireland.

To fulfill this aim, the study addresses four objectives:

1. To critically analyse existing conceptual ideas in agri-environmental policy research to develop and apply a theoretical framework for researching power and governance within agri-environmental policymaking.
2. To conduct empirical research to understand the actions, experiences and perspectives of stakeholders involved in Ireland and NI's agri-environmental policymaking networks.
3. To analyse secondary policy documents to understand how the structure of Ireland and NI's agri-environmental policymaking networks influences policy outcomes.
4. To compare agri-environmental policymaking processes north and south of the border and the impact of these differences on shared management of the island's trans-border waterways.

These aims and objective were investigated using a primarily qualitative case study approach. Research methods employed included semi-structured interviews and focus groups and secondary data analysis. Underpinning this approach were philosophical assumptions grounded in critical realist theory.

1.4 Structure of the thesis

This thesis comprises ten chapters. This chapter presents the background to, rationale for and the aims and objectives of this research. Subsequent chapters are outlined below.

Chapter 2

Chapter 2 presents the theoretical and conceptual context for this research and identifies key knowledge gaps. It provides an overview of, and critically reviews, current debates in the literature related to land management practices in agriculture and to landscape and ecosystem management. It first introduces the concepts of the multifunctional countryside and multifunctional agriculture and explores the contested nature of countryside management. It then considers factors influencing farmer decision making and land management practices. Finally, it describes the European agri-environmental policy environment.

Chapter 3

Chapter 3 describes the theoretical framework that underpins this research and outlines how it is applied theoretically and empirically in this study. First, it introduces the concept of 'wicked problems' and considers it as it relates to agriculture and agriculture-related water pollution. It then discusses governance and policymaking in the agri-food sector. This thesis

draws on theories of agricultural post-exceptionalism, policy network analysis and leverage points to describe governance structures and their influence on agri-environmental policymaking. Finally, the chapter considers theories of power. It presents a novel framework of power, based on Lukes' 'three faces' model of power, that describes how actors within the agri-food sector obtain and employ power within the agri-environmental policymaking arena.

Chapter 4

Chapter 4 is the first of two chapters which provide context-specific background information for this research. It first details the historical and administrative context of land use on the island of Ireland. It then describes the structure of the agri-food industries in Ireland and NI.

Chapter 5

Chapter 6 focuses on waterways and water policy on the island of Ireland, providing further details about this research's context and setting the scene for the three empirical chapters that follow it. It first details legislation that underpins waterway management in Ireland, NI and Europe. It then discusses agriculture-related pressures on the island's waterways and the challenges of legislating against it, including in an international (trans-border) context.

Chapter 6

Chapter 6 describes the methodology and methods employed in this study. It first presents the philosophical assumptions that underpin this research. It then details and justifies the research design and methods: a primarily qualitative case study approach employing semi-structured interviews, focus groups and secondary data analysis. It also considers methodological and ethical issues inherent to the research process. Finally, it discusses the data analysis strategy and briefly considers obstacles experienced in this research.

Chapter 7

Chapter 7 is the first of this thesis' three empirical and analytical chapters. It presents analysis of Ireland and NI's agri-food strategies and examines what they reveal about the structure of agri-environmental policymaking networks on the island of Ireland. It then discusses what empirical data reveal about the power of the Irish agri-food sector as a whole and what its ongoing position at the centre of agri-environmental policy networks both north and south of the border means for regulation of agricultural pollution and waterways on the island.

Chapter 8

Chapter 8 builds on data and analysis presented in chapter 7 to further describe the way in which power distributions within Ireland and NI's agri-environmental policymaking networks impact the development and implementation of water policy on the island of Ireland. It moves beyond a focus on meso-level relations within policy networks (i.e., the 'agriculture lobby' versus 'the environment') to discuss what empirical data reveal about power distributions within the agri-food sector and how these determine the way different agri-food actors influence and engage with water and other agri-environmental policies.

Chapter 9

Chapter 9 presents a case study of the trans-border Ulster Blackwater catchment. It synthesises empirical data described and analysed in chapters 7 and 8 and discusses what the practical outcomes of these are for the shared management of trans-border waterways. It first describes the case study context and providing an overview of agricultural activities taking place there. It then discusses the impact activities are having on waterways in the catchment and the challenges faced in addressing these. It then considers what empirical data from this case study reveals about addressing these challenges across administrative boundaries, regional to international.

Chapter 10

The final chapter consolidates this research's key findings and identifies its contributions to knowledge. These focus on theoretical implications for social policy research but also provide insights relevant to policy and practice. The chapter ends with a reflection on the research process and suggests areas for further research.

Chapter 2: Review of Relevant Literature

2.1 Introduction

In Ireland and NI, as in much of Europe, the landscape remains largely agricultural, even as the relative importance of the agriculture industry to the economy and to rural regions has declined in recent decades. There is increasing recognition of the 'multifunctionality' of agriculture and of the countryside, and of the importance of supporting the range of services they provide. As a result, the nature of the 'countryside' is increasingly contested, as is the debate about how best to manage it. This chapter provides an overview of current debates in the literature related to land management practices in agriculture and to landscape and ecosystem management more broadly. First, the concepts of the multifunctional countryside and multifunctional agriculture are introduced and the contested nature of countryside management is explored. Second, factors influencing farmer decision making and land management practices are considered. Finally, the European agri-environmental policy environment is described.

2.2. Management of landscapes: policy, practice and contestation

2.2.1 The multifunctional countryside

Landscape is, as Swanwick (2009) writes, "…a complex construct with multiple layers of meaning and interpretation" (p. S63). Landscapes evolve through time because of interaction with both human beings and with natural forces. As such, a landscape's natural, social and cultural components must be considered together, not separately (Council of Europe, 2000). A landscape can provide many services and benefits to the people who interact with it, either directly or indirectly. These include, among other things, food production, a sense of place, aesthetic appreciation, cultural heritage, tranquillity, inspiration, and recreation, as well as a range of more indirect benefits to society including wildlife and biodiversity, environmental regulation, carbon sequestration, and climate modification (Gerowitt et al., 2003; Macmillan et al., 2004; Firbank, 2005; Vanslembrouck et al., 2005; Renting et al., 2009; Swanwick, 2009; Hynes and Campbell, 2011; Howley et al., 2012; Blom-Zandstra et al., 2016). Many of these play a critical role in supporting life on earth, human or otherwise, and beyond this, can have multiple positive impacts on people's mental and physical health (Swanwick, 2009).

As multiple authors note, societal expectations concerning rural landscapes have progressively changed in recent decades, and recognition of the multifunctional nature of rural landscapes, or 'the countryside', is increasing (Bohnet et al., 2003; Andersson et al., 2009; Swanwick, 2009; Hynes and Campbell, 2011; Howley et al., 2012; Primdahl et al., 2013; Howley et al., 2014; Pedroli et al., 2016; Rogge and Dessein, 2015; Pinto-Correia et al., 2016). The Organisation for Economic Co-operation and Development (OECD) calls multifunctionality the "new rural paradigm" (Renting et al., 2009; Pinto-Correia et al., 2016), and, as will be discussed in the following sections, the concept of 'the multifunctional countryside' now underpins EU agri-environmental and rural development policy. However, the value people place on a landscape's different components and services can vary widely, and within society, there are contested notions about what is important. Interpretation of landscape, or of the countryside, is not just about the features of the landscape themselves, but about the values, past experiences and socio-cultural conditioning of the viewer (Scott 2003). Scott (2003) writes that interpretation of landscape is "multi-dimensional", and "overlain by powerful human sentiment" (p.24), and that people tend to be resistant to changes in the visual appearance of local or otherwise familiar landscapes. The countryside means different things to different people, and thus, conflict may arise when it comes to deciding how the countryside should be managed or to whom it belongs.

Across much of Europe, including Ireland and the UK, the countryside has historically been viewed primarily as a 'production asset', valued solely for the provision of food and other raw materials required for economic growth and development, and agriculture has been assumed to be the main force shaping rural landscapes and societies (Swanwick, 2009; Andersson et al., 2009; Howley et al., 2014). However, the social and economic importance of agriculture is declining (see next section), and the countryside is increasingly considered a 'consumption good', something that both landowners and other members of the public utilise for non-production-related activities such as recreation (Bohnet et al., 2003; Swanwick, 2009; Andersson et al., 2009; Primdahl et al., 2013; Howley et al., 2012; Howley et al. 2014; Rogge and Dessein, 2015; Pedroli et al., 2016). The production of new rural goods and services has become central to the development of the countryside (Andersson et al., 2009; Oueslatie and Salnie, 2011), and, as Hall et al. (2004) argue, there are many public goods that rural areas provide that do not require the involvement of agricultural activities at all. Many purport that there is a new rural economy, the basis of which is things like

tourism, gastronomy, second homes, and nature protection, among others, and that these may be the key factors that determine future rural development (Marsden, 1999; Mormont, 1990; Nilsson, 2002; Oliver & Jenkins, 2003; Garrod et al., 2006; Andersson et al., 2009). Garrod et al. (2006) speak of 'countryside capital', a concept that advocates consideration of both traditional rural and natural resources, such as landscape, water, forests and roads, as well as immaterial resources such as local customs and languages.

Multiple factors are driving this shift. First, changes within agriculture itself, including increasing intensification and specification, have changed the nature of both the landscape and rural communities (Rogge and Dessein, 2015; Pedroli et al., 2016). Although much of the European landscape remains devoted to agricultural purposes[2], an increasingly small percentage of the population actively manages it (see next section). The way most people engage with the countryside has fundamentally changed, and by extension, what they expect from it. Alongside this, there is growing public awareness of global environmental crises including climate change and biodiversity loss, phenomena to which agriculture is directly linked. Awareness of this is changing public opinion of what food and fibre production should look like and increasing the value many people place on public goods the countryside offers, such as biodiversity and carbon sequestration. Various researchers have noted increasing public concern around protection of the countryside, sustainability and biodiversity (Howley et al., 2012; Rogge and Dessein, 2015; Pedroli et al., 2016; Pinto-Correia et al., 2016).

Alongside this, Howley et al. (2012) and Rogge and Dessein (2015) suggest that society's changing values and expectations are due in part to increasing affluence and population growth. For example, more people have income to spend on recreational activities, and, in increasingly populated urban centres, 'escaping to the countryside' is an attractive option for those who can afford it. Rogge and Dessein (2015) and Pedroli et al. (2016) add that factors such as urban outmigration are changing how peri-urban and rural areas function, impacting not only the physical geography of rural areas, but also their social fabric. Notably, outmigration has reportedly accelerated during the Covid-19 pandemic, which has potential to exacerbate this process. However, although whether this is a long-term trend remains to be seen (Marsh, 2020; Whitaker, 2021).

[2] For example, agriculture accounts for 67 percent of total land-use area in Ireland (Conroy et al., 2016) and 75 percent in NI (DAERA, 2018). See chapter four.

Together, these changes can have major implications for rural governance and for policymaking, fomenting a shift to what Daugbjerg and Feindt (2017) call agricultural post-exceptionalism, a concept discussed in detail in chapter three. In short, new and different stakeholders, who may hold values and expectations distinct from those of incumbent actors, have progressively powerful stakes in how the countryside is managed (Greer, 2017). This increases the complexity of policymaking networks concerned with rural and agri-environmental governance, which in turn impacts how agri-environmental policies are developed and implemented. The growing importance of 'messy', or 'wicked' policy issues such as climate change and waterway pollution further alters policymaking (Persson, 2007; Greer, 2017). What this means for agri-environmental policymaking on the island of Ireland is discussed in chapters seven and ten**.** The following section takes a closer look at what the concept of multifunctionality means for agriculture.

2.2.2 Multifunctional agriculture – part of a multifunctional countryside

In the UK, Ireland and much of Europe, agriculture has shaped the landscape for thousands of years and traditional agricultural landscapes are part of many people's social and cultural identity (Vos and Meekes, 1999; Bruns et al., 2000; Jones and Daugstad, 1997; Hynes and Campbell, 2011; Junge et al., 2011, Howley et al., 2014). Research has found that people frequently rate such landscapes highly in terms of beauty and feel that protecting them is important (Hall et al., 2004; Hynes and Campbell, 2011; Howley et al., 2012). Many also have a positive view of farmers and farming (Shortall, 2007; Howley et al., 2012; Howley et al., 2014) and believe that farmers are good caretakers of the countryside (Howley et al., 2012). However, they tend to have a negative perception of intensively farmed landscapes (Hunziker, 1995; Hietala-Koivu, 1999; Kaltenborn and Bjerke, 2002; Soliva et al., 2010; Hynes and Campbell, 2011; Howley et al., 2012a; Howley et al., 2014), which as discussed below, leads to potentially contradictory expectations in terms of what is demanded from agriculture.

Despite a general shift towards considering the countryside as multifunctional, it is still assumed both publicly and politically that rural landscapes are, and will continue to be, a product of the activity of famers, and farmers are considered to be producers of public goods (Bromley and Hodge, 1990; Bohnet et al., 2003; Vanslembrouck et al., 2005; Junge et al., 2011; Howley et al. 2014). Thus, policy focus has been, and remains, on incentivising individual farmers to manage land in certain ways. This is another characteristic of

agricultural post-exceptionalism. While the relative importance of primary agricultural production is declining, and that of other issues, such as environmental protection, is increasing, farmers are still considered the most legitimate custodians of the land and continue to be supported to manage it (Daugbjerg and Feidnt, 2017). However, according to Andersson et al. (2009), there is a broad consensus within rural development that modern agriculture must undergo significant reform, and, as the above section highlights, it is no longer necessarily the only or even the main force shaping rural society and landscape.

Since World War II, and in the past 50 years in particular, multiple "push and pull factors"[3] have led to profound changes in the processes and outputs of agriculture, with implications for such landscapes (Howley et al., 2014). Trends like intensification, specialisation and concentration are increasingly prevalent in agriculture in Europe and elsewhere (Commins, 2004; Weis, 2007; Rogge and Dessein, 2015; Pedroli et al., 2016, Winders and Ransom, 2019). It has become more globalised and market-oriented, and at the same time, increasingly disconnected from rural communities and rural development (Pedroli et al., 2016). Across Europe, farms are larger and increasingly fewer people derive a living directly from food and fibre production; most farmers in the European Union (EU) now farm part-time and earn much of their income from off-farm employment (Rogge and Dessein, 2015). For example, in 2020, agriculture in NI and Ireland employed only 2.4 percent[4] and 4.2 percent of the population, respectively (DAERA, 2021), whereas, as late as the mid-20th century, nearly half of Ireland's population was actively involved in the sector. Of those remaining in agriculture, approximately half farm on a part-time basis[5], although this varies widely by sector (refer to chapter four).

Much of modern agricultural activity has a substantial negative impact globally, both on the natural environment and on the lives of the people who work in food production and processing (Patel, 2007; Weis, 2009; UN FAO, 2019; IPCC, 2019; Winders and Ransom, 2019). Marsden (2003) states that modern agriculture has performed a "race to the bottom", and Van der Ploeg et al. (2002) argue that it has "…reached its intellectual and practical limits" (p. 8). Many believe this is a direct result of the trend towards intensification and argue that

[3] "Push factors" include various trends in agriculture, such as a demand for biofuels, that result in agricultural intensification or extensification, or the development of new farming techniques. "Pull factors" are derived from what 'the public' wants from the countryside, such as increased recreational activities and environmental services (Howely et al., 2014).

[4] The figure for the UK as a whole is 1 percent (DAERA, 2021).

[5] 52 percent in Ireland (Donnellan et al., 2020) and 45 percent in NI (DAERA, 2020)

agriculture must move away from its current industrialised, specialised approach towards a strategy of pluriactivity or multifunctionality (e.g., Hall et al., 2004; Andersson et al., 2009; John and McIsaac, 2017; Zhang and Schwärzel, 2017; Rickart et al., 2018).

2.2.3 Multifunctionality in agri-environmental and rural policymaking

Globally, the concept of agriculture as 'multifunctional' first appeared in the 1987 Brundtland Report[6], and was subsequently carried forward into the United Nations' (UN) 1992 Rio Convention on Environment and Development (O'Connor and Dunne, 2009; Renting et al., 2009). It began to make its way into EU policy after the seminal report 'The Future of Rural Society' (1988), and the Cork Declaration[7] (1996) (O'Connor and Dunne, 2009; Howley et al., 2012; Blom-Zandstra et al. 2016), where it was agreed that there was a need for policy to encourage landowners to manage their land in a socially desired manner (Howley et al., 2012). Since then, a range of (sometimes ambiguous) definitions and interpretations of the term have been developed and have been used to promote everything from (often small-scale) agro-ecological farming practices (e.g., Mendoza, 2015; Poux and Aubert, 2018) to large-scale industrial farming (e.g., Syngenta, Arcadis, and Bioversity International, 2018). Most such terms refer in some way to the fact that agricultural activity can deliver multiple functions above and beyond its traditional role of producing food and fibre, all of which are beneficial to society in some way (Renting et al., 2009; Howley et al., 2012; Blom-Zandstra et al., 2016).

Multifunctionality in agriculture is seen by many as positive from social, environmental and rural development points of view (Van der Ploeg and Roep, 2003; Hall et al., 2004; McDonagh et al., 2013). Hall et al. (2004, p. 211) state that it "…has been identified as the way forward for European agriculture", and McDonagh et al. (2013) refer to it as a long-term adaptation strategy that has gained acceptance in the face of various current economic, social and environmental challenges. The provision of public goods through agriculture has, at a policy level, become part of a "new concept for a sustainable countryside" (Blom-Zandstra et al., 206, p. 46), as well as an effort to reduce agriculture's negative externalities

[6] The Bruntland Report is the common name for a report titled 'Our Common Future', published in 1987 by the United Nations. Its main aim was "to propose long-term environmental strategies for achieving sustainable development by the year 2000 and beyond" (Bruntland, 1987).

[7] The Cork Declaration, or "A Living Countryside" (European Commission, 1997) was developed following the 1996 European Conference on Rural Development ("Rural Europe – Future perspectives"), which is considered to have laid the ground for current rural development policy in the EU.

(Hynes and Campbell, 2011; Howley et al., 2012; Blom-Zandstra et al. 2016). For many, agriculture's non-market goods are just as important as food production (Hynes and Campbell, 2011; Pedroli et al., 2016).

The concept has become a cornerstone of EU agri-environmental and rural policy (Renting, 2009). McDonagh et al. (2013) state this has allowed the EU to support its two main agendas of agricultural modernisation (competitiveness) and rural development simultaneously. Similarly, others argue that shifting away from promoting production only towards supporting agriculture's non-market goods has allowed the EU to, at least in part, address the growing problem of its costly farm supports and the trade distorting impact of these, and take into consideration an increased public awareness of agricultural practices and the environment more broadly (Hall et al., 2004; Renting et al., 2009; McDonagh et al., 2013). Food scares such as the BSE crisis of the 1990s have increased the public's expectations of what farmers should deliver in return for public support (Hall et al., 2004). Further, as discussed above, people are increasingly aware of the negative impacts agriculture can have on the environment (Burrell, 2004; Moreddu et al., 2004; Firbank, 2005; Boel, 2005; Howley et al., 2014) and a strong social demand for the public goods provided by agriculture has developed (Arriaza et al., 2004; Hynes and Campbell, 2011; Howley et al., 2014). Again, 'messy' policy issues are becoming increasingly important, driving a shift towards post-exceptional agriculture policy (Persson, 2007; Greer, 2017).

In discussing the transition towards multifunctional agriculture as a policy objective, Gorton et al. (2008) point to the importance of the 2003 Common Agriculture Policy (CAP) reforms, under which the general management of agricultural land began to receive the same level of support as production activities (see section 2.4, below). As the role of farmers in maintaining landscapes became recognised, they began being paid for this work without a requirement to produce marketable outputs (again, post-exceptionalism). This trend has only increased over time. Financial support for agriculture has continued its downward trajectory in the 2014 – 2020 and 2021 – 2027 EU funding periods, and CAP payments are increasingly tied to delivery of ecosystem services (European Parliament, 2021; see section 2.4). Following the UK's exit from the EU, England[8] is pursuing an even more ambitious

[8] Note that the UK's devolved nations have not committed to such an approach, something discussed in detail in chapter four.

'payment for public goods' approach, in which government support for primary agricultural production is set to be removed nearly entirely (DEFRA, 2018) (see chapter four).

Multifunctional agriculture: Who 'owns' the 'goods' and the 'bads'?

Nevertheless, multifunctionality remains a contested concept within agri-environmental policymaking. First, there is disagreement regarding how agriculture's non-trade-based aspects should be considered (O'Connor and Dunne, 2009; Renting et al., 2009). Within the context of Word Trade Organisation (WTO) negotiations on agriculture, the EU continues to use the notion of multifunctionality to legitimate aspects of the CAP model that would otherwise not be viable under unrestricted free trade. It is argued that government support for agriculture's non-market goods is justified because the market mechanism is not sufficient for the regulation of the provision of public goods (Hall, et al., 2004; Blom-Zandstra et al., 2016). Opponents of the concept see it as a disguised form of protectionism, and suggest that instead of relying on government intervention, creative ways need to be found to bring these goods into the market (O'Connor and Dunne, 2009).

Neither approach is straightforward. First, there no clear way to measure non-market goods or to compensate farmers for them. It is also difficult to discern how the public weights them (Hall et al., 2004). This is further complicated by the fact that the concept of public goods is not clear-cut. Pure public goods are non-rival, whereby "…[an] individual's consumption of…a good leads to no subtracting from any other individual's consumption of that good" (Samuelson, 1954, p. 387), no matter how many people consume it. They are also non-exclusionary, that is, it is very difficult, if not impossible to prevent any person from consuming them (Renting, et al. 2009; Gramzow, 2009; Blom-Zandstra et al., 2016). However, as Blom-Zandstra et al. (2016) point out, not all public goods produced through multifunctional agriculture, or from a multifunctional countryside more generally, are 'pure'. For example, although game is considered a non-exclusive public good, it is clearly rival. Moreover, while exclusion is a binary concept, meaning that goods are either exclusive or not, rivalry is, as Starrett (2003) puts it, "a matter of degree" (p. 105). This makes it challenging to assign 'ownership' to such goods. Therefore, managing collective public goods (and 'bads', or negative externalities) via market mechanisms is exceptionally difficult (Starrett, 2003; Blom-Zandstra et al., 2016).

Writing about environmental resources, Starrett (2003) highlights that their non-appropriable nature – the fact that it is difficult or impossible to enforce private property

rights related to them – is the biggest impediment to using markets to allocate them. If it is not clear who owns a resource, or, in this case, a public good (or 'bad'), then it is impossible to use a market solution to allocate or regulate it (Coase, 1960; Starrett, 2003; Neves, 2012). Allocating rights becomes particularly difficult when considering 'collective' resources or goods both for reasons highlighted above, and because of the large number of actors involved, directly or indirectly, in the negotiation of who owns what (Starrett, 2003). This does not mean markets cannot be used to allocate rights related to such resources or goods, but that doing so works "inefficiently at best" (Starrett, 2003, p. 106).

Such problems are evident in attempting to legislate for 'multifunctional agriculture'. The concept is, in effect, an attempt to bring the 'goods' from agriculture-based land management (i.e., ecosystem services) into the market. However, it does not do the same for the associated 'bads'. It argues that farmers or land managers should be paid for goods they provide but does not articulate if/how they should pay for environmental degradation they may concurrently cause. While this approach does not preclude development of legislation that requires farmers to pay for the pollution they produce, in absence of a clear definition of who 'owns' agriculture's goods and bads, it is difficult to do effectively.

For example, in the EU, the main legislative instrument for regulating water pollution is the Nitrates Directive. While its rules do limit the amount farmers are allowed to pollute, it operates on a threshold basis, that is, farmers are only penalised for pollution caused above set limits (see chapter five). As such, they do not have full ownership of ('rights' over) the pollution they produce. Responsibility for dealing with most of its effects are passed on to the public (most often) or other actors. Meanwhile, under associated Common Agriculture Policy schemes (section 2.4, below), payment for the goods farmers deliver is not threshold dependent. They have full rights to the goods they produce. Thus, it is possible for farmers to receive payment for these, while concurrently paying nothing for the associated negative externalities. Seen in this light, it can be argued that, rather than challenging agricultural exceptionalism and the power of agricultural interests generally, the concept of multifunctionality upholds it. As will be discussed further in chapters seven and ten, a failure to internalise the true cost of food and fibre production in policy approaches serves to reinforce the power of agricultural actors. This results in ineffective regulation of agriculture – both its public goods and its pollution (bads).

Multifunctional agriculture and policy: Further challenges

There are other criticisms. Van Huylenbroeck and Durand (2003) and Pedroli et al. (2016) argue that a multifunctional policy approach is contradictory: farmers are pushed to meet society's demand for various non-productive agricultural functions but are simultaneously required to be competitive in an increasingly liberal and competitive global market. The government intervention required to support the delivery of non-market goods is not compatible with a liberal approach to free trade but is justified in various ways (Van Huylenbroeck and Durand, 2003). This is another clear example of post-exceptionalism, whereby the agriculture sector continues to be treated as special and worthy of disproportionate government support, but other, often competing, policy objectives are also important (Daugbjerg and Feindt, 2017). This increases the complexity of the policymaking environment. As will be argued later in this thesis (chapter three, chapter ten), this is not necessarily bad. A more complex policymaking environment means that the 'status quo' of agricultural exceptionalism is more likely to be challenged, and by extension pressing agriculture-related environmental and social issues are more likely to be addressed effectively. However, it can also make it much more difficult to develop policies.

As Hall et al. (2004) highlight, within a paradigm of multifunctionality, the public's expectations of farming are also increasingly contradictory. For example, many people want an inexpensive supply of food that is safe to eat, but also want the environment to be protected. O'Connor and Dunne (2009), Brunori et al. (2013) and Marsden (2013) all make the point that providing high-quality, widely available food puts pressure on the space available for consumption-based activities, such as recreation, or even the protection of environmental resources. O'Connor and Dunne (2009) argue this often manifests itself as tension between support for commodity agriculture and for rural development.

Marsden (2013) suggests that, so far, the demands on rural land placed by food production, amenity provision and environmental protection has been "…assuaged by increasingly cheap imports of temperate and exotic foodstuffs from outside the EU" (p. 123). While the UK and European public have benefitted in the form of increased food choice, lower household bills, and increased protection for the countryside, many of the environmental and social externalities of food production have been "exported and distanced" (Marsden, 2013, p. 123). Various authors highlight similar issues related to exporting food production's negative externalities (Pretty and Bharucha, 2014; Garnett, 2015; Lang, 2020). Although such an

approach has, as Marsden (2013) puts it, "…instilled a satisfying (and politically legitimating) culture of plenty and pastoralism over much of rural UK" (p. 123), it does not address the problem of the externalities created by food production, nor is it a fool-proof strategy in a time of increasing political, social and ecological volatility. Many argue that the UK's food system is highly vulnerable and does not have the resilience or organisational capacity to overcome the range of pressures it faces now and will continue to face moving forward (Marsden, 2013; Garnett et al., 2020; Lang, 2020).

Related to this, there are questions about whether food security[9] for all can be achieved through multifunctional agricultural systems – a debate that is hotly contested, particularly as it relates to smaller-scale and/or localised multifunctional agriculture systems, such as those advocated for by many in the 'sustainable food system' camp. Proponents argue that such systems can produce most, or even all the food we need, in a way that is environmentally and socially 'sustainable' (e.g., Hamer et al., 2017; Steel, 2020; Food, Farming and Countryside Commission, 2021). However, issues related to food affordability and equity in access to food (a key component of food security), although increasingly acknowledged, are yet to be sufficiently addressed on this front. 'Local', 'sustainable'[10], foods are often (although not always) more expensive to produce than food procured on the international market, and it is, therefore, often necessary to sell them at higher prices[11]. Moreover, such foods are frequently marketed at artificially high prices based on these 'unique selling points' (Thompson, 2000; Johnston et al., 2012; Forman, 2012; Donaher and

[9] Food security is typically described in terms of food availability, access and utilisation (Sen, 1981, Foresight, 2011). According to the World Health Organisation, it is achieved when "…all people at all times have access to sufficient, safe, nutritious food to maintain a healthy and active life" (World Health Organisation, 2015).
[10] Note that 'sustainable' is a contested term and is interpreted in various ways. Conceptions of it may encompass terms such as 'organic', 'grass-fed' and 'natural', among many others.
[11] This argument is very much context dependent. Here, it is being made from a UK/Ireland-based perspective. However, it often does not apply in places where localised (often subsistence-based) food systems are the norm (i.e., much of the 'Global South', but not only). Moreover, empirical research shows that, in many cases, even in countries in the 'Global North', 'local' foods are less expensive to purchase than imports (e.g., Noseworthy et al., 2011; Donaher and Lynes, 2017). However, the 'price' of food, i.e., what the consumer pays, typically does not reflect the true 'cost' of food – neither its positive nor negative externalities. 'Price' is also distorted by a range of other factors, including both direct and indirect subsidies, among others (Pretty et al., 2005; Lang, 2020). There are also issues of scale; in the UK, for example, such production systems are currently relatively small-scale, and therefore have not reached the economy of scale necessary to provide sufficient return through high volume sold, as opposed to through higher/premium prices (Food, Farming and Countryside Commission, 2021). Lastly, issues of food affordability and food access are closely tied to others of poverty and inequality (Hawkes et al., 2015; Lang, 2020; Hawkes et al., 2020; Steel, 2020). It is not only a food production or supply chain issue, it is also a matter of public health and other social policies. Thus, this argument is an exceptionally complicated one to unpick and it is outside the scope of this thesis to do so. Regardless, the case remains that the 'price' of such foods often puts them out of reach of many people, particularly those on low incomes, which is problematic – the argument being made here.

Lynes, 2017; Tavares et al., 2021). As a result, they are often the preserve of relatively well-off members of society (Carins et al., 2010; Johnston et al., 2011; Forman, 2012; Johnston et al., 2012).

At the opposite end of the food security argument is a narrative that to feed a rapidly growing global population, it necessary to expand large-scale intensive agricultural production systems, not smaller, extensive ones. Alongside this, a 'land-sparing' argument is often advanced – that is, it is better to intensively produce food and fibre on as little land as possible, thereby 'sparing' other land for conservation and other non-agricultural purposes, than to rely upon more extensive agricultural systems[12] (see Green et al. (2005) and Fischer et al. (2014) for a comprehensive overview of the 'land-sparing' versus 'land-sharing' debate). Within this argument, a strategy of 'sustainable intensification', i.e., increasing food production without increasing environmental harm, is usually trumpeted (Firbank et al., 2013; Tittonell, 2014; Levidow, 2015; Lymbery, 2017), and the language of 'multifunctionality' is often drawn upon as a tool to support this approach (e.g., see: The Royal Society, 2009; Tittonell, 2014; Syngenta, Arcadis, and Bioversity International, 2018).

Many have critiqued the social and environmental merits of this approach, arguing that, for example, within such systems, costs associated with feed production (e.g., destruction of the Amazon rainforest) and pollution clean-up are externalised and not sufficiently accounted for (Lang and Barling, 2012; Garnett, 2015; Levidow, 2015; Lymbery, 2017; Caffyn, 2021). Lymbery (2017) characterises 'sustainable intensification' as 'business as usual' with a little added 'greenwash'. However, as Pretty and Bharucha (2014) argue, implicit in many arguments against sustainable intensification is "the notion of an association between 'large-scale' and particular technologies, and a distinction between the values of 'large' and 'small', with an implicit preference for only the latter" (p. 1578). They highlight how this points to a tension between different conceptions of what is good in agriculture.

Along similar lines, this debate underscores difficulties inherent in interpreting what 'multifunctional' means. Applied to intensive production systems, it may simply refer to the positive environmental externalities that agriculture can produce or support, such as biodiversity or carbon sequestration. Promotion of techniques such as conservation

[12] In opposition to the 'land-sparing' approach is a 'land-sharing' position, often held by proponents of smaller-scale, less-intensive agriculture systems, argues that food production can, and should, occur alongside/with conservation efforts, and not be seen as separate (Green et al., 2005; Fischer et al., 2014).

agriculture, which focus on increasing the biodiversity promoting and carbon sequestration potential of agricultural systems (either intensive or extensive) (e.g., see Kassam et al., 2009), exemplify this agriculture-centred approach (Pretty and Bharucha, 2014). However, this does not encompass the wider meaning of 'multifunctionality', as described above, which is advanced by, for example, the European Union through its Common Agriculture Policy and related legislation (see section 2.4, below, and chapter four).

As with most polarised debates, relatively few argue for an entirely either-or solution to the world's food and fibre production conundrum. A range of positions occupy the middle ground of the extensive/intensive agriculture argument, many of which rely upon various definitions of 'multifunctionality' to justify their position. The point to be made here is that, although a shift towards considering agriculture and the wider countryside as 'multifunctional' is undoubtedly positive given the need to respond to society's changing needs and values and to a range of pressing environmental crises, doing so adds multiple layers of complexity to governance and policymaking. Increasing numbers of competing or contradictory policy channels (e.g., environmental regulation, rural development, industry development, public health, etc.) can result in policy 'gaps' that different interests can take advantage of to maintain or improve their relative position. On top of this, neither 'multifunctionality' nor the ownership of the value and costs of the goods that a 'multifunctional' countryside produces are clearly defined. Both concepts are therefore open to interpretation. This further increases opportunity for actors to manipulate the policy agenda in ways that advance their position. However, the degree to which actors can do this depends on their relative power within the policymaking area. Thus, to understand policy outcomes and their implications, it is necessary to understand the sources of actors' power and the ways in which this power is manifest. Chapter three discusses this in detail, and chapters seven through ten consider what it means for land and waterway management on the island of Ireland – the focus of this research. But first, this chapter continues with an overview of literature related to farmer decision making.

2.3 Farmer decision making

Farming is an increasingly difficult industry from which to make a living income, and 'monoactive family farms' – farms earning income from farming alone – are becoming less and less likely to be financially viable, particularly those classified as small (Shucksmith and Hermann, 2002; Bohnet et al., 2003; Strutt and Parker, 2019; Lang, 2020; Rebanks, 2020;

Jack et al., 2021). Despite this, many farmers are reluctant to consider leaving the agriculture industry and instead adopt a range of adaptation techniques to survive (Bohnet et al., 2003; Lobley and Potter, 2004; Howley and Dillon, 2012; O'Rourke et al., 2016; Jack et al., 2021). For example, in a study of English farmers, Lobley and Potter (2004) found that, despite increasingly tough economic conditions, only 15 percent of farmers were actively exiting agriculture. Various authors cite evidence that European farmers use decoupled CAP payments to subsidise unprofitable farming activities (Colman and Harvey, 2003; El-Osta et al., 2004; Breen et al., 2005; Howley et al., 2011; Howley and Dillon, 2012). Other research has found that farmers' (or, more accurately, farm households'[13]) responses to challenging financial times include: increasing output from a farm's more profitable enterprises; cutting unprofitable enterprises; reducing costs associated with labour, machinery and other inputs; spending savings; accumulating debt; diversifying; and securing off-farm income (Savills, 2001; Reed et al., 2002; Van der Ploeg and Roep, 2003; Lobley and Potter, 2004; Andersson et al., 2009; O'Connor and Dunne, 2009).

This runs counter to the 'rational', profit-maximising economic behaviour which might be expected under traditional neo-classical economic theory, and points to the fact that farming is not a 'typical' enterprise. Many researchers highlight that farmers do not always make decisions with a singular goal of maximizing income (Ackerman et al., 1989; Hermann and Uttitz, 1999; Willock et al. 1999; Kantelhardt, 2006; Key and Roberts, 2009; Renting et al., 2009; Howley and Dillon, 2012; Conway et al., 2016; Conway et al., 2017). As Willock et al. (1999) put it, farmer behaviour is "…a result of complex processes influenced by a range of socio-economic and psychological variables" (p. 286). Although economic factors do impact farmer decision making, farming is, for many, a way of life and part of personal identity, tied up with a host of social, cultural and historical factors (Shortall, 2014; van Viliet et al., 2015; Conway et al., 2016; Conway et al., 2017).

Conway et al. (2016) state that "[farming] life throughout the world is characterised by the almost inseparable intimate integration of home, work, memories and family tradition" (p. 166), and highlight farmers' deep-rooted emotional attachment to the land they farm. This is particularly true in places like Ireland and NI (and much of Europe), where the family-owned farm is the predominant model, and many farming families can trace their family's history on

[13] Much research, including most cited here, typically refers to 'farmer behaviour', but this researcher notes that more typically, decisions are taken by farm households, not individual farmers alone, as various authors highlight (e.g., Burton, 2004; Shortall, 2014).

the land back multiple generations (Lobley and Baker, 2012; Conway et al., 2017) (see chapter four). Therefore, maintaining ownership and control of the family farm is often the central objective (Gasson and Errington, 1993; Bohnet et al., 2003; Mishra and El-Osta, 2008; Glover, 2010; Conway et al., 2017). The fact that agricultural land itself is a major economic asset, one which changes hands very infrequently in places like Ireland and NI (Conway et al., 2016; Conway et al., 2017), cannot be overlooked. Nonetheless, Kirkpatrick (2013) argues that the sense of place and purpose a farmer attaches to the family farm often supersedes economic imperatives. For many, farming is a vocation that is valuable in and of itself and the non-pecuniary aspects of farming are important to them ((Ackerman et al., 1989; Hermann and Uttitz, 1999; Willock et al., 1999; Gorton et al., 2008; Howley and Dillon, 2012, Rebanks, 2020). Price and Conn (2012) and Conway et al. (2016) suggest this is evidence that, for many farmers, lifestyle is significantly more important than profit.

It should be noted that although these characterisations may apply to most farmers/farm households, particularly those operating family-owned farms (as nearly all the farms on the island of Ireland are), there is a distinct difference between the economic viability of, for example, a dairy farm and a drystock (beef and/or sheep) farm. As is detailed in chapter four, the majority of dairy farmers in Ireland and NI operate on a full-time basis and make considerably more income than their counterparts in the drystock sector, most of whom farm on a part-time or even hobby basis. Therefore, in terms of dairy farmers' (or other full-time farmers') business-related decision making, 'rational' economic decisions are likely to play much more of a role than factors such as culture and identity, even though the latter are most certainly still important. The opposite is likely true of part-time drystock farmers, many of whom do not even keep accounts for their agricultural businesses (Argilés and Slof, 2003; Kinsella, 2018). As will be discussed in chapters eight, nine and ten, this is an important consideration for policymakers.

Regardless of what they farm or whether they farm part or full-time, research shows that many farmers still have what is referred to as a 'productivist mindset', that is, a focus on maximising production (Walford, 2002; Burton and Wilson, 2006; Gorton et al., 2008; Howley and Dillon, 2012; McDonagh et al., 2013, O'Rourke et al., 2016). For example, a study in northern England conducted by Harvey (2000) found that farmers were generally reluctant to change their practices and keen to maintain a production-based focus. In a study of farmers in France, Sweden, England, Lithuania and Slovakia, Gorton et al. (2008)

also found that most farmers still expressed a preference for agricultural land to be fully utilised for production purposes. Most were resistant to diversification, particularly in terms of finding off-farm employment. Research participants held an overriding belief that farmers should "produce food and fibre" (p. 334) and that it would be difficult for a farmer to find off-farm employment due to lack of appropriate skills and off-farm opportunities. Similarly, Walford (2002) and Burton and Wilson (2006) found that English farmers maintain productivist tendencies, despite agriculture policy shifting towards a more multifunctional view of agriculture and the rural in general (Gorton et al., 2008; Howley and Dillon, 2012). In line with these findings, Tranter et al. (2007) found that most farmers in Germany, Portugal and the UK had no intentions of changing their farming plans post-2003 CAP reforms, while Breen et al. (2005) found Irish farmers to be similarly resistant to post-CAP reform change.

Given that, until relatively recently, farmers were subsidised based on the amount they produced (see section 2.4), it is unsurprising that a drive to produce became entrenched in many farmers' mindsets. Moreover, further to the above discussion on the 'property rights' related to the 'goods' produced by agricultural activities, it can be argued that while farmers have a clear 'right' over the food and fibre they produce, rights related to other goods are less clear. As such, while the reward for food production is relatively clear and understood, the same is not true for other goods. Considered this way, resistance to reducing production in lieu of being rewarded for other activities is logical.

There are additional explanations for the persistence of farmers' productivist tendencies. O'Rourke et al. (2016) argue that many farmers are not happy that diversification often requires the adoption of new skills such as marketing, and they are more comfortable with their traditional productivist role. They also suggest that the development of new skills and competencies can influence a farmer's mentality and identity, something that some farmers are resistant to. Their study of Irish pastoralists also highlighted the professional and social importance of productivist farming: productivist activities were the measure by which farmers judge themselves and each other, and therefore farmers held on strongly to this mindset. For example, some Irish hill farmers still overstock their fields, despite policy pressure to do otherwise, because of the prestige associated with owning a large flock or herd. In line with these findings, Burton (2004, p. 196) argues that many farmers strongly value the "…social/cultural rewards traditionally conferred through existing commercial agricultural behaviour", and that these behaviours are associated with "the 'good farmer'

identity". The social value of production is as important as the economic value. In explaining this, he draws on Goffman's (1959) 'dramaturgical metaphor' of 'front stage' activity, in which individuals perform in certain, regularised ways for others who might observe them. Burton's (2004) research highlighted that many farmers regularly perform 'front stage' productivist activities for other farmers, and that these behaviours are critical to their feeling of social belonging and identity as 'good farmers'. Both Burton (2004) and O'Rourke et al. (2016) suggest that if changes are to happen within agriculture, they need to be attractive socio-culturally, not just economically, because farming practices are so much about identity. This would likely entail a fundamental change in the way policy is developed and implemented, something Meadows (1999) and Abson et al. (2016) term a 'deep' policy shift. This concept is elaborated on in chapter three.

Because farmers/farm households are still responsible for managing much of the European landscape, as highlighted in the previous section, a great deal of EU legislation is concerned with regulating how farmers do this. Clearly, discerning how best to do so is incredibly difficult given the complex nature of farmers' decision making about land management. Further discussion of what this complexity means for policymaking on the island of Ireland takes place is chapters seven through ten. The current approach to doing regulating farming activity is discussed in the following section.

2.4 Legislating ecosystem management in the EU

The EU's strategy for managing Europe's natural environment is positioned within a neoclassical economic framework[14] and revolves around the concepts of ecosystem services (ES) and natural capital. Ecosystem services are essentially the positive benefits an environment provides to people (Berg et al., 2016) and natural capital, as defined by the EU, is "…the biodiversity that provides goods and services we rely on, from fertile soil and productive land and seas to fresh water and clean air "(Maes et al., 2018, p. 7). Strategies, action programmes and directives related to the protection of the environment are centred

[14] Neo-classical economic theory holds that a well-functioning market can account for the costs and benefits created within the economy by adjusting prices in order that resources can be used sustainably (Mäler and Vincent, 2003; Patel and Moore, 2017). Any costs or benefits not accurately accounted for in this system are termed 'externalities'. For example, the public goods associated with agriculture, discussed above, are considered positive externalities, whereas agriculture-related environmental degradation are negative externalities. Externalities can lead to a 'market failure', whereby the market price (or equilibrium[14]) of a product or service does not accurately reflect the product's/service's true costs and benefits (Mäler and Vincent, 2003).

around the idea of quantifying both ES and natural capital to support their delivery and/or management.

These are applied in an agricultural context through various agri-environmental schemes, which have been a key element of EU policy since the 1980s. Under these schemes, the state effectively contracts farmers to deliver environmental goods and services for a set period of time (Dwyer, 2014). In the UK and Ireland, agri-environment schemes operate as a binding contract between farmers or farming businesses and the public, represented by the government. Farmers follow set management prescriptions on defined areas of land and receive regular payments in return (Dwyer, 2014). The main policy vehicles for implementing these schemes are the EU Common Agriculture Policy and the Nitrates Directive, which have developed alongside a range of regulatory approaches associated with water and biodiversity policy, such as the Water Framework Directive (Dwyer, 2014). The Common Agriculture Policy is discussed in detail in the following section, while the Nitrates Directive and the Water Framework Directive are considered in chapter five.

2.4.1 The Common Agriculture Policy

The Common Agricultural Policy (CAP) is one of the EU's most significant policies. Although it has declined in importance since the 1980s when it absorbed 66 percent of the total EU budget, it still accounted for 37.8 percent of the EU budget in 2014-2020 funding period, and 31 percent in the 2021 – 2027 period (European Parliament, 2021). Since being ratified in 1962, it has undergone various reforms. First, under ongoing pressure from the Word Trade Organisation, there was a shift away from legislating protectionist tariffs and price supports towards offering farmers support via less market-distorting measures. Additionally, in response to the release of the 1988 'Future of Rural Society' report (European Communities Commission, 1988), support for environmental and rural development measures was included. The most notable reforms took place in 1992 (MacSharry Reforms) when internally supported market prices were replaced with price reductions and area-related compensation payments, and in 2003 (Fishler Reforms) when the Single Farm Payment scheme was introduced and Pillar 2 was established. The latter reforms represented a strong shift away from 'coupled' farm payments[15] and an increase in the level of support for environmental

[15] Couple farm payments are payments linked to the production of specific commodities. These sometimes serve to stimulate over-production (e.g., Europe's "wine lakes" and "butter mountains" of the 1970's and 80's) and are viewed as highly market distorting (Harvey 2015; Swinbank, 2017).

and rural development measures (Harvey, 2015; Coleman, 2017; Diamand, 2017; Swinbank, 2017).

Today, the CAP delivers three main types of payment support to farmers under two financial pillars. So-called 'Pillar 1' support includes (i) Direct Payments, comprising a Basic Payment Scheme (area-based income support payments) and payments for 'greening measures' (30 percent of Direct Payments), as well as (ii) a small number of market management measures such as import tariffs and crisis management support payments. The much smaller 'Pillar 2' support mechanisms provides funding for (iii) rural development schemes and agri-environmental initiatives (European Commission, 2017; DEFRA, 2018). This support is intended to help the EU meet the following objectives: to increase agricultural productivity; to ensure a fair standard of living for farmers; to stabilise markets; to ensure the availability of supplies; to ensure reasonable prices for consumers (European Commission, 2017).

Despite these reforms, the CAP has repeatedly come under criticism both from within and outside the EU. It may have been fit for purpose in the post-war period during which it was created and successfully supported European agriculture to meet the food security needs of member states. However, it is widely argued that it is no longer an effective policy. Many believe that current regulations are overly complex, posing a significant regulatory/administrative burden for farmers, and preventing farmers from being competitive and innovative (Diamand, 2017; Gravey et al., 2017; House of Lords, 2017; DEFRA, 2018c). Going further, Diamand (2017) asserts that CAP payments have obscured the link between subsidies and the taxpayers who pay for them. Hill (2017) argues that the CAP's basic payment scheme offers no clear public benefit. It has also been accused of inflating land prices and disproportionately subsidising some of Europe's wealthiest landowners[16], while leaving the smallest farmers unsupported and allowing rural areas to go into decline (Shortall and Warner, 2010; House of Lords, 2017; Diamand, 2017; Hubbard et al., 2017; Burns et al., 2018; Cadywould, 2018; DEFRA, 2018c). It is also argued that CAP regulations do not do enough to protect the environment, and that, in some cases, they actively facilitate environmental degradation (Gravey et al., 2017; Hubbard et al., 2017; Burns et al., 2018;

[16] For example, 19.5 percent of farm businesses own 74 percent of the UK's agricultural land (Diamand, 2017) and in 2016, the top 10 percent of CAP recipients in England received 47 percent of total payments, while the bottom 20 percent received only 2 percent (DEFRA, 2018). Similarly, a 2016 Greenpeace report found that one in five of the biggest recipients of CAP subsidies in Britain are billionaires and millionaires on the Sunday Times Rich List (Dowler and Carter, 2016; Beament, 2017).

Cadywould, 2018; DEFRA, 2018c, DEFRA 2018d [FFEEC]). Finally, those member states that are still home to a strong farming lobby, France in particular, are viewed to have undue influence on CAP policymaking (Minford, 2005; Gordon, 2005). With respect to Pillar 2 greening measures, researchers have found that none of the operational conservation measures applied within the UK have made an impact nationally owing to the fact they were applied with insufficient advisory support and at insufficient scale (Diamand, 2017). It was also found that, under CAP greening schemes in general, farmers have not been given sufficient advice to make effective biodiversity improvements. They tend to make choices within agri-environment schemes that work for them, but may have minimal environmental impact (Diamand, 2017). Moreover, the cross-compliance mechanism - the only tool used to implement various greening measures - is not supported with effective monitoring (Diamand, 2017).

More broadly, while the CAP and related legislation have shifted to focus on multifunctionality in recent decades, Hall et al. (2004) and Nijnik et al. (2008) contend that emphasis remains on encouraging agricultural production, and delivery of other public goods is still not supported effectively. Nijnik et al. (2008) argue that, considering changing stakeholder attitudes and preferences concerning the ecological, socio-economic and aesthetic aspects of land use, this is problematic, and that there is need within policy making to "…shift from a production-focused model to a people-focused model" (p. 77). They further suggest that social, ecological and economic values need to be "…operationalised into concrete management decisions" (p. 77). Similarly, Bohnet et al. (2003) emphasise the importance of "…[re-thinking] the notion of an agriculturally constructed and determined landscape, rebalancing planning, agricultural policy and the knowledge network in order to sustain the attributes and character features deemed to be worth protecting for the future" (p. 363). After all, as various other authors argue, market forces alone cannot guarantee that desired public goods such as a 'traditional farm landscape' will be protected (Hall, et al., 2004; Nijnik et al., 2008; Howley et al., 2012; Blom-Zandstra et al., 2016).

Writing about EU agri-environmental schemes, Dwyer (2014) suggests that by linking public funding to specific values-based agri-environmental goals they "…make explicit societal recognition of these values at local scale within the individual management contracts" (p. 177), and argues they successfully encouraged the incorporation of environmental considerations into land management practices (Dwyer, 2014). However, many authors argue

that, although there is good coordination of agri-environmental policies and goals at the national and EU levels, there is often a lack of local integration. The centralised, "menu-based" approach to prescribing land management improvements is often not sufficiently sensitive to local conditions, while an ecosystems approach, which calls for landscape scale changes, often overlooks what is required at the local level (Dwyer, 2014). It is also argued that the 'prescription' approach disincentivises farmer innovation (Burton et al., 2008; Shortall and Warner, 2010; Cadywould, 2018; DEFRA, 2018). When farmers are considered passive implementors of prescribed management conditions, they are not equal partners in landscape management, which can negatively affect the long-term outcomes of agri-environment schemes (Dwyer, 2014). It is also often the case that a range of underlying economic constraints may limit farmers' ability to participate in schemes, or to adopt sustainable policies more generally (Dwyer, 2014). Indeed, these limitations are in line with findings of research conducted for this thesis and have had significant implications for land and waterway management on the island of Ireland. This is discussed in detail in chapter eight.

2.5 Summary

This chapter considered debates around the concept of multifunctionality as it relates to agriculture and rural landscapes more broadly. Section **2.2** discussed how the relative importance of food and fibre production to the economy and to rural regions has declined, while that of other public goods such as recreation and environmental services has increased, making the policymaking environment increasingly complex. Finding integrated solutions and building consensus becomes more difficult as policymaking networks include more and different actors and various competing policy channels enter the policymaking arena. However, as is typical of agricultural (post-)exceptionalism, policy focus remains on how best to support farmers to deliver the new range of services being demanded. Meanwhile, the cost of dealing with agriculture's negative externalities continues to be a public problem. This becomes clear when the concept of multifunctional agriculture is critiqued through the lens of property rights. As this section highlighted, because neither 'multifunctionality' nor the ownership of the value and costs of the goods that a 'multifunctional' countryside produces are clearly defined, agricultural actors are credited with, and paid for, an increasing number of 'goods', but still do not pay the cost of the associated 'bads'. Policy approaches continue to fail to internalise the true cost of food

and fibre production. This reinforce the power of agricultural actors, which, as will be discussed in chapters seven through ten, has significant implications for how agri-environmental policy is developed and implemented. As highlighted in section 2.3, this challenge is further complicated by to the complex nature of farmer decision making processes, and because of the 'productivist mindset' that many farmers continue to hold. Finally, section 2.4 detailed existing EU land and waterway management policies and considered some of the challenges faced by EU policymaker as a result of the issues discussed in 2.2 and 2.3. Together, these sections set the context for debates considered and empirical data collected in this research. We turn now to chapter three, which details the theoretical underpinnings of the research.

Chapter 3: Theories of governance and power

3.1 Introduction

This chapter describes a theoretical framework that explicitly recognises how power directly and indirectly shapes how concepts such as multifunctionality are operationalised within agri-environmental policy. First, the concept of 'wicked problems' is introduced and discussed as it relates to agriculture and agriculture-related water pollution. This is followed by discussion of governance and policymaking in the agri-food sector. This thesis draws on theories of agricultural post-exceptionalism, policy network analysis and leverage points to describe governance structures and their influence on policymaking. Finally, the chapter considers theories of power. This research builds on Lukes' 'three faces' model of power to develop a novel framework for describing and how actors within the agri-food sector obtain and employ power within the policymaking arena.

3.2 The policy context: Agricultural water pollution as a wicked problem

Wicked problems, originally defined by Churchman (1967) and Rittel and Webber (1973) as problems that seem incomprehensible and resistant to solution, cannot be understood or addressed in isolation and are grounded in competing value frameworks (Head and Alford, 2013; Candel et al., 2016; Duckett et al., 2016; DeFries and Nagendra, 2017; Kuhmonen, 2018). They are, by nature, complex and exceptionally difficult to 'solve', that is, it is not possible to develop final, definitive or explicit solutions to them (Rittle and Webber, 1973; Head and Alford, 2013; DeFries and Nagendra, 2017; Kuhmonen 2018). They share roots with other problems and their potential resolutions are open to conflicting and divergent arguments; stakeholders typically disagree both on the nature of and solution to such problems (Conklin, 2006; Candel et al., 2016; Kuhmonen, 2018). To further complicate matters, resolving one wicked problem often causes new problems elsewhere (Kuhmonen, 2018). According to Head (2014) and Duckett et al. (2016), environmental wicked problems are especially difficult for policymakers. They suggest it is particularly challenging to implement policy initiatives aimed at addressing complex socio-environmental issues for reasons including conflicts between short-term interests and long-term benefits, and ambiguous boundaries which prevent assignation of responsibilities for resource allocation.

Problems associated with food production are classically 'wicked'. They can neither be understood nor addressed in isolation; it is impossible to fully consider the ways in which we produce food without also considering the associated environmental and socio-political

roots and impacts of agricultural activities (Candel et al., 2016; Kuhmonen, 2018). Further, solving one food production 'problem' generally creates others. For example, during World War II and in the decades that immediately followed, food security was a key concern for European governments, who responded by implementing policies that encouraged farmers to produce as much food as possible. These efforts were hugely successful (to the point that food surpluses, not shortages, became the problem), but this vast increase in food production was achieved at the expense of the natural environment. Agriculture-related habitat destruction and pollution became, and remain, some of the biggest problems we face in feeding ourselves. However, solving these problems creates new challenges. As Kuhmonen (2018) suggests, resolving agricultural pollution and biodiversity problems by reverting certain intensive agriculture systems to more extensive ones creates other problems in terms of agricultural productivity and incomes, subsidy budgets and trade balance. Lastly, there is no one 'solution' to the multiple, intersecting problems associated with the ways in which we feed ourselves, and solutions that are presented are often fiercely contested. Current debates around what we should eat and how it should be produced are often extremely heated and polarised (Barling et al., 2002; Candel et al., 2016).

The challenge for governments is to determine how best to balance the competing challenges associated with food production. How do we meet our food security needs without undermining the natural environment on which food production depends? How do we produce food that is affordable yet still allows farmers to make a decent living? Do we even need farmers? Why should all food not be produced in labs? The difficult questions associated with food production are nearly endless and cannot all be addressed here. The point to be made is that when it comes to the problems associated with food production, as with other 'wicked problems', their polarity often creates competing or contradictory policy channels: environmental regulation, rural development, industry development, etc. (Barling et al., 2002; Candel et al., 2016; Kuhmonen, 2018). This results in policy 'gaps' that different interests can take advantage of to maintain or improve their relative position. This framing can help explain why water pollution from agriculture remains such a problem – something researchers have characterised as a wicked problem unto itself (Smith and Porter, 2010; Jordan et al., 2012). There is a clear need to mitigate water pollution, but also a parallel and competing need for farmers to produce sufficient food at competitive prices. Additionally, there are concerns about preserving a countryside that people are culturally attached to,

and maintaining a vibrant rural community that, in much of Europe, including Ireland, is rooted in historical ideals of the small family farm. It is not possible to maximise all these outcomes simultaneously. Therefore, from government's point of view, the policy goal must be to achieve some 'socially optimal' balance of the 'goods' and 'bads' associated with agriculture – that is, a multi-dimensional social optimum (Barling et al., 2002; Candel et al., 2016; Kuhmonen, 2018).

This research aims to shed light on the ways different actors in the agri-environmental policymaking arena interact to both develop and implement water policies on the island of Ireland. To understand relationships between the state and other stakeholders in the agri-food industry and how these affect policy outcomes, it is important to examine governance processes. Research has shown how conceding disproportionate power to certain interest groups can lower policy effectiveness, not least because this may result in policies that ignore the embeddedness of markets in wider social structures and so omit broader societal interests such as concern for the environment or animal welfare (Foord, 2017; Benoit and Patsias, 2017; Richardson, 2018).

3.3 Governance in the agri-food sector

The agri-food sectors in Ireland and NI remain special, or 'exceptional', in governance terms, like the agri-food sector in Europe as a whole. Exceptionalist policy approaches occur where a sector is perceived to contribute significantly to the 'public good', e.g., education or health (Daugbjerg and Feindt, 2017). In agriculture, it is believed disproportionate state intervention is warranted due to the sector being different from most other economic sectors: agricultural producers face unpredictable natural and economic risks, and agriculture is seen to contribute to broader national interests such as food security and maintenance of 'the countryside' (Skogstad, 1998; Daugbjerg and Swinbank, 2012; Daugbjerg and Feindt, 2017; Attorp and McAreavey, 2020). Agricultural exceptionalism has a long history in Ireland, the UK and the rest of Europe. Agriculture – bound up with ideas of an idyllic rural countryside maintained by an army of self-sufficient peasants – was positioned as a cornerstone of 'Irishness' as the new Republic sought to reinforce its own identity after gaining independence from the UK in the 1930s (Foster, 1988). In Northern Ireland and Great Britain, as elsewhere in Europe and North America, agricultural exceptionalism was central to the state-assisted policy paradigm that arose post Second World War (Foster 1988; Skogstad, 1998). The European Union's (then European Economic Community) Common Agricultural

Policy was a key element of this paradigm, originally employing a combination of protectionist tariffs and price supports to support European food security (Harvey, 2015).

Agriculture within Europe has thus long benefitted from special treatment, or 'agricultural exceptionalism', in policymaking terms (Cox et al. 1985; Grant 1995; Skogstad, 1998). Farmers have historically been viewed as the sole legitimate 'custodians of the countryside', and a relatively closed network of farm ministries and farm groups – farmers' unions in particular – were traditionally responsible for developing agriculture policies (Smith, 1990; Clunies-Ross et al., 1994; Daugbjerg, 1998; Woods, 2005; Daugbjerg and Feindt, 2017; Attorp and McAreavey, 2020). Although other groups such as agricultural input suppliers, food processors and financial institutions benefitted from this policy approach, the intention was to support agricultural producers (Clunies-Ross et al., 1994).

Evidence of a transition away from traditional agricultural exceptionalism has become apparent in recent years. Increasingly, retail corporations and food processors assume a privileged position globally as they integrate food systems and occupy political and economic leadership roles (Lang et al., 2001; Clapp and Fuchs, 2009; Díaz-Méndeza and Lozano-Cabedo, 2020; Attorp and McAreavey, 2020), and, as discussed in chapter two**,** the idea of agriculture as 'multifunctional' – not just about food production – is now a central research and policy focus (Marsden and Sonnino, 2008; Renting et al., 2009). There has also been a broad "participative turn" in Western public policies (Benoit and Patsias, 2017, p. 2), in which community involvement and participatory approaches to decision-making have been encouraged (Prager et al., 2015; Benoit and Patsias, 2017). This shift has been reflected in the CAP, which, in response to a seminal EU policy statement on rural society (European Communities Commission, 1988) that highlighted the multi-functional nature of the countryside, began to include support for environmental and rural development measures from the 1990s. Further, under ongoing pressure from the World Trade Organisation, it has moved away from legislating protectionist tariffs and price supports towards supporting farmers via less market-distorting measures (Harvey, 2015).

Alongside the shift in European agriculture policy's trajectory came interest in what a paradigm shift away from exceptionalist policymaking would entail (Skogstad, 1998; Persson, 2007). Much debate and analysis preceded Daugbjerg and Feindt (2017) labelling agricultural policy as 'post-exceptionalist' in 2017. Skogstad suggests that a move away from exceptionalism is characterized by deregulation of agricultural markets and "the termination

or substantial restraint of government expenditures for agriculture, and a discourse antithetical to government intervention" (1998, p. 471). Greer (2017, p. 1586) argues a shift towards post-exceptionalism occurs when new actors and interests are incorporated into the policymaking arena, with boundaries of inclusion becoming extended beyond primary producers. "Messy" policy issues such as climate change or 'the environment' more broadly become increasingly important, and the highly interventionist role of government is weakened, as reflected in changing policy instruments and programmes. Similarly, Persson (2007) highlights a move away from a productivist discourse within policymaking to one where economic and environmental interests become more balanced. However, in a post-exceptionalist paradigm, the idea that a sector is special is retained. Daugbjerg and Feindt (2017, p. 1573) articulate how the idea that the agriculture sector warrants special treatment is combined with a move away from a "compartmentalized policy arena" to create an "updated set of policy ideas", such as those related to sustainability. They argue that, although a full transition to market orientation does not occur and scope for government intervention remains, such a shift still results in policy innovation (Daugbjerg and Feindt 2017).

Other authors maintain that, in Europe at least, a neat transition to post-exceptionalism has not been made, rejecting the notion that policy instruments have been "reframed" (Persson 2007, p. 1605) to address wider environmental interests (Alons, 2017; Greer, 2017). Writing about the CAP, Greer (2017) argues that, although some policy mechanisms have changed, focus remains on propping up farm income – a form of "shallow exceptionalism". New actors and institutions have been included alongside changes to certain policy instruments, but ideas around redistribution and farm subsidies remain intact (Greer 2017, p. 1599). Similarly, Attorp and McAreavey (2020) argue that, in Northern Ireland, an incomplete transition away from agricultural exceptionalism has resulted in a state of what Daugbjerg and Feindt term "tense post-exceptionalism" (2017, p. 1579). Despite intentions to extend power to a range of stakeholders both within and outside of the NI agri-food sector, and to update the policy agenda to address emerging environmental issues, the region's most recent agri-food strategy failed to do so (Attorp and McAreavey, 2020). Evidently, the transition from policy exceptionalism to policy post-exceptionalism is not straightforward. As the literature suggests, there are circumstances which fall between the two policy approaches.

Multiple authors highlight how actors formerly marginalized within agri-food politics, including processors, suppliers, retailers, NGOs and consumers/consumer organizations, are increasingly active in the policy area (Benoit and Patsias, 2017; Tosun, 2017; McCarthy et al., 2018; Díaz-Méndeza and Lozano-Cabedo, 2020). Similarly, Lawrence et al. (2015) argue that increased corporatisation and financialisation of the agriculture industry have brought various interests – both upstream (e.g. input producers, financial institutions) and downstream (e.g. processors, distributors, retailers) – into the food value chain. In the European context, Daugbjerg and Feindt (2017) state that "post-exceptionalist actor constellations are more complex and contain players from a wider range of backgrounds" (p. 1574). However, they suggest relatively little is known about how much these players influence food and agriculture policy. Inclusion of a broader range of actors does not necessarily result in equal power sharing across those new players. Rather, it is typically manifest in strategic positioning of individuals or partners (Skogstad, 1998), such as a concentrated role for multi-national food corporations in food systems, local to global (Barling et al., 2002; Clapp and Fuchs, 2009; Foord, 2017).

There is wide recognition that, because of this concentration of control, existing food governance systems are no longer fit for purpose due to questions of legitimacy, power, resources and interactions of relevant actors (Hinrichs, 2014). Issues including climate change, food safety and quality, and wider systemic inequalities present further challenges (Angus et al., 2009; Clapp and Fuchs, 2009; Hinrichs, 2014). Policy decisions rely on extended debates about the nature of the 'problem' to be addressed. Corporate actors are influential in how these debates are framed in public discourse (Clapp and Fuchs, 2009; Sacks et al., 2018). Given these issues, much of the current research on food systems is concerned with different forms of change (Hinrichs (2014) gives an overview), specifically, transition, i.e., the "gradual, pervasive shift from one state or condition to something different" (Hinrichs, 2014, p. 144), and involves adjusting imbalances and addressing "design faults" (Richardson, 2018, p. 218).

3.4 Linking governance to policy: Policy networks and policy interventions

To describe the ways in which organised interests and state actors interact in the policymaking sphere, it is helpful to conceptualise these relationships as a network, or community. Policy networks can be described as structures on a continuum ranging from a 'tight' or 'closed' policy community, which includes a limited number of members and

represents a narrow range of views, to a more open issue network, in which a wide range of members and interests are represented (table 3.1) (Daugbjerg, 1998; Daugbjerg and Fawcett, 2017). A 'closed' policy community and an 'open' issue network occupy the opposite extremes of this continuum; in reality, most policymaking networks occupy a position somewhere along the spectrum between the two (Daugbjerg and Fawcett, 2017). This has relevance to the concept of policy (post-)exceptionalism discussed above. In policy exceptionalism, one would expect to find a closed 'policy community', such as the 20th century British agricultural policy community, in which the National Farmers' Union had a very close relationship with government, there was generally consensus on agriculture policy, and the agriculture sector received significant state support (Smith, 1990). In policy post-exceptionalism, actors in the policy arena are likely to operate in a more open 'issue network'. It could be argued that in Britain today, the agri-environmental policymaking network incorporates a much broader range of interests than it did in the latter half of the 20th century, including, for example, various environmental and public health interest groups, and therefore sits nearer the 'issue network' end of the continuum.

Table 3.1 Extremes on the Policy Network Continuum

Dimensions	Policy Community	Issue Network
Membership	Very limited number of members Narrow range of interests represented	Large number of members Wide range of interests represented
Integration	Bargaining and negotiation Frequent interaction	Unstable pattern of interaction
Institutionalisation	Consensus on policy principles and procedures to approach policy problems	Conflict over policy principles and procedures to approach policy problems

Source: Daugbjerg, 1998, p. 44

Within policy network analysis, networks are typically described in terms of the resources network members share. Many network analysts follow Benson (1982, p. 148) in defining a network as "…a cluster or complex of organisations connected to each other by resource dependencies and distinguished from other clusters or complexes by breaks in the structure of resource dependencies" (Daugbjerg, 1998). 'Resources' can be physical (e.g., infrastructure, people) or non-physical (e.g., information and knowledge; access to

stakeholders or decision makers; political support, etc.) (Smith, 1990; van Waarden, 1992; Daugbjerg, 1998). According to Daugbjerg (1998), resource interdependency is more important than any other feature of policy network. Policy networks develop when political actors regularly exchange resources. Organisations within the network depend on each other for resources and must exchange them with each other in order to achieve policy goals. If actors lack valuable resources, they are likely to be excluded from a network, and therefore, have little influence, or power, in the policymaking arena. (The concept of power and resources is discussed in further detail below, in section 3.5). Exclusion of certain interests is a key feature of 'closed' policy networks (communities).

Policy network analysis research has mainly been concerned with developing meso-level frameworks for analysing policy, with a goal of exploring how certain actors, norms or interests are privileged over others within policymaking areas and how this impacts policymaking outcomes (Daugbjerg, 1998; Daugbjerg and Fawcett, 2017). That is, how do interests derive and operationalise power to influence policy (again, see section 3.5)? More closed policy communities tend to create stability and predictability in the policymaking process, something which benefits both interest groups and state actors (Daugbjerg, 1998). The existence of such communities generally prevents fundamental policy change because members tend to agree on the principles underpinning policy choices and the ways to handle policy problems. This creates a "strong status quo-minded coalition" that prevents "outsiders" from bringing about policy change (Daugbjerg, 1998, p. 7). As a result, within such policymaking environments, any policy reforms successfully introduced are usually moderate, and new policies tend to be what Daugbjerg (1998) calls "low-cost" (p.71). When policy networks are less cohesive (i.e., more like 'issue networks' than 'policy communities'), it is more possible for fundamental policy change to take place. Absence of a strong, central coalition within the network means that there is less opposition to change. Under these circumstances, new policies are more likely to be "high-cost" (Daugbjerg, 1998, p. 71).

Here, the 'cost' of a policy refers to how those being regulated perceive the policy's consequences. 'Low-cost' policies maintain the status quo and include policy instruments that shift political and economic responsibility for making change away from those being regulated towards other groups. If the policy requires significant change, particularly change that challenges the status quo and in which those being regulated bear the cost of making

such change, it is considered 'high-cost' (Daugbjerg, 1998). These types of polices are summarised in table 3.2.

Table 3.2 Low and high-cost policies

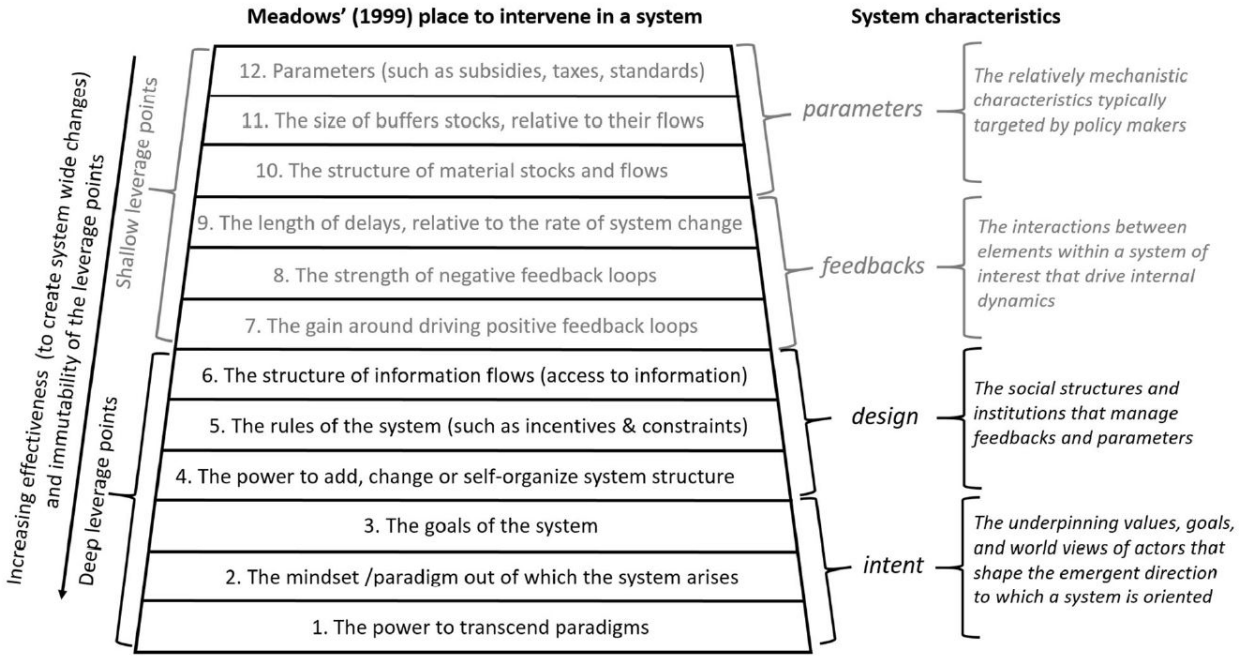
Policy Type	Characteristics
Low-cost policy	Transfer of policy principles from the established policy to the new policy. Policy instruments and economic policy costs on to groups other than those being regulated. Policy objectives do not contradict established sectoral policy objectives.
High-cost policy	New policy principles. Policy instruments concentrate policy costs on the groups regulated. Policy objectives contradict established sectoral policy objectives.

Source: Daugbjerg, 1998, p. 71

While the concept of 'high-cost' and 'low-cost' policies is very useful in trying to understand what kind of policy outcomes different policy network structures may produce, in this thesis, a different, but closely related concept is combined with the above policy network framework to describe policy outcomes on the island of Ireland, namely, that of leverage points. Originally articulated by Meadows (1999), it outlines twelve 'leverage points' that might be targeted to influence system change (figure 3.1). These range from 'shallow' points, where interventions are relatively easy to implement but effect little change in a system's overall functioning, to 'deep' points, where change is difficult to make, but results may be transformational (Meadows, 1999; Abson et al., 2016; Fischer and Reichers, 2019). Sustainability science researchers Abson et al. (2016) aggregate Meadow's twelve points into four categories of system characteristics ranging from shallow to deep: parameters, feedbacks, design and intent (figure 3.1). They argue that for fundamental change to be brought about within the food system, interventions must be targeted at the 'design' and 'intent' level. That is, the characteristics of a system's rules, power and organisational structures must change, alongside the values and ideas underpinning these (Meadows, 1999; Abson et al., 2016). This is not to say that interventions at 'shallow' points are not useful or worthwhile, but they must take place in combination with interventions at 'deep' points for transformational change to take place (Abson et al., 2016; Fischer and Reichers, 2018). Combining Daugbjerg's (1998) concept of open/closed policy networks with Meadows' (1999) leverage points theory, as developed by Abson et al. (2016), this research

argues that more closed policymaking networks will most often develop policies aimed at shallow intervention points (henceforth termed 'shallow interventions'), whereas more open policymaking networks are more likely to develop interventions at the 'deep' level of design and intent (here, 'deep interventions').

Figure 3.1 Leverage points for intervention and associated system characteristics



Source: Abson et al. (2016), p. 32

There are three main reasons the leverage points concept, as opposed to that of low-/high-cost policy interventions, is applied in this research. First, the language around leverage points (i.e., shallow versus deep interventions) is somewhat easier to apply and understand. When speaking of interventions as 'low' or 'high' cost, the question is frequently asked: low-/high-cost for whom? Even if this can be clearly articulated, in, for example, an article or thesis, the definitions often need to be re-iterated, because they are not necessarily intuitive. There is less room for confusion if interventions are instead referred to as 'shallow' or 'deep'. Second, it is sometimes difficult to clearly discern who is assuming the burden of responsibility (the 'cost') for implementing a certain policy. For example, in the case of waterway management, it may be argued that if public money is used to clean up agriculture pollution in waterways, the intervention is 'low-cost' (i.e., low-cost to farmers, high-cost to 'the public'). However, farmers are also members of the taxpaying public, so, in effect, are also paying for said clean up. It is not clear cut. Third, the leverage points concept is embedded in a wide body of literature around system change and sustainability (e.g.,

Ostrom, 2008; Fischer et al., 2007; Abson et al., 2016; Everard et al., 2016; Fischer and Reichers, 2019).

3.5 Power in the agri-food sector

In examining governance, it is important to consider how actors involved in the policymaking arena came to be so, and what their involvement means for governance processes. What power do they have in the policymaking process, from where do they derive it, and what impact does their power have on policy outcomes? In the UK, Ireland and Europe generally, much attention has been devoted to understanding how the agri-food sector has leveraged disproportionate focus and support through its influence in the policymaking area. Literature from the late 20th and early 21st centuries focuses on describing and understanding the close policymaking relationship between farmers unions and governments (e.g. Smith, 1990; Clunies-Ross et al., 1994; Jordan et al., 1994; Daugbjerg, 1998; Woods, 2005). More recently, much of the literature on power in the agri-food system focuses on how, globally, power is increasingly concentrated in the hands of a few large corporations at the expense of 'farmers', public health and the environment (Lang et al., 2001; Barling et al., 2002; Patel, 2007; Clapp and Fuchs, 2009; Foord, 2017). What has received less attention is how power is distributed *within* the agriculture sector more broadly, and what implications this has for policy. While it is true that the influence of multi-national corporations coupled with a general drive towards larger, more 'efficient' farming operations is changing the landscape of food production around the world, in many European countries, including Ireland and much of the UK, a legacy of small 'family farms' remains, and still needs to be considered.

In Ireland and NI, the agriculture industry has historically received (and in many cases continues to receive) considerably more support and attention than many other industries, often at the expense of the island's waterways and wider natural environment as per an exceptionalist policy approach (Daugbjerg and Feindt, 2017; Attorp and McAreavey, 2020). It has specifically benefitted from a range of public subsidies, such as Common Agriculture Policy direct payments[17], renewable energy incentives and 'rural' support aimed mainly at farmers. As is discussed in detail in chapters seven and eight, intensive agricultural industries (dairy, poultry, pig) receive ongoing government support to expand, despite recognition of the increasing impact that animal manure from such operations is having on the island's waterways and wider natural environment. Many other less-intensive farmers also

[17] Refer to chapter two for an overview of these.

contribute to the island's water pollution problems, but in terms of their impact, receive less policy attention, and meanwhile are maintained on the land through government funding (national and EU) despite being unprofitable. In trying to describe and understand this situation, traditional, meso-level power/policy analyses would focus on the power of the agriculture industry as a monolith. This gives us only part of the picture as power distributions within agriculture itself also have implications for policy. By overlooking these, policy analysis misses important nuances in the way that different farmers engage with policy during its development and implementation. Many of these nuances are a result of asymmetrical power relations, including between different types of farmers and farming organisations (e.g., dairy versus beef farmers/organisations), as well as between farmers and other actors such as processors, input suppliers and farm advisors. That is not to say meso-level analysis should not take place. This research also considers the power relations evident between 'the agriculture lobby' as a whole and actors such as the government, environmental NGOs and retailers. However, it makes the argument that we cannot understand how water policy is developed and implemented without looking beyond meso-level interactions to consider how different types of farmers engage with it.

Multiple frameworks have been developed to articulate the power the European agriculture industry has in policymaking. These draw on various conceptions of power, ranging from uni-dimensional pluralist/neo-pluralist models (e.g., Pennock, 1959 and 1962; Wilson, 1977; Cox, Lowe and Winter, 1986) to multi-dimensional power models, such as those developed by Bachrach and Baratz (1970) (two faces of power) and Lukes (1974) (three faces of power). This research employs a framework that builds on a model of 'structural power' developed by Smith (1990), which is closely aligned with Lukes' three-dimensional power concept. As detailed below, this concept allows for a fuller exploration of the power dynamics found to be at play in the Irish agri-food sector than either pluralist or two-dimensional models of power allow. Power is considered to be not only directly observable (visible, or hidden), but also 'invisible', as Lukes describes it, operating in ways that cannot be directly measured but are nonetheless important.

A pluralist model of power, rooted in the works of Max Weber and developed by various others including, most prominently, Truman (1951) and Dahl (1957), focuses on power that is 'visible' and suggests that the degree to which individuals or groups can influence policy outcomes is dependent on the resources they have (Lukes, 2005; Gaventa, 2011). It is most

often summarised as follows: “A has power over B to the extent that he can get B to do something B would not otherwise do” (Dahl, 1957, *in* Lukes, 2005). Smith (1990) writes that, until the end of the 20th century, pluralism was the main power model applied in the study of pressure groups and agriculture policy in Britain, with researchers focusing on the “resources of the groups involved in the policy arena and the observable means by which pressure groups have tried to influence government” (p. 11). Bachrach and Baratz (1970) critique the pluralist model, arguing it does not consider the fact that power can be, and often is, exercised by limiting the scope of decision making to relatively ‘safe’ issues. They write:

> “Power is also exercised when A devotes his energies to creating or reinforcing social and political values and institutional practices that limit the scope of the political process to public consideration of only those issues which are comparatively innocuous to A” (p. 7).

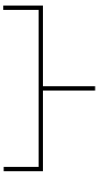
That is, power can be ‘hidden’, exercised not only by putting issues on the agenda, but also keeping others off it. Lukes (1974; 2005) agrees with this, but for him, the Bachrach and Baratz theory is still too focused on observable behaviours and is thus incomplete. He argues that power can also be ‘invisible’, exercised through “unseen mechanisms” such as manipulation and authority: “the bias of the system can be mobilised, recreated and reinforced in ways that are neither consciously chosen nor the intended result of particular individuals’ choices.” (Lukes, 1974, p 21).

Within the British agriculture policy context, Smith (1990) builds on Lukes to develop what he calls a ‘structural model’ of power. Smith cites Giddens (1986, p. xxiii) who states that “structure is the culturally patterned behaviour of groups and practices of institutions” – something which is beyond the direct control of individuals. Speaking of the 20th century British agriculture policy area, Smith (1990) argues that the exclusion of certain issues or groups from the agricultural agenda is not due to the power of farmers, or to a consensus on the nature of agriculture policy. Rather, the structure of institutions and beliefs within agricultural policy making is what prevents their access. Related to this, Smith (1990) suggests the need to articulate structural constraints, which, according to Giddens (1986, p. 177) are “limits on the range of options open to an actor” – the actual physical limits placed on an individual or group. These are different from what he terms structural power, which is “the use of social forces to prevent a weaker group taking action”. Smith suggests that an

example of a structural constraint is a country being bankrupt and therefore unable to buy imports. Smith is clear this is not an argument for structural determinism, referring to Lukes (1974) in saying that although 'agents' (individuals or groups) operate within limits that are structurally determined, they still have a certain degree of autonomy within those limits.

With these points in mind, Smith outlines the following model of structural power (1990, p. 35), which he articulates in the context of 20th century British (agricultural) policymaking:

1. Non-structural power
2. Institutional privilege
3. Ideological privilege
4. Economic privilege
5. Structural constraints



Structural power

Although derived from Lukes' three dimensions of power, the above model does not map exactly onto it. According to Smith (1990), structural power comprises 'institutional privilege', 'ideological privilege' and 'economic privilege', which include aspects of the 2nd and 3rd dimensions of power, as articulated by Bachrach and Baratz (1970) (2nd dimension) and Lukes (1974) (3rd dimension). Structural constraints, i.e., the "limits on the range of options open to an actor" (Giddens, 1986, p. 177), are not a form of power in and of themselves but must be accounted for when analysing power. 'Non-structural power' is in line with the 1st (pluralist) dimension of power, but always operates within the other four elements of the model. Critically, following Marsh and Locksley (1983), Smith (1990) notes that all levels of power may operate simultaneously. Although one element may be the main determinant at a certain point, this may change over time. Moreover, one level of power is not superior to another. Smith (1990) cites Gaventa (1980) who, in speaking of multi-dimensional power, states: "each dimension serves to reinforce the other" (p. 120).

Smith (1990) describes the elements of this structural model of power as follows:

> **Non-structural power**: "the power available to all who want it through being a well organised pressure group or organising a demonstration" (p. 35). This does *not* derive from the policy-making structure, the ideological structure or the economic structure.
>
> **Institutional privilege:** "the power that A has over B due to institutional rules and procedures which prevent certain groups or issues having access to the agenda" (p.

36). Smith (1990) suggests that agriculture has its own department within government exemplifies this kind of privilege.

Ideological privilege: power that "…limits policy options by defining what is possible because it defines reality, problems and acceptable action" (p. 36). For example, the post-World War Two paradigm of agricultural expansion and self-sufficiency in food.

Economic privilege: in short, the idea that economically privileged groups have a greater influence in policymaking, because governments are generally required to maintain 'healthy' economies (or at least, be seen to be trying to do so).

Structural constraints: the structural limits (i.e., the context) within which actors operate, and which they cannot change. Smith cites the structure of the global economy as an example.

A multi-dimensional model of power is required to articulate how power is distributed and wielded within the Irish and Northern Irish agriculture sectors because, as detailed later in this thesis (chapters seven and eight), the actors considered in this research derive power through multiple means that overlap and intersect in various ways. They also exercise it in ways that are sometimes directly observable and other times are hidden, or even invisible. Lukes' 'three faces of power' (1974; 2005) thus provides an effective framework for considering this, as does, by extension Smith's model (1990) because it articulates categories which provide language to help describe the elements of power identified in this research, as described below. Moreover, the fact that Smith's model specifically articulates physical structural constraints that limit actors' actions is very useful. As is discussed in chapters seven and eight, multiple external factors such as land base and the global economy play a direct role in determining how power plays out within agriculture, and within the broader policymaking area. Context matters. Although Lukes did not deny this in his original publication (1974), Smith (1990), Polsby (1980) and Robinson (2006) (among others) critiqued him for not paying enough attention to the 'structures' shaping people's behaviours – a key reason Smith cites for developing his 'structural' model. Smith also asserts that Lukes' model is not empirically testable – the other main reason he developed his structural model (p.34). It is outside the scope of this thesis to wade into a theoretical debate about whether or not a 'structural' model of power overcomes these issues, or even if delineating 'structural power' can or should be done. It should be noted, however, that

Lukes explicitly acknowledged the importance of considering wider structures when he revisited his arguments around power in 2005 and again in 2021 (Lukes, 2021). It is also important to highlight that in response to the first criticism, Lukes argues that just because it is difficult or, in some cases, impossible to prove that power has been exercised in a given situation, we cannot conclude it has not been exercised (1974, p. 39). In the second edition of *Power: A Radical View*, Lukes takes his defences further, highlighting the work of various others that he argues demonstrates the operation of three-dimensional power (2005, p.p. 137 – 51), including Sen (1984) and Nussbaum (2000).

Regardless of whether Lukes' model sufficiently accounts for the wider structures underpinning the exercise of power in society, Smith does go a step further than Lukes to provide language that allows for these structures to be articulated more clearly, specifying certain types of power/privilege as they relate to the 1st, 2nd and 3rd faces of power. This is what makes Smith's model so relevant to this research; because this thesis sets out to understand the multiple ways different agri-environmental actors derive and exercise power, it is very helpful to have a model that provides language to describe specific elements of power. Although Lukes describes types of power (visible, hidden, invisible), his model does not so easily allow for discussion of sources of power as does Smith's.

However, Smith's model does have a few limitations which are worth highlighting. First, the terminology is slightly complicated; using both the term 'power' (non-structural) and the term 'privilege' (institutional, ideological, economic) to describe how actors derive and exercise power is confusing given the two are separate concepts. Whereas power, as defined here, is the ability to do something or influence others to do something, privilege refers to the collective advantages an individual or group has (NEON, 2015). Privilege may afford an individual or group power, but it is not the same thing. While it can be argued that Smith does use the term privilege accurately, given that he is uses terms such as 'ideological privilege' to describe advantages individuals/groups have, he also uses the same terms to describe how such privilege is operationalised – e.g., ideological privilege allows actors to "…limit policy options by defining what is possible…" (Smith, 1990, p. 36). The latter –an action – is power, not privilege. While there are likely linguistic arguments to be made for using the term privilege as Smith does, it is argued here that it would be clearer to simply refer to the different elements of this model as different types 'power'.

Further, ideas about economic privilege, as Smith articulates them, are somewhat limited. He derives this concept from the works of Lindblom (1977) and Offe (1984), who argue that capital (i.e., business) is privileged in decision making because of governments' dependence on the tax raised from capital's profits for survival (Smith, 1990). Today, the depth and nature of globalisation is arguably different than in the late 20th century, particularly within the food system. As described above, the production, processing and sale of agricultural products is becoming increasingly concentrated in the hands of relatively few multi-national corporations, and the link between in-country profits and taxes paid is not always direct. Global supply chains are also more entangled and complex, making it difficult to discern the degree to which capital interests influence government. However, Smith's assertion that a "…pressure group or interest can increase its influence by convincing the government it is economically important" (1990, p. 37) remains relevant. As Daugbjerg (1998) points out, although the national economic importance of agriculture cannot explain policy choices, particularly given that the sector's economic contribution is increasingly small in most 'developed' regions, a *perception* of economic importance still has significant political consequences.

Given these critiques, an adaptation of Smith's model has been developed for this research, which can be depicted as follows:

1. Organisational power — 1st dimension of power
2. Institutional power
3. Ideological power — 2nd and 3rd dimensions of power
4. Economic power
5. Structural constraints

First, it uses simplified language: power and privilege are taken to mean the same thing. Second, it moves away from the 'structural power' argument and therefore does not identify structural versus non-structural power. Instead, it categorises different types of power as they relate to the three faces of power (following Smith). Related to this, non-structural power becomes 'organisational power', but retains the core of Smith's definition. However, unlike Smith (1990), who argues that this type of power does not derive from the policy-making structure, the ideological structure or the economic structure, this research does not make these claims. Following the already-stated argument that each dimension of power serves to reinforce the other dimensions (Gaventa, 1980), it is argued here that one cannot

consider organisational power (or 'non-structural power') as entirely separate from the others, because actors' ability to organise both facilitates and is a result of other forms of power. Descriptions of these adapted power categories are listed below. In most cases the exact definition is borrowed from Smith (1990), but some caveats and changes are introduced.

Organisational power: although called differently, this power is still considered that which is "available to all who want it through being a well-organised pressure group or organising a demonstration" (Smith 1990, p. 35). It is the visible 'first face' of power. Research-specific examples, discussed in detail later in chapter five of this thesis, include dairy co-operatives and protests by beef farmers.

Institutional power: again, to borrow Smith's definition, this is "the power that A has over B due to institutional rules and procedures which prevent certain groups or issues having access to the agenda" (1990, p. 36). In line with Smith's example, the fact that agriculture has its own department within government in Ireland, and, until very recently, did in Northern Ireland as well, exemplifies this kind of power.

Ideological power: power that "…limits policy options by defining what is possible because it defines reality, problems and acceptable action" (Smith, p. 36). In discussing ideological privilege (here, power) within the UK agriculture policy context, Smith (1990) argues that the ideology that underpins agricultural policy is "a set of beliefs developed by those who make agricultural policy…a limited group" (p. 36). However, in this research, a much broader view is taken. In Ireland and Northern Ireland, as elsewhere in Europe, the idea of farmers as the sole legitimate custodians of the countryside still runs deep. This, and similar beliefs, are deeply rooted in the socio-political history of the island of Ireland and contribute significantly to the agriculture sector's influence. By extension, they also shape policy.

Economic power: again, this is rooted in the idea that economically privileged groups have a greater influence in policy making. However, in this research, the idea of economic power focuses less on strictly financial measures such as GDP and GVA, and tries instead to broaden the definition to consider things like number of people employed in a sector as well.

Structural constraints: the context within which actors operate that they cannot change. In this research, land base and the global economy are two key examples.

To reiterate points made above, all levels of power may operate simultaneously, and although one element may be the main determinant at a certain point, this can change over time, and one level of power is not superior to another.

By developing a detailed understanding of how actors both gain and employ power within policymaking, it is possible to move beyond simple descriptions of how policymaking networks are structured to articulate why they are structured that way. By extension, this improves understanding of why policymaking outcomes are effective, or not – critical if policy change is required to address problems such as persistent water pollution more effectively. As discussed in this chapter, articulating whether policymaking networks are relatively more closed or open can help us predict whether policy outcomes will be 'shallow' or 'deep', and, therefore, how likely policies are to effect transformational change. However, this thesis argues that, where transformational change is required, such as is the case with water policy in Ireland and NI (see chapter five), it is difficult to understand how to make policy more impactful – i.e., deep – without understanding why networks are structured the way they are. Such is the value of the theoretical framework outlined in this chapter: by combining the concept of shallow and deep leverage points with a power framework that helps us understand *why* policymaking networks are structured the way they are, it is possible to develop an in-depth understanding of why water policy on the island of Ireland is as it is, and why it has not, thus far, been effective in addressing the problem of diffuse agricultural pollution there. This also makes it possible to identify opportunities for change.

3.6 Summary

As will be detailed in chapter four, agriculture is historically – and in many ways remains – a culturally and economically important sector on the island of Ireland, and the Irish agri-food industry (north and south) has long had strong political influence, as various authors describe (Foster, 1988; Lee, 1989; Hannan and Commins, 1992; Crowley, 2006; O'Connor and Dunne, 2009). However, agriculture's relative importance has declined in recent decades, and as public awareness of the number and severity of environmental challenges facing humanity continues to grow, many of which agriculture directly contributes to, the agri-food industry is coming under increasing pressure to reform its practices. This raises questions about the role of agriculture in Irish society (and globally), most of which boil

down to one ‘wicked’ problem: how should Ireland feed itself? This question leads to many others: If not Irish farmers, where will food come from, and what else should happen with the Irish countryside? If food is to be produced by Irish farmers, then what should they be producing, how, and how much public support should they be receiving to do this? Further, given it is expected that some level of environmental impact will occur as a result of producing food, how much is acceptable? Obviously, these are not either/or questions; a ‘socially optimal’ level of agricultural activity likely lies somewhere in between no Irish farming and ‘too much’ of it. Who decides what this ‘optimal’ level is, and how to achieve it, often comes down to the structure of policymaking networks and who has the power to make policy decisions. Discussion of how different elements of power (as outlined above) are expressed and play out within the Irish and Northern Irish agri-food system, and the impact this has on governance of the island of Ireland’s waterways, takes place in chapter five. But first, we turn now to chapter four, which details the context for this research.

Chapter 4: Land use on the island of Ireland

4.1 Introduction

Most land on the island of Ireland is used for agricultural purposes (Hynes and Campbell, 2011; Conroy et al., 2016). Ireland has 3.9 million hectares of grassland, accounting for 90 – 95 percent of its utilized agricultural area (Ulén et al., 2007; van Grinsven et al. 2012) and 67 percent of its total land-use area (Conroy et al., 2016). In NI, agriculture accounts for an even greater percentage of its landmass: almost 75 percent of the country's total land-use area – more than 1 million hectares – is devoted to agriculture (DAERA, 2018). A key distinguishing feature of the agriculture sector on the island is the persistence of its substantial small-scale landholding sector (Hannan and Commins, 1992; Commins, 2004; O'Connor and Dunne, 2009). While the agriculture sector in most other western European countries is now characterised by large, industrialised farms, most farms in both Ireland and NI are still classified as small, and in both regions, over 99 percent are family operated (McCormack, 2016; Central Statistics Office, 2018). The average size of Ireland's approximately 137,500 farms is only 32.4 hectares (Central Statistics Office, 2018). Similarly, in NI, 88 percent of its nearly 25,000 farm businesses are classified as small (77 percent) or very small (11 percent) (DAERA, 2020c). In comparison, the average holding in England is 87 hectares (DEFFRA, 2021). This chapter first considers the historical and administrative context of this land use pattern, then discusses the structure of the agri-food industries in Ireland and NI.

4.2 Historical and administrative context

This pattern of extensive small-scale landholdings has its roots in the late 19th and early 20th centuries. Land ownership is, historically, politically contentious on the island, with the struggle for the right to own land grounded in socio-political conflict and the fight for political independence from Britain (Foster, 1998; Lee, 1989; Hannan and Commins, 1992). Far-reaching land ownership transfers which took place between 1870 and 1920 via various land acts – most notably The Wyndham Land Act (or the Irish Land Act) of 1903 – transformed a generation of impoverished tenant farmers into what Hannan and Commins (1992) call "peasant proprietors" and created a new social order in Ireland. The new smallholder class experienced upward social mobility and improved living standards, a trend which increased rapidly until the 1920s before declining and eventually stabilising into a subsistence-oriented pattern that held until the end of the 1950s (Hannan and Commins, 1992). Small family farms became the central focus of the rural economy; by the 1920s, the

majority of Ireland's 'active population' were either farmers or 'relatives assisting' with farming (Hannan and Commins, 1992). A similar pattern was observed in newly partitioned Northern Ireland (Johnson, 1985; Foster, 1988). Due to these social changes, owning and farming land became culturally very significant and the Irish agriculture industry gained significant political influence, bolstered by a strong 'rural vote' (Foster, 1998; Hannan and Commins, 1992; O'Connor and Dunne, 2009). Agriculture became an industry worthy of 'exceptionalist' policy interventions (Daugbjerg and Feindt, 2017).

4.2.1 Agriculture in Ulster and Ireland before accession to the EU

Although the histories of the Irish and Northern Irish agri-food industries have much in common because of their shared roots, there are some key differences. First, even before partition, the province of Ulster (most of which became Northern Ireland post-partition), had much closer links with Britain than other Irish provinces, owing both to its geography – the port of Belfast is one of the island's nearest points to Britain – and to the socio-political history of British occupation of Ireland (for a comprehensive overview of this, refer to Foster (1988) and Lee (1989)). As a result, Ulster/NI benefitted from Britain's rapid industrialisation in ways that the rest of Ireland did not. Industries such as linen and shipbuilding were prominent in the region during the 19th and early 20th centuries, and therefore, agriculture did not play as important an economic role during this period in Ulster (and then NI) as it did elsewhere in Ireland (Foster, 1988). Nevertheless, small family farms retained importance, a pattern entrenched by "British policies of imperial preference" (Foster, 1988, p. 555) which supported the diversification and expansion of the NI agriculture industry in the 1930s. As Ulster's traditional shipbuilding and linen industries began to decline globally in this decade, the agriculture industry gained even greater economic importance. A 1930s quote from an (urban) NI politician pointedly illuminates this:

> "If a farmer wanted somebody to blow his nose some hon. Member would get up and raise the question in this House, and a man would be appointed not only to blow the farmer's nose but to wipe it for him." (*in* Foster, 1988, p. 556)

The NI agriculture industry was further bolstered by UK government policies directed at maximising agricultural production both during and after World War Two (Foster, 1988). This resulted in rapid intensification of many sub-sectors of the industry, dairy in particular, something which has had long-term implications for the region's natural environment, as discussed below (section 4.3.1, below, and chapter five).

Conversely, Ireland did not fully participate in the industrial revolution, which meant agriculture remained a mainstay of its economy until well into the 20th century. The new Irish Republic was founded on ideals of small-scale agriculture and self-sufficiency (Foster, 1988), with support for the rights of smallholders to own land and manage the countryside reinforced by the 1937 Irish Constitution, which committed the state to directing its policy towards "[establishing]…on the land in economic security as many families as in the circumstances shall be practicable" (O'Connor and Dunne, 2009). This pattern of self-sufficient smallholders was sustained for some time, with intensification and consolidation of the Irish agriculture industry happening at a much slower rate than in NI for multiple reasons. Because of the 'smallholder ideal', industry intensification was not pursued in the 1930s in the same way as in NI and Britain. Further, because Ireland remained politically neutral during World War Two, the Irish government did not take the same food security-maximising approach as the UK government did (Foster, 1988). Focus was on expanding family farming, not agricultural output.

Agriculture's share of the economy and employment in Ireland began declining in the 1940s and continued to do so over the latter half of the 20th century, as it did across Europe (Lee, 1989; Hannan and Commins, 1992). However, Ireland remained relatively unique among western European countries during this time in that agriculture retained both social and political prominence. Indeed, as recently as 1999, Ireland's DAFM policy stated a main goal of rural development to be "…the development or maintenance of vibrant rural communities…where the maximum number of rural households, and especially family farms, will be retained" (O'Connor and Dunne, 2009). Even as the economic viability of smallholder farming declined—so much so that by the end of the 20th century most small farmers were not making sustainable income from farming (Hannan and Commins, 1992)—a combination of political support, state subsidies and social and cultural factors kept them on the land. Hannan and Commins (1992) suggest that Irish smallholders are particularly reluctant to give up their land, owing, at least in part, to the significance of the landholding class's historical political struggles. Despite a greater than 50 percent decline in the country's farm labour force between the 1970s and 1990s – Hannan and Commins (1992) highlight a 71 percent increase in the number of part-time farmers between 1961 and 1987 – there was concurrently only a 0.5 percent per annum decline in the number of land holders (Hannan and Commins, 1992; McDonagh et al., 2013). Rather than sell out during tough economic

times, smallholders undertook a range of measures to stay on the land, including finding off-farm employment.

Because of this history, many Irish people are only one to two generations removed from a time when their families were directly involved in farming, and many still own land rurally, even if they no longer actively farm. Farming, therefore, remains culturally important in the country and still enjoys popular support, as evidenced by the fact that 'the rural vote' continues to hold influence within Irish politics. Crowley (2006) notes the climate of "intercessionary politics" in Ireland, while Hannan and Commins (1992) underscore the historical importance and favoured political position of the farming class in Ireland, and O'Connor and Dunne (2009) highlight the historically strong 'neo-corporatist' relationship between the Irish government and the farming lobby. This culture contributes to the Irish agri-food industry's ongoing power, as is discussed in detail in chapters seven and eight.

4.2.2 Accession to (and The UK's exit from) the EU

Both the UK and Ireland joined the European Economic Community (EEC; now the EU[18]) in 1973. EU member states belong to both the EU's Customs Union[19] and its Single Market[20], which regulate how members trade with each other and with third party nations. In addition to trade regulations, EU members adhere to common regulations, directives and policies related to, inter alia, human rights, national security, public health, the environment, and agriculture (Eur-Lex, 2018). Importantly, EU law takes primacy over member states' national law; member states cannot pass laws that contradict EU laws, and EU Law can over-rule national-level laws, even if the latter were in place before the EU law came into effect (Citizens Information, 2021). Consequently, legislation pertaining to agriculture, land and waterway management in Ireland and NI comes mainly from the EU[21,22]. This includes a wide range of policies and directives, of which the most important in terms of impact on agriculture are the Common Agriculture Policy (CAP), the Water Framework Directive (WFD), the Nitrates Directive (NiD)[23]. The CAP is considered in detail in chapter two, and the WFD and NiD are discussed in chapter five.

[18] The EEC was incorporated into the European Union upon formation of the latter in 1993.
[19]Sets common tariffs for imports coming from 'third country' trade partners (Salter, 2017).
[20]Guarantees EU member states the freedom of movement of goods, services, capital, people (Salter, 2017).
[21] EU legislation will remain enshrined in NI and UK law following the UK's exit from the EU until direct action is taken to change it (Gravey and Whitten, 2021).
[22] Individual member states do have flexibility in terms of developing legislation around how best to *meet* the terms of these policies. But fundamentally, direction of travel is set at the EU-level.
[23] The Natura 2000 Directives (Birds and Habitats) also influence agriculture practices, but do so less directly

Thus, EU membership has profoundly shaped agriculture and land use in the UK and Ireland. Although a "productivist paradigm" was already becoming mainstream within agriculture in NI and Ireland prior to accession, it received renewed support from EU CAP policies (O'Connor and Dunne, 2009; McDonagh et al., 2013). Rapid modernisation and restructuring occurred following accession, facilitated by research and extension services, and the support of agri-business, farming organisations and the government. Focus on the interests of larger, more intensive and commercial farmers increased (O'Connor and Dunne, 2009). A dualism developed in the Irish and NI agriculture sectors: some farm businesses managed to grow and thrive under the new conditions, while many others did not (Hannan and Commins, 1992; O'Connor and Dunne, 2009). Inequality between larger more intensive farmers and smaller extensive farmers grew, and the latter became perceived as "surplus to the requirements of an efficient food industry" (Share et al., 2006, in O'Connor and Dunne, 2009, p. 336). Farm numbers declined, especially smaller farms, and on both sides of the Irish border, the industry became dominated by larger and increasingly specialised farms (Hannan and Commins, 1992; Commins, 2004). Larger farms tended to concentrate on the more profitable dairying and tillage activities, while smaller farmers were more likely undertake dry cattle and sheep production[24] (Hannan and Commins, 1992). However, it is important to note that even with these changes, the pattern of small landholdings persisted across the island; Share et al. (2006) argue that this 'polarisation process' resulted not so much in a concentration of land ownership, but in a concentration of capital and production – something discussed in section 4.3.1, below.

As highlighted in chapter three, Daugbjerg and Feindt (2017) argue that, in recent decades, the EU has begun to shift away from explicitly productivist, production-promoting policies towards "post-exceptional" policies that focus on supporting environmental 'goods' and a 'multifunctional countryside' (chapter two). Re-orientation towards the market has also (partially) occurred (Daugbjerg and Feidnt, 2017). During this period, Irish and UK agri-environmental legislation has similarly adapted, but, as will be discussed below (section 4.3, and chapter eight), the 'dualism' between intensive and extensive industries remains, and in many ways the gulf has widened. Nevertheless, a focus on environmental goods and rural multifunctionality has meant that, as in much of Europe, many extensive farmers have been

than the CAP, the WFD and NiD, and are thus not considered in detail in this thesis.

[24] The move to drystock farming was likely due in part to the lower labour requirement and compatibility with part-time farming (Hannan and Commins, 1992).

retained on the land across the island of Ireland despite not being 'competitive' on a market basis. This has implications for waterway management on the island, which are discussed in detail in chapters seven through ten.

The UK's exit from the EU

The UK's 2020 exit from the EU has significantly altered the legislative environment on the island of Ireland and in the UK. It will likely take years, if not decades, for the new relationship between Ireland (and the rest of the EU), NI and Great Britain to evolve and for the full impact of this political decision to be felt and understood. While no definitive conclusions can be drawn in this research regarding the long-term implications of this, a brief overview of current and potential impacts is given here.

Legislation outlining the new relationship between the UK and the EU includes the UK-EU 2019 Withdrawal Agreement and the UK-EU 2020 Trade and Cooperation Agreement (European Commission, 2021). These documents are supplemented by decisions made jointly by both parties regarding their implementation (refer to Gravey and Whitten (2021) for a comprehensive overview). A key element of the Withdrawal Agreement is the Northern Ireland Protocol (UK Cabinet Office, 2021), which aims to avoid a hard border between NI and Ireland (something imperative in protecting the 1998 Good Friday Agreement[25]) and preserve the integrity of the EU's single market while simultaneously maintaining unfettered access trade in goods between NI and Great Britain (nidirect, 2021). As a result of the protocol, NI (but not the rest of the UK) effectively remains in the EU's single market for goods, thus allowing goods to move between NI, Ireland and the rest of Europe without customs checks or tariffs. By extension, NI must continue to apply EU rules in this domain, and remains under the supervision of EU institutions for compliance with relevant rules[26] (Gravey and Whitten, 2021; nidirect, 2021). Included in this are rules pertaining to the environment (see figure 4.1) and agri-food standards. As the latter pertain mainly to food quality and health and safety, it is EU environmental regulations that will continue to have the greatest influence on land and waterway management in NI agriculture moving forward.

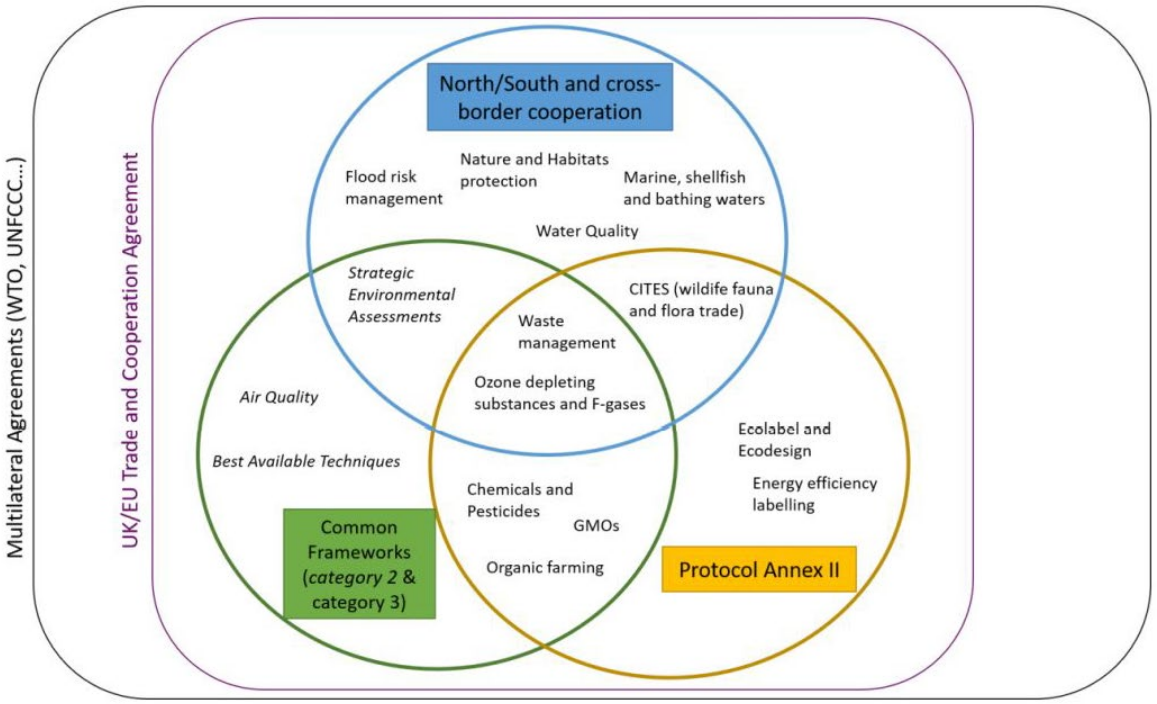
[25] The Good Friday Agreement, or the Northern Ireland peace deal, brought an end to three decades of conflict ('The Northern Ireland Conflict', or 'The Troubles') between Republicans and Unionists in Northern Ireland. Central to this was an agreement between The UK and Ireland to maintain an open border between Ireland and Northern Ireland. McGarry and O'Leary (2004) offer a comprehensive overview of the conflict and the GFA.

[26] A complete list of these rules is listed in Annex II of the NI protocol. See UK Cabinet Office (2021)

Importantly, as Gravey and Whitten (2021) highlight, NI has no power to modify EU Protocol law. Thus, pathways for influencing decision-making around EU Protocol law – both in terms of revisions, and additions to, Annex II rules (see figure 4.1) – will be largely informal. Gravey and Whitten (2021) suggest that "A NI voice in Brussels, both the NI Executive Office in Brussels, and continued engagement from business and civil society with their respective umbrella groups will be critical in making sure NI concerns are heard…" (p. 4). As will be detailed in chapters seven and eight, research for this thesis shows that who this 'voice' represents depends on the power respective actors hold. The structure of the policymaking network in NI is therefore likely to have a strong influence in determining which rules applied and how they are implemented as policymakers navigate this new era in policymaking. This issue is returned to in detail in chapter ten.

A further issue to highlight is that, within the UK, devolved nations (NI, Scotland and Wales) will continue to be allowed to pursue divergent agri-environmental policies, as was the case pre-2020. But this freedom to diverge is constrained by both international law (e.g., the UK's commitments under the Paris Climate Agreement), the new UK-EU relationship, and domestic UK legislation (see figure 4.1) (Gravey and Whitten, 2021). Conflicts between a fully reserved UK trade policy and devolved agri-environmental policies will likely present a key stumbling block. It is outside the scope of this thesis to discuss these issues in detail, although various authors provide excellent overviews of the range of issues faced as the new UK-EU relationship is negotiated (including Burns et al., 2016; Diamand, 2017; Gravey, 2017; Gravey et al., 2017; House of Lords, 2017; Hubbard et al., 2017; Burns et al., 2018; Carrington, 2018; Hird, 2018; Keating, 2018; Jordan and Moore, 2020; Gravey and Whitten, 2021). The key point to be made here is that, moving forward, the 'wicked problem' of producing food without degrading waterways is set to become even more complex as the UK's exit from the EU has introduced an even greater number of competing policy channels. Again, the structure of policymaking networks in NI, Great Britain, Ireland and beyond will strongly influence the direction of travel for future policies.

Figure 4.1 Constraints on environmental legislation in NI following the UK's exit from the EU



Source: *In* Gravey and Whitten, 2021: UK-EU mapping of North South cooperation (European Commission, 2019), Protocol Annex II and Annex IV (UK Cabinet Office, 2021) and UK Government 2020 Frameworks Analysis.
**Frameworks in italics are non-legislative, category 2 frameworks and the rest are category 3, legislative frameworks, list of Annex II and IV non-exhaustive.*

4.3 The agri-food sector on the island of Ireland

Agriculture production on the island of Ireland is heavily cattle focused. Beef[27] and dairy products have long been a mainstay of the Irish economy (Foster, 1988), and cattle hold a special place in Irish culture, with both beef and dairy farming being integral to the island's social, cultural and economic fabric for thousands of years (Whitehouse et al., 2014; Smyth and Evershed, 2016). Archaeologists at the University of Bristol argue that dairy was an important food source for Neolithic peoples on the island after their research identified traces of dairy fats in pots found in the region dating between 4,000 and 2,500 BC (Smyth and Evershed, 2016), and Whitehouse et al. (2014) cite evidence that cattle likely played an important role in ceremonial feasts and sacrifices during the same period. Smyth and Evershed (2016) suggest that, as dairy cattle are not native to the island, early farmers – possibly indigenous foragers or incoming farmers, or both – transported the animals across the open sea from mainland Europe to Ireland in small vessels that could hold only a few

[27] Herein, the beef industry is referred to mainly as 'drystock', although note that this term also encompasses sheep farming.

animals at a time. Such voyages were "…unlikely to have been undertaken without a significant degree of determination and broader social support" (p. 220). Over time, cattle grew to represent wealth and power. Foster (1988) notes that powerful Gaelic chieftains would often possess several thousand head. He also documents the intricate ways in which cattle farming is linked with the island's socio-political history, with cattle being used as pawns in various conflicts (e.g., being "…stolen or mutilated as demonstration of aggressive intent against enemies or interlopers" [p. 19/20]) and cattle farming becoming closely linked to social status. Today, most agricultural output in the region continues to come from beef and dairy production: 68 percent in Ireland (Board Bia, 2019) and 54 percent in NI (DAERA, 2018). Importantly, over 90 percent of this output is exported, an economic reality which, as will be discussed in chapters seven and ten, strongly influences the power structures evident within the agri-food sectors on both sides of the border.

In Ireland, growth of its agriculture sector is mainly from growth in beef and dairy production (Board Bia, 2019), and these sub-sectors are most prominent within the industry (chapter eight). In NI, the dairy and beef sectors also remain important, although the region's two fastest growing sectors are poultry (both broilers and layers) and pig production. While the latter currently account for only 18 percent and 8 percent respectively of output between 2016 and 2017, broiler production increased by 16 percent, layer production increased by 12 percent, and pig production increased by 8 percent. In comparison, the number of cattle raised, either for beef or for dairy production, remained the same (DAERA, 2018). As will be discussed in chapter eight, the relative importance and influence of these industries varies north and south of the border, which has implications for management of the island's shared waterways (see chapter ten). However, they share commonalities in terms of industry structure and economic performance. These are outlined in the following section[28].

4.3.1 Dairy and drystock

As highlighted above, a dualism exists in the Irish and NI agri-food industries, something most evident between their large dairy and drystock industries. Dairy is the most economically dominant sub-sector of the agri-food industry on both sides of the border, accounting for 29 percent of Ireland's agricultural exports (DAFM, 2020b) and 35 percent of NI's (DAERA, 2020b). As will be discussed in chapters seven and eight, in an export-focussed

[28] Note that because conversations in this thesis focused on dairy, drystock and poultry, only these industries are considered in this section and elsewhere. See chapter eight for further details.

economy, this gives the industry considerable economic power. Although beef and sheep meat comprise a significant proportion of Irish agricultural output, they have less than half the export value of Irish dairy (DAFM, 2020b), and by extension, far less economic power. Dairy is also far more profitable than the drystock industry; average on-farm income[29] for an Irish dairy enterprise is €66,828, an average of €1,118 per hectare, whereas the figures are €9,008 total/€285 per hectare for cattle enterprises, and €14,780 total/€315 per hectare for sheep enterprises (Donnellan et al., 2020). The situation is similar in NI where dairy is the most profitable sector by some distance. In 2019, average net farm income was £52, 831 for dairy enterprises and only £6,386 for drystock enterprises[30]. As a result, both north and south of the border, dairy farmers typically earn enough income to farm on a full-time basis, while more than half of drystock farmers in their farming income with off-farm employment (Donnellan et al., 2020; DAERA, 2020b)[31]. This has implications for land use and waterway management, as explained in chapter eight.

Reasons for dairy's economic successes are multifaceted. First, Irish and Northern Irish dairy products[32] are competitive internationally since production costs are comparable to, and in many cases lower than, those in other major dairy-producing countries. Thorne et al. (2017) found that Irish dairy farms have the second-lowest cash costs[33] per kilogram of milk solids in the EU. To capitalise on this, the industry and government actively cultivate and promote an image of Irish dairy as 'sustainable' and 'green', a 'unique selling point' that has helped the industry gain a foothold in certain markets (Henchion et al., 2017). For example, there is high demand in the United States for Irish grass-fed butter – Irish brand Kerrygold is the second-best selling brand of butter there (Dunn, 2019) – and certain baby formulas are very popular in Asia because they contain 'sustainable' Irish whey protein (Donnelly, 2018). For

[29] That is, income from farming activities, including subsidies. Off-farm income not included.
[30] Note that in NI, 46 percent of dairy enterprise income and 171 (lowland) to 184 (LFA) percent of drystock enterprise income came from CAP subsidies in 2019/20 (DAERA, 2021; table 7, p. 16). In Ireland, the figure was 31 percent for dairy, 162 percent for cattle and 132 percent for sheep in 2019 (Donnellan et al., 2020, p. xi).
[31] It is difficult to cite exact figures for off-farm employment, because the situation is not straightforward. While figures are available for the number of farmers that work off-farm, these often obscure the fact that in most farm households – drystock in particular, but not only – there is a spouse (and sometimes other family) that also works off-farm. Data is also presented slightly differently in Ireland and NI. In the Irish farm survey, cited here (Donnellan et al., 2020), figures are given for farmers, spouses and household. Most recent figures available from DAERA present data on a household basis only. However, regardless of these inconsistencies, the case remains that most dairy enterprises are considered 'full-time', and the majority of drystock enterprises are considered 'part-time'.
[32] Note that the Irish and NI dairy sectors are closely integrated, with approximately a third of milk produced in Northern Ireland exported to Ireland for processing (Donnellan and Hanrahan, 2016).
[33] Here, all costs excluding depreciation and imputed opportunity costs for family labour, equity capital and owned land (Thorne et al., 2017).

this reason, the industry's reputation is a matter of considerable concern for industry and government officials alike, a point returned to in chapter eight. Further, milk can be broken down into multiple component parts and therefore sold as a wide range of products, from milk to yogurt to baby formula to protein powder. It is a versatile commodity that is easy to add value to.

The relatively intensive nature of dairy operations means it is also possible for dairy farmers to achieve economy of scale. Dairy farms typically operate on high-quality land with good soils, and are often situated in regions with more favourable climatic conditions. Drystock enterprises tend to be concentrated in the west and border regions of the island, which typically receive significantly more rainfall than elsewhere (refer to figure A1.1, appendix 1). Further, according to DAERA, 76 percent of NI beef farms and 80 percent of NI sheep farms operate on land classified as 'less favoured', compared to only 37 percent of dairy farms (DAERA, 2020c). This means it is easier for dairy farmers to farm productively – mainly, working at higher stocking densities – than it is for drystock farmers who tend to operate on more marginal land (Donnellan and Kinsella, 2019). Stocking rates for Irish dairy farms are typically 60 - 80 percent higher than for beef farms[34]. Mechanisation of the dairy industry in the 1960s and 70s, a process significantly accelerated in both Ireland and NI by accession to the EEC (Binfield et al., 2007), also allowed many dairy farmers to expand and intensify in a way not available to drystock farmers. In NI, in particular, dairy enterprises have moved away from grazing towards more feed-based, and in some cases, entirely 'housed' systems[35] - a trend with significant implications for the region's waterways (see chapter five).

Not all dairy farms expanded with the advent of mechanisation. In fact, the overall trend since the 1980s has been one of consolidation[36], with the number of dairy farms in Ireland declining from 80,000 in 1984 to 17,500 in 2014 (Donnellan et al., 2015). Similarly, AFBINI (2011) suggests there was a 36 percent decrease in dairy farms in NI between 1981 and 2008. Many smaller dairy farmers were 'left behind' in the 1970s and 80s, lacking the resources, land base, or, in some cases, the motivation to invest in expanding their farms.

[34] Figure calculated based on data from 2019 Ireland Farm survey: Stocking rates for dairy are 2.09, 1.11 – 1.13 for other cattle, depending on the system (suckler or finishing) (Donnellan et al., 2020)

[35] Zero-grazing production systems in which cattle are housed all year round. According to one dairy industry representative interviewed in this research, approximately 30 percent of NI dairy enterprises operate under housed, zero-graze system.

36 Note, decline in dairy farm numbers has been accompanied by a growth in dairy herd size. See appendix X.

Lack of a clear successor also prevented many farmers from risking investment[37] (Donnellan et al., 2015). Implementation of the EU dairy quota system in 1984 – a response to the rapid expansion of the dairy industry across EU member states, which had resulted in a significant and growing milk surplus across the region (Binfield et al., 2007) – further restricted expansion of the industry (although, as is detailed in appendix 1, the impact of this was different north and south of the border since NI farmers were able to access greater quota amounts than their southern counterparts). However, quotas were lifted in 2015, at which point the dairy industry began to grow rapidly once again. In Ireland, milk production expanded by 50 percent between 2010 and 2019, while the value of dairy exports doubled (Ireland CSO, 2021). The intensive nature of Ireland and NI's dairy industry is one of the biggest pressures on the island's waterways, and has created an environmental problem that is becoming increasingly challenging as growth of the industry continues, particularly in the south. This issue is considered in detail later in chapter five.

4.3.2 Poultry

The poultry sector, as NI's fastest growing agricultural industry, has in recent years has gained prominence and influence in the region[38] (see chapters eight and nine). While it does not have a presence in most of Ireland, the industry is growing rapidly in the country's border counties, particularly Cavan and Monaghan, and this has potential implications for the island's trans-border waterways, as discussed in chapters nine and ten.

In an increasingly globalised, competitive food system, many industries remain economically viable by intensifying. Often, this means moving towards a vertically integrated production model under which growers share costs and risks of production with the integrator, i.e., a corporate food processor (Weis, 2007; Winders and Ransom, 2019). This model of vertical integration was pioneered by the poultry industry in the United States in the 1930s and now characterises industrial poultry production globally, as well as, increasingly, pig, dairy, and beef production (Weis, 2007; Winders and Ransom, 2019). Companies own the inputs (e.g., feed and chicks) and the outputs (e.g., meat, eggs), while the growing is outsourced to

[37] Instead of exiting agriculture altogether, many dairy farmers turned instead to drystock farming, which requires far less time, labour and capital input than dairy farming (Donnellan et al., 2015).

[38] Interestingly, there was a concerted effort to expand poultry's share of Ireland's agricultural output and exports in the early 20th century, but because poultry keeping was traditionally the domain of women, the agriculture department struggled to convince men to become involved. Bourke (1987) and Daly (2002) suggest this may have limited the industry from expanding at the time, making it a latecomer to the modern Irish agricultural economy.

farmers (Weis, 2007; UN FAO, 2014). This is part of a broader global trend in which food processors and retail corporations are gaining increasingly privileged positions at national and international levels as they integrate food systems and assume both economic and political leadership roles (Lang et al., 2001; Clapp and Fuchs, 2009; Attorp and McAreavey, 2020). Again, the intensive nature of poultry production, as well as the sector's growing influence in NI, has considerable implications for the island of Ireland's waterways, discussed below in chapters six, eight and nine.

4.4 Summary

This chapter details the socio-political and historical context of land use patterns observed on the island of Ireland. It highlights how a long history of cattle farming and a political struggle for land rights, tied up with Ireland and NI's complicated relationship with Great Britain, has resulted in a unique landholding pattern centred on small family farms that still retains much social, cultural and political importance today. It also presents an overview of the structure of the agri-food industries in Ireland and NI. Dairy and drystock have a strong presence across the island, with the former considered more 'successful' than the latter. In NI, the poultry industry is also growing rapidly. Information detailed here helps set the context for this thesis' empirical and analytical chapters (seven through nine). Further contextual information is provided in the following chapter, which is focused on the island of Ireland's waterways, and the impact that diffuse pollution from the agri-food sector is having on them.

Chapter 5: Water and agriculture on the island of Ireland

5.1 Introduction

The island of Ireland is covered in waterways. Ireland (70,273 km^2) alone has 513 groundwater bodies, more than 800 lakes, and over 70,000 km of rivers and tributaries (Fanning et al., 2017). NI, while significantly smaller (14,130km^2), still has 75 groundwater bodies and 471 river and lake water bodies (DAERA, 2015). EU directives such as the Nitrates Directive (NiD) and the Water Framework Directive (WFD), detailed below, underpin the primary environmental policies guiding water management and planning in both Ireland and NI, including agri-environmental schemes implemented under the CAP. However, despite decades of concerted effort to address the issue following implementation of the NiD and WFD, water pollution remains a significant challenge on the island. While there are multiple sources of pollution placing pressure on the island's waterways, including public wastewater treatment facilities and private septic tanks, agriculture remains the biggest (Cave, 2015; Robins et al., 2017; Boyle et al., 2019).

Agriculture is a major source of water pollution globally (Mateo-Sagasta et al., 2017; Graversgaard et al., 2018; Holden et al., ND), and as agriculture production continues to intensify, so too does pressure on waterways. Agriculture-specific pressures on waterways include increased abstractions, diffuse run-off of nutrients (nitrogen and phosphorus) and other chemicals (e.g., antibiotics, pesticides), sediment and saline drainage from land, and point-source pollution from farmyards (Fanning et al., 2017; Holden et al., ND)[39]. Resultant water pollution has a negative impact on aquatic ecosystems, human health and productive activities (Conroy et al. 2016; UNEP, 2016; Graversgaard et al., 2018; Holden et al., ND). The Organisation for Economic Co-operation and Development (OECD) has estimated that in OECD countries alone, the social and environmental costs associated with water pollution from agriculture exceeds billions of dollars annually (OECD, 2012). In fact, in most high-income countries, agricultural production contributes more to the degradation of inland and coastal waters than do either settlements or other industries (Matteo-Sagasta et al., 2017; Holden et al., ND). In the EU, 38 percent of water bodies are currently under significant pressure from agricultural pollution (WWAP, 2015).

[39] Agricultural pollution may originate either from diffuse sources (e.g., run off from larger areas of farmland) or from a point source (e.g., from a slurry store) (Cave and McKibben, 2016).

In this chapter, legislation underpinning waterway management on the island of Ireland is outlined (section 5.2). This is followed by consideration of agriculture-related pressures on the island's waterways and the challenges of legislating against it (section 5.3), including in an international (trans-border) context (section 5.4). The Ulster Blackwater catchment provides a case study for discussion of the latter and is considered later in this thesis, in chapter nine.

5.2 Policy context

5.2.1 Water-related legislation in the EU

Water-related legislation is one of the most highly developed branches of EU law, and includes various directives designed to improve water quality. Because diffuse water pollution comes from many sources, not only agricultural ones, it can be very difficult to monitor and regulate. This means it needs to be managed via a combination of coordinated policy measures and no single measure is sufficient or cost-effective alone (Robins et al., 2017; Graversgaard et al., 2018). There is a great need for collaboration and coordination within this arena; Forslund et al. (2009) suggest that within the water sector, "institutional fragmentation can result in antagonistic management actions that fail to achieve overarching goals and that often overlook the importance of maintaining healthy freshwater ecosystems" (p.2).

Within the EU, the Nitrates Directive and the Water Framework Directive are considered the most significant pieces of water-related legislation to date (McNally, 2009; van Grinsven et al., 2012) (figure 5.1) and have the most direct impact in terms of regulating agricultural land management. These are elaborated upon here. Other directives, such as the Habitats Directive and the Floods Directive, have an indirect impact on water quality (Cave, 2016; Robins et al., 2017), but are not considered in detail in this thesis because their role in regulating agricultural pollution is less significant. It should be noted that CAP legislation also has implications for waterways in the EU, given it is the main legislation underpinning both land use policy and rural development there. As discussed in chapter two, original CAP policies initially drove rapid intensification of agriculture across the EU, and by extension, amplified pressure on waterways and wider natural environment. Later, 'greening' of the CAP saw attempts to reverse some of the damage done by earlier productivist policies, although, as highlighted above, many argue these efforts have been ineffective (Diamand, 2017; Gravey et al., 2017; Hubbard et al., 2017). Further, this thesis argues that ongoing support for

extensive farms, many of which would otherwise be economically unviable, has had unintended consequences for waterways. As is discussed in section 5.3, below, extensive agriculture is an important but often overlooked source of diffuse agricultural pollution. Keeping extensive farmers on the land without addressing their contribution to water pollution is therefore problematic (refer to chapters eight, nine and ten).

Figure 5.1 EU water policy

Source: Meehan, 2019

The Water Framework Directive

The Water Framework Directive (WFD; Directive 2000/60/EC), which established "…a framework for community action in the field of water policy" (McNally, 2009, p.131), came into force in December 2000, and is regarded by many as one of the most important pieces of EU legislation (McNally, 2009). It covers the environmental, economic and social aspects of waterway management, drawing upon principles of sustainable development (Woods, 2008), with a primary goal of promoting common standards, measures and approaches for water management within the EU (European Parliament and Council, 2000; Murphy and Glasgow, 2009).

Under the WFD, rivers, lakes, estuaries and coastal waters are awarded one of five statuses: high, good, moderate, poor or bad. Groundwater has only two statuses: good or poor (EPA, 2016). Waterways are managed based on natural geographical areas called river basin

districts (RBDs)[40]. Approximately a third of these are shared between EU member states (McNally, 2009; Murphy and Glasgow, 2009). These cross-border districts are referred to as international RBDs, and the WFD requires member states to coordinate their efforts within these international districts through the development of common River Basin District Plans (RBDPs) (Murphy and Glasgow, 2009; Robins et al., 2017). Individual countries must also develop RBDPs for RBDs that lie wholly within their own borders (Robins et al., 2017). Plans are reviewed in six yearly cycles (EPA, 2016).

One of the WFD's original aims was for all inland waters in the EU to have achieved 'good' ecological status by 2015, with additional improvements to be made during the second WFD cycle (2015 – 2021). Additionally, it was stated that in no case should the existing status of water bodies deteriorate (European Parliament and Council, 2000; McNally, 2009; Robins et al., 2017). Yet, despite general improvements in some indicators, more than 60 percent of EU waterways have still not achieved 'good' or 'high' status. Overall improvements have been limited; most water bodies achieved a similar status in the first (2009) and second (2015) RBMP reviews (EU EA, 2018). The EU Environment Agency cites diffuse agricultural pollution as a main reason for the lack of progress (EU EA, 2018). However, RBD management is intended to be iterative, and it is recognised that several RBDP cycles may be required before all objectives are met (McNally, 2009). The WFD's third cycle begins in 2021 and will run until 2027.

The Nitrates Directive

The Nitrates Directive (NiD; Directive 91/676/EEC) has been in place since 1991. Its main aim is to reduce water pollution caused by nitrates and phosphorous from agricultural sources (van Grinsven et al., 2012; European Commission, 2021a). Van Grinsven et al. (2012) argue that the NiD is the most important piece of EU legislation in terms of reducing the environmental impact of agricultural fertilizer and manure, and increasing nitrogen use efficiency within agriculture generally. Under the directive, all EU member states must identify all waters within their borders that are polluted, or at risk of pollution; distinguish Nitrate Vulnerable Zones (NVZs; that is, areas at risk from agricultural nitrate pollution); limit the application of nitrogen from manure; and develop a Nitrates Action Programme (NAP) which is to be reviewed every four years. The latter must set out regulations that a) limit the

[40] A RBD comprises the area of land and sea made up of a single river catchment (or river basin) or a number of related river basins. This includes rivers and lakes together with their associated groundwater, transitional and coastal waters and water-dependent ecosystems (McNally, 2009).

amount of livestock manure applied to the land each year, b) set periods when land spreading is prohibited due to risk, e.g., from bad weather, and c) set capacity levels for the storage of livestock manure. EU Good Agricultural Practice for Protection of Waters regulations (GAP regulations) gives legal effect to Nitrates Action Programmes within EU member states (European Commission, 2021a). Farmers who fail to comply with GAP regulations can be sanctioned via a reduction in the CAP payments they receive, an approach to regulation termed 'cross compliance' (European Commission, 2021b) (refer to appendix 2 for full details).

5.2.2 Water-related legislation on the island of Ireland

Both Water Framework Directive and the Nitrates Directive are established in law in Ireland and NI (EPA, 2018; NI Department for Infrastructure, 2019). In NI, this remains the case following the UK's exit from the EU and will continue until the government takes direct action to change it (Robins et al., 2017). NI has three river basin districts (RBDs) under the WFD: North Western, Neagh Bann, and North Eastern (Murphy and Glasgow, 2009; Robins et al., 2017). Regions of the first two are shared with Ireland, as is discussed further in section 5.4. Each RBD has three Catchment Stakeholder Groups as well as a dedicated Catchment Management Officer. Further to this, RBDs are divided into nine local management areas, each with an individual local action plan (Robins et al., 2017). Three agencies are primarily responsible for implementing these policies within NI: The Department for Agriculture, Environment and Rural Affairs (DAERA), the NI Environment Agency (NIEA, one of two DAERA executive agencies), and the Rivers Agency, which lies within the Department for Infrastructure (DfI). Other national agencies such as NI water and the Woodlands Trust are also involved in water management (Robins et al., 2017).

Ireland originally established eight RBDs with the implementation of the WFD, but after review of the first RBDP cycle in 2015, these were amalgamated into one national RBD (Department of Housing, Planning and Local Government, 2018). A single Water Policy Advisory Committee (WPAC) now provides high-level policy direction and general oversight of RBDP implementation in Ireland. Under this are a National Co-ordination and Management Committee (NCMC) and a National Technical Implementation Group (NTIG), both of which provide more detailed oversight of RBDP implementation. The latter also serves as a forum for knowledge sharing. Finally, the regional local authorities form five regional committees, which support implementation measures at the local level and work

directly with local stakeholders (Department of Housing, Planning and Local Government, 2018). A separate administrative area is in place to manage the Ireland portion of the Neagh Bann and North Western IRBDs, which are shared with NI (Department of Housing, Planning and Local Government, 2018) (see section 5.4).

The NiD is the main legislation underpinning regulation of diffuse agriculture pollution in both Ireland and NI. Ireland's fourth Nitrates Action Programme (NAP) came into effect in 2017 (SI No 605, 2017; Irish Statute Book, 2017) and is set to be reviewed in 2021 (Department of Housing, Planning and Local Government, 2021). NI's latest NAP came into effect in 2019, and runs until 2022 (NIEA, 2019). In Ireland, Local Authorities are responsible for enforcing NAP regulations, with additional research and support and training for farm businesses provided by Teagasc. The Environmental Protection Agency (EPA) are the country's environmental oversight body, and have overall responsibility for reporting water quality performance to the EU (Department of Housing, Planning and Local Government, 2021). The Local Authority Waters Programme (LAWPRO) coordinates efforts by Local Authorities, public bodies and other stakeholders to meet WFD water quality objectives (LAWPRO, 2021a). Alongside this, the Agricultural Sustainability Support and Advice Programme (ASSAP), a partnership between Teagasc and Dairy Industry Ireland, offers farmers a "free and confidential advisory service" to help them meet the regulations (Teagasc, 2021). Working in 'priority areas' where the status of a waterway or waterways is at risk of declining, advisors work with farmers to help them address potential on-farm issues that may be affecting water quality[41] (refer to appendix 3 for details on both LAWPRO and ASSAP). In NI, enforcement is carried out at the national level by the NI Environment Agency. Additional monitoring is carried out by the NI Agri-Food and Biosciences Institute (AFBI), and guidance and training on the NAP is offered to farm businesses by DAERA's College of Agriculture, Food and Rural Enterprise (CAFRE) (NIEA, 2019).

Unlike most other member states, the entirety of Ireland is classified as a Nitrates Vulnerable Zone (NVZ), as is all of NI (but only parts of Great Britain) (NIEA, 2019; Department of Housing, Planning and Local Government, 2021). According to a government employee interviewed for this research, the decision to classify the whole island as an NVZ was taken because it was politically easier to implement regulations on this basis. Rather

[41] Note, ASSAP has no authority to enforce regulations, nor funding available to support farmers to implement measures, something outlined in appendix nine discussed in chapters eight and ten.

than enforcing stricter regulations selectively, all farmers on the island face the same restrictions, but have the option to apply for a NiD derogation[42], should they require it. This allows them to apply higher amounts of nitrogen in specific areas and under certain conditions (see appendix 2). On both sides of the border, it is mainly dairy farmers who are making avail of the derogation, with much greater take-up in Ireland. As will be discussed in chapter eight, this is integral to the success of the dairy industry there.

The NiD and WFD have underpinned a concerted effort to improve the status of waterways both north and south of the border, with some positive impacts, particularly for the most polluted waterways (van Grinsven et al. 2012; Rolston et al. 2017; Boyle et al., 2019; NIEA, 2019) (refer to appendix 4). For example, the Gross Nitrogen Balance (GNB) decreased by 25 percent in Ireland and 23 percent in the UK between 2000 and 2008 (van Grinsven et al., 2012) and between 2009 and 2015, the number of NI's waterbodies classified as 'good' or 'excellent' increased from 28 to 37 percent (NIEA, 2019). However, both Ireland and NI are falling far short of meeting the WFD target of having 70 percent of waterbodies reach 'good' status by the end of the programme's second cycle in 2021. In Ireland's most recent (2018) water quality review (O'Boyle et al., 2019), 53 percent of surface waterbodies were assessed as being either good or high ecological status based on current WFD classifications, and 47 percent were in moderate, poor or bad ecological status. Although the overall trend is positive, with many of the worst quality waterways improving in status, the quality of the country's highest standard waterbodies continues to decline (O'Boyle et al, 2019). In NI, an assessment done the same year revealed only 36.6 percent of waterbodies were classified as good or high, down from 37.4 percent 2015 (NIEA, 2019) (appendix 4). Pollution from agriculture is one of the key reasons water quality continues to be such an issue on the island of Ireland.

5.3 Diffuse agricultural pollution and waterways on the island of Ireland

That agriculture production on the island of Ireland is centred on livestock presents a significant challenge: how to manage the substantial volumes of animal waste – and resultant nutrient pollution – produced as a by-product. Diffuse agricultural pollution is the most significant source of water pollution in both Ireland and NI. Run-off of nutrients such as nitrogen and phosphorous, the majority of which comes from animal manures, poses a

[42] Notably, at the time of writing, Ireland and NI are two of only five EU member states awarded an NiD derogation (Denmark, The Netherlands and Belgium being the others) (European Commission, 2021).

particular problem (van Grinsven et al., 2012; Doody et al., 2015; Ní Longphuirt et al., 2015; Mockler et al., 2017). NI's Environment Agency (NIEA) (Cave, 2015; Robins et al., 2017) and Ireland's Environmental Protection Agency (EPA) (Boyle et al., 2019) both state nutrient emissions from agriculture are the primary reason[43] their respective jurisdictions will fall short of meeting water quality objectives in the current cycle of the EU's WFD.

Both NI and Ireland have set ambitious agricultural growth targets in a drive to remain competitive in a globalised market and to respond to changing diet patterns, including an increasing demand for meat and dairy products (e.g., NI's 'Going for Growth' strategy (Agri-food Strategy Board, 2013) and Ireland's 'Food Wise 2025' (DAFM, 2015). Refer to chapter seven). However, meeting these targets puts pressure on freshwater systems already under strain from multiple sources and will make it difficult to attain water quality targets that both Ireland and NI are statutorily obliged to meet (Doody et al., 2015; Ní Longphuirt et al., 2015; Conroy et al., 2016; Matteo-Sagasta et al., 2017).

5.3.1 Diffuse agricultural pollution: Intensive versus extensive agriculture

Intensive agriculture remains the biggest contributor to diffuse agricultural pollution in both Ireland and NI. In Ireland, the dairy industry poses a threat to waterways in the south and south-east especially, where high levels of diffuse nitrogen run-off from dairy farms are putting significant pressure on waterways (Doody et al., 2016). In NI, agricultural intensity is an even greater issue, with phosphorous a particular problem for the region's freshwater bodies because of the high levels of phosphorous being imported into the ecosystem through animal feed[44] (NIEA, 2019). Agriculture is more intensive in NI for multiple reasons. First, because it is simply more difficult to grow grass in the North's wetter, cooler climate, feed-based intensive industries can make more economic sense. Intensive poultry and pig industries have a greater presence in NI than in Ireland, and the NI dairy industry typically relies more heavily on imported feed than its southern counterpart (Spencer and Whittaker, 1990). And, as described in chapter four, historically, NI's dairy sector also took a

[43] 53 percent of Ireland's waterbodies are negatively impacted by agricultural activities (Boyle et al., 2019). No equivalent figure is available for NI.

[44] Feed (e.g., soy and corn) contains phosphorous. Animals consuming feed therefore consume, and excrete, more phosphorous than animals raised in a predominantly grass-based system. However, this is not a clear-cut issue, as there is not always a direct correlation between what manure is produced on a farm and where it is spread. Refer to appendix 12 for details.

fundamentally different approach to mechanisation and intensification, thereby intensifying much earlier than its southern counterpart (refer also to appendix 1 for further details).

Less intensive drystock farming is also placing significant pressure on the island's waterways, particularly in the west and border regions. This is largely due to the land base. There is increasing understanding that soil type is a key factor determining the degree to which agricultural runoff will impact waterways. This is particularly the case for phosphorous: on thin peat or gleyed[45] soils, even small amounts of phosphorous imported into the system may cause run-off issues (Doody et al. 2012) (appendix 5). Because drystock farms tend to be on hilly land with thin soils, they may, therefore, also experience considerable runoff problems, even at low stocking densities. Paradoxically, dairy farmers are usually based on higher-quality lowland with free-draining soils and thus, despite having higher stocking densities, may have fewer run-off problems than drystock farmers (Doody et al., 2012). However, a narrative linking intensive agriculture to water pollution continues to underpin policy and practice, meaning extensive farming's contribution to water pollution is often overlooked – a particular threat to waterways in Ireland's border regions. Further, as discussed in chapter eight, both the (typically) part-time nature of drystock farming and the power distributions within the agri-food industry can exacerbate this problem. Although this is beginning to be addressed (e.g., see the CatchmentCARE project, described in chapter nine), there is a long way to go on this front, a challenge discussed in detail in chapters eight and ten.

5.3.2 Regulating diffuse agricultural pollution

Under the NiD, a range of measures are enforced in Ireland and NI to limit agricultural pollution. Table 5.1 summarises key interventions being implemented in Ireland and NI. The first three listed are legal requirements under the NiD GAP regulations, the latter three are examples of measures farmers are being supported to implement, through programmes such as ASSAP (see appendix 3) and CatchmentCARE, to meet those legal requirements. The development and impact of these interventions are discussed in greater detail in chapter seven, in the context of this research's theoretical framing.

[45] Compact, permanently waterlogged soils.

Table 5.1 Examples of water pollution control measures under the NiD

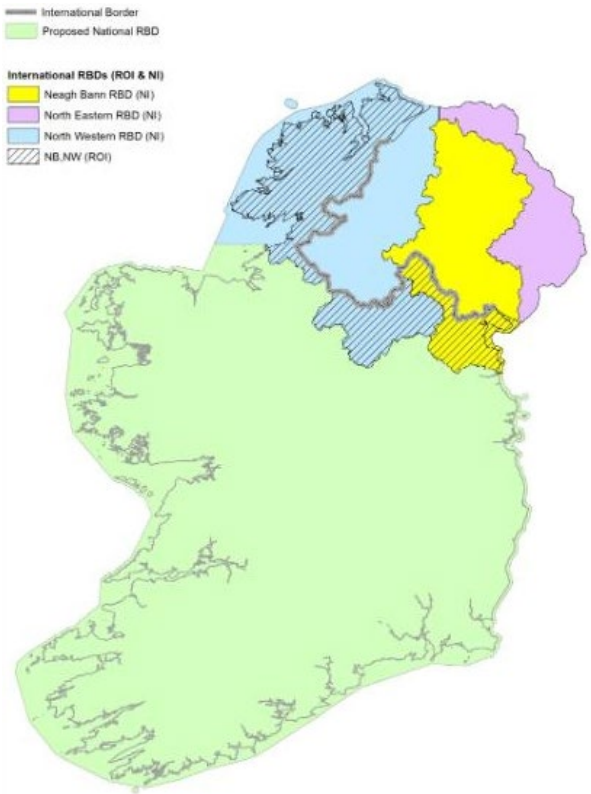
Water pollution control measure
Limits on land spreading (170kg N/ha NiD; 250kg N/ha derogation)
Closed period (no land spreading during late autumn/winter)
Improving farmyard management, e.g.: • Improving slurry storage capacity
Improving land management, e.g.: • Riparian margins; buffer strips
Improving nutrient and fertiliser management, e.g.: • Soil testing
Improving pesticide application, e.g.: • Use of appropriate pesticide application equipment

5.4 Trans-boundary waterways on the island of Ireland

Hydrological boundaries and administrative boundaries often do not correspond. Administrative collaboration between jurisdictions is critical if trans-boundary watersheds are to be effectively managed (Graversgaard et al., 2018). The WFD has been instrumental in helping facilitate this collaboration on the island of Ireland. NI and Ireland share two international river basin districts (IRBDs) under the WFD: the North Western and the Neagh Bann (see figure 5.2). Note that until 2015 there was a third IRBD, the Shannon, but this has since been amalgamated into Ireland's new national RBD (Murphy and Glasgow, 2009; Department of Housing, Planning and Local Government, 2018). Given that sizeable areas of cross-border water catchments lie within both NI and Ireland, a tradition of cross-border water management between the two countries does pre-date the WFD (Murphy and Glasgow, 2009). However, prior to WFD implementation, coordination focused mainly on responses to acute pollution incidents, whereas introduction of the WFD has made coordination much more holistic, as well as more structured and formalised (Murphy and Glasgow, 2009). Cross-border water bodies have now been mapped for the development of coordinated, catchment-wide monitoring programmes (McNally, 2009), and public authorities in each RBD must now consult and cooperate with their colleagues across the border when developing new plans such as the introduction of environmental quality standards. Similarly, significant proposals for new regulatory controls in either jurisdiction must undergo a Regulatory Impact Assessment to evaluate whether the proposed regulations will have the desired impact, and whether there might be any undesirable side effects or unpredicted costs (Murphy and Glasgow, 2009).

Coordination of efforts in the early stages of WFD implementation was deemed to be successful; early milestones were met and both jurisdictions continually expressed their commitment to ongoing coordination and integration efforts (Murphy and Glasgow, 2009). However, as noted above, neither country has yet achieved a "good" status for all its water bodies, either national or trans-national. Murphy and Glasgow (2009) also noted in commentary on implementation of the first WFD cycle on the island of Ireland that ongoing coordination is likely to become increasingly challenging as final RBMPs are implemented and their effects begin to impact stakeholders. Indeed, because Ireland experienced delays in implementing the second stage of the WFD, north-south collaboration became less co-ordinated after 2015, an issue highlighted by participants in this research (see chapter nine). The UK's exit from the EU will likely serve as another obstacle to effective cooperation, an issue returned to in results and discussion. To illustrate the challenges of trans-border waterway management on the island, this research considered the case of the Ulster Blackwater Catchment, which is discussed in chapter nine.

Figure 5.2 WFD River Basin Districts on the island of Ireland (WFD phase 2, 2015 – 2021)



5.5 Summary

This chapter further contextualised this study, providing an overview of waterways and water policy on the island of Ireland. It detailed key legislation that underpins waterway management in Ireland, NI and Europe, including the Nitrates Directive and the Water Framework Directive. It then discussed agriculture-related pressures on the island's waterways and the challenges of legislating against it, including in an international (trans-border) context. Intensive agriculture is a main pressure on waterways, and receives the most focus. But extensive agriculture also is a problem because of the land base it typically operates on, and because of other practical constraints drystock farmers face. However, its contribution is often overlooked, an issue discussed in detail in chapter seven. Alongside information presented in the previous chapter, information detailed here helps set the context for this thesis' empirical and analytical chapters (seven through nine). First, chapter six describes the methodology and methods employed in this study.

Chapter 6: Research Methodology

6.1 Introduction

This chapter presents the methodology and methods used in the research project. It first considers philosophies of knowledge production in the social sciences and discusses the philosophical assumptions underpinning this research. It then details the research design and accompanying methods: a primarily qualitative case study approach employing semi-structured interviews, focus groups and secondary data analysis. It also considers methodological and ethical issues inherent to the research process, and concludes with discussion of the data analysis strategy, and a brief consideration of obstacles experienced in this research.

6.2 Research philosophy: Critical realism

Research philosophies determine both how we conceive of reality (ontology) and what we consider to be legitimate knowledge about that reality (epistemology) (Clarke and Braun, 2013). They also provide the theoretical link between research questions and research methods (Graham, 2005), and are thus a foundational element of academic research. However, C. W. Mills (1959 [1999]) argued that sociology, as a discipline, often leans towards one of two extreme philosophical tendencies: grand theory (formulaic concepts) or abstract empiricism (technical problem solving). He asserted that both these positions lack "sociological imagination", that is, the capacity to explain the complex interconnectedness of the "personal troubles of milieu" and "the public issues of the social structure" (Mills, 1959; in Reed, 2009). The research outlined in this thesis adopts a critical realist philosophy (a distinct version of realist theory), originally proposed by philosopher Roy Bhaskar (1978), which, as Reed (2009) argues, resonates with this critique. Central to a critical realist (CR) approach to social research is a search for causation, which can help researchers explain social events and develop practical policy recommendations (Easton, 2010; Fletcher, 2017). Inherent in this is a search for what connects the everyday lived experiences of research participants with the social structures that underpin those experiences (Bhaskar and Callinicos, 2003; Easton, 2010; Fletcher, 2017) – in effect, an application of Mills' "sociological imagination". As will be discussed below, CR provides an appropriate philosophical framework for this research given its concern with discerning causative mechanisms, and the fact that its ontological, epistemological and methodological positions fit this thesis' research questions.

6.2.1 Ontology and epistemology

Ontology examines assumptions we make about the nature of the world, or 'reality', and can be understood as spanning a continuum from positivism/realism to constructivism/relativism (Reed, 2009; Fletcher, 2017). A positivist ontology holds that the world is ordered and constitutes a series of discrete and observable events or occurrences. These can only be observed through sense experiences and represented through empirical regularities. By extension, only that which can be directly observed is 'real' (Reed, 2009; Fletcher, 2017). Conversely, a constructivist ontology assumes that reality is socially constructed, and therefore, multiple realities exist. The constructivist social reality is constituted through language and discourse, and no objective ontology exists independent of socio-linguistic practices (Reed, 2009; Fletcher, 2017). However, as King and Horrocks (2010) note, the boundaries between these theoretical positions are often blurred. CR ontology attempts to traverse the middle-ground between the polarised ends of this spectrum. Combining aspects of both positivism and interpretivism, CR researchers hold that a 'real' world exists, which can be empirically observed, but also accept that lived 'reality' is, to a large degree, socially constructed (Reed, 2009; O'Mahoney and Vincent, 2014; Fletcher, 2017).

By extension, CR envisions the world as complex and stratified, consisting of events as well as objects, including social structures, which can generate events (Sayer, 1992; Easton, 2010). This conception makes it possible to articulate causation; CR researchers consider all 'levels' of a system they are trying to explain (Bhaskar and Callinicos, 2003; Easton, 2010; Fletcher, 2017), which allows them to "look beyond" what can be directly observed and gives them a more nuanced view of social reality, as opposed to "flatter" empiricist or constructionist approaches, which effectively consider only one element of 'reality' (O'Mahoney and Vincent, 2014, p. 8). To do this, CR researchers employ 'retroduction', a process Lawson (1997) defines as "…moving from a conception of some phenomenon of interest to a conception of a different kind of thing (power, mechanism) that could have generated the given phenomenon" (p. 236). In short, the strategy involves 'working backwards' from observed phenomena to the theoretical mechanisms and structures causing them (Lawson, 1997; Yeung, 1997; Reed, 2009; Fletcher, 2017). Here, it should be noted that because of CR's assumptions about the mechanisms and structures that underpin individual subjective experiences, critics of the theory, including Baert (1998) and Contu and

Willmott (2005), accuse it of structural and historical determinism. However, Reed (2009) argues that because CR gives overriding emphasis to the open and dynamic nature of social phenomena, its social ontology is "fundamentally antidterminist and antireductionist", particularly given its explanatory intent (p. 443).

CR researchers argue that alongside their ontological limitations, positivism and interpretivism also have epistemological limitations: strictly positivist or interpretivist philosophies do not adequately articulate causal mechanisms, something CR's 'middle ground' approach better accommodates (Easton, 2010). Positivism's epistemological stance holds that law-like generalisations can be made through observation of regularities in material or social settings, and that these provide a basis for both explanation and prediction. By extension, causal statements can be made about the phenomena being studied (Easton, 2010). However, Easton (2010) argues that a "conjunction of elements or variables" can only offer an atheoretical statement about the world, not a causal explanation, and therefore, does not answer the question 'why?' (p. 119). Put another way, while such an approach can give a 'shallow', or 'thin', conception of cause and effect, it does not provide a 'thick' explanation of the 'why'. Conversely, while an interpretivist framework can offer this 'thicker' explanatory data, interpretivists tend to argue it is not possible to know what is 'real', or to discern causality. Researchers can only provide an interpretation of their own, based on what they personally observe (Easton, 2010). Critics of this approach take issue with this position because it is not clear whether one interpretation may be judged as better than another; no standards exist (Easton, 2010).

As outlined in chapter one, this research aimed to shed light on the governance and power processes – that is, the social structures – underpinning the development and implementation of agri-environmental policies on the island of Ireland and the impact these have on land and waterway management practices there. A concern with causation – or the why – is central, something better addressed by the 'thick' explanatory data provided by interpretivist research (Easton, 2010). Additionally, this research holds that not all social structures are directly observable. In particular, the research theory considers power to be simultaneously directly observable, but also 'hidden' or 'invisible' (Lukes, 1974 and 2005; refer to chapter three). Moreover, like much research in the social sciences, this research was underpinned by the belief that the social world is open to subjective interpretation and understanding. Land and waterway management practices on the island of Ireland are the

result of the complex interactions of multiple social, cultural, historical and economic factors, all of which directly influence policymaking. Again, these are best understood through an interpretivist lens. However, this research does not reject the possibility of an empirically observable world, or of objectivity. Indeed, land and waterway management activities are the empirically observable outcome of socially constructed agricultural practices. Moreover, it is argued that the structure of governance networks (chapter three) and some elements of power are also observable. The goal of this research was to 'work backwards' from these observed phenomena to understand the 'unseen' mechanisms causing them. CR was an ideal philosophical framework for this research, allowing the researcher to not only simultaneously consider both empirically observable phenomena such as land management practices, and often 'invisible', socially constructed phenomena, including power, but also to place an explicit focus on the (causative) links between the two.

6.2.2 Critical realism and methodology

CR is also an appropriate fit for this research methodologically speaking. As is detailed in the following section, this research adopted a qualitative case study approach in which both primary qualitative data and secondary quantitative data were collected and analysed. This is something which CR accommodates. As Yeung (1997) writes, "[critical] realism has much to say on the philosophy of the social sciences, but it leaves the theoretical and methodological work to each substantive social science" (p. 53). Similarly, Sayer (2000) states that CR is compatible with a relatively wide range of research methods, unlike positivism and interpretivism. Quantitative methods can be used to establish empirical regularities between objects/events and to highlight the external and contingent relations between these, while qualitative methods such as interviews are necessary to illuminate the more abstract causal mechanisms at work (Yeung, 1997). Blaikie (2000) claims that CR's relatively relaxed stance on methodology legitimates an 'anything goes' approach, making the research process excessively complex. However, Flyvbjerg (2006) states that it is of critical importance that "…good social science [be] problem driven and not methodology driven" (p. 242), and that dogmatic adherence to either qualitative or quantitative methods can undermine the quality of social research by pigeonholing researchers into a specific set of methods or a narrowly defined methodology which may not best answer the research questions. In line with this, Sayer (2000) argues that a CR approach places research questions front and centre, and implies that the chosen methodological approach "…should

depend on the nature of the object of study and what one wants to learn about it" (p. 19). As is described in the following section, this research employed a case study approach precisely because it was the most appropriate method for answering this study's research questions.

In summary, this research adopted a critical realist approach because it offers the most appropriate framework for thoroughly investigating the causal mechanisms linking social structures, policymaking and land and waterway management practices on the island of Ireland. CR's acceptance of a variety of research methods also means that it is compatible with the qualitative case study approach adopted in this research project, the details of which we turn to now.

6.3 Research design

This research employed a qualitative case study approach. This study's overarching aim was to determine whether potential divergence in agri-environmental policies between Ireland and NI might impact co-management of shared waterways on island, and if yes, how. To answer these questions, a single trans-border water catchment, the Blackwater Catchment in south-east Northern Ireland/north-east Ireland, where Ireland and NI share responsibility for managing waterways (described in detail in chapter nine), was selected as the site of this research's main case study. However, to understand challenges faced in co-managing waterways trans-boundary waterways in this catchment, it was necessary to first understand the wider policymaking context in Ireland and NI, because the agri-environmental policies that underpin regulation of agricultural pollution and management waterway management in the catchment are developed at national and international levels. Thus, in effect, this study employed two case studies: the Ulster Blackwater case study, embedded within a wider case study of the island of Ireland. This section describes and justifies the use of this method of inquiry, before describing how this approach was applied.

6.3.1 Case study research

Contemporary case study research originates from qualitative research approaches employed in sociology, anthropology, history and psychology. Creswell et al. (2007) define case study research as "…a qualitative approach in which the investigator explores a bounded system (a case) or multiple bounded systems (cases) over time through detailed, in-depth data collection involving multiple sources of information…and reports a case description and case-based themes" (p. 245). The goal of this type of research is to

understand an issue, in-depth and in-context (Harrison et al., 2017). It is considered a flexible and pragmatic approach, useful for exploring context-dependent issues related to human behaviour and social interactions, particularly where the study's contextual conditions are highly pertinent to the research questions being asked, and where there are many variables at play (Yin, 2009; Flyvbjerg, 2011; Harrison et al., 2017). Indeed, a focus on context was critical for this research. As is discussed in chapter nine, contextual conditions in the trans-boundary Blackwater River catchment have significant implications for how waterways are managed there. Further, as discussed in chapters seven and eight, the wider policymaking environment on the island of Ireland is directly affected by multiple contextual factors specific to the Irish context: socio-political, historical and geographical. A case study approach facilitated in-depth consideration of these.

Importantly, case study research also centralises participants' perspectives (Harrison et al., 2017). In social research that adopts an interpretivist approach, as this research does (in part), it is important to place participant perspective front and centre. For example, in this research, analysis of participant perceptions and experiences of the policymaking process were critical to understanding the power relations within policymaking networks, and what impact these were having on land and waterway management practices in the catchment and across the island of Ireland.

According to Yin (2009), case study research is most suitably employed when seeking to answer 'how' and 'why' questions. Given this research was concerned with not only how the policymaking environment impacts land and waterway management practices on the island of Ireland, but why the policymaking environment is the way it is, the ability to ask both 'how' and 'why' questions was an important consideration for research design. Related to this, Flyvbjerg (2006, p. 223) suggests that a case study's "closeness" to real-life situations allows the researcher to development a nuanced view of reality, thus enriching the quality of the research. The challenge of managing shared waterways is highly complex, and is impacted by multiple physical (e.g., topographical and geographical) and socio-cultural variables. Therefore, developing a nuanced, in-depth understanding of this challenge was important, something a case study approach facilitated.

Unlike many other methods, case study research is not aligned with a specific philosophical position and can be orientated to any of the main perspectives, from positivist to constructivist (Harrison et al., 2017). In the context of this research, an alignment with

Critical Realism is acceptable, even advantageous, given that, as discussed above, CR is compatible with a wide range of research methods (Easton, 2010). The case study design broadly follows that set out by Yin (2009), who conceptualises case study research from a realist/post-positivist perspective. Within this approach, focus is placed on maintaining objectivity in the methodological process (Harrison et al., 2017). Scientific enquiry is used to "apprehend the nature of reality", although it is acknowledged that all measurement is imperfect, and everyone's world view is inherently biased. Therefore, multiple methods are employed with triangulation to minimise errors and develop an understanding of what is happening in 'reality' that is as close as possible to 'truth' (Easton, 2010; Lincoln et al., 2011; Harrison et al., 2017). However, Flyvbjerg (2006) cautions that the value of this 'truth' is not in producing "general, context-independent theory", but rather, concrete, context-dependent knowledge (p. 223), which is, once again, something important in this research.

The ability to incorporate multiple sources of evidence into a research design is a major strength of case studies as it offers a more comprehensive, synergistic view of the topic being studied (Denscombe, 2007; Yin, 2009; Flyvbjerg, 2006; Flyvbjerg, 2011). Triangulation of methods also helps researchers develop more accurate and convincing conclusions that are often possible to generalise, although, as is discussed below, case studies have some limitations on this front (Yin, 2009). Further, to re-iterate a point made above, such an approach allows for selection of data collection methods that are best suited to answering a study's research questions, as opposed to being "methodology driven" (Flyvbjerg, 2006, p. 242). In this study, although the approach was primarily qualitative, secondary quantitative data not only supported findings arising from (qualitative) interviews and focus groups, but also helped paint a more detailed picture about the research context. The possibility of generalising findings was also something important in this research; although the primary goal of the case study was to gain an in-depth understanding of the issues affecting trans-boundary waterway management in the Blackwater catchment, it was hoped that some generalisations might be made about these findings to improve understanding of trans-boundary waterway management issues faced across the island of Ireland.

Although it has clear strengths, the case study approach has been criticised for problems related to external validity, generalisability, bias and rigour (Yin, 2009; Flyvberg, 2006; Flyvbjerg, 2011). Of these, generalisability and validity are the two most frequently cited (Flyvbjerg, 2006; Yin, 2009). Validity concerns the rigour and reliability of case studies, and

external validity – the validity of applying a study's conclusions to cases outside the context of that study – is deemed the most problematic for case study research (Yin, 2009). This relates strongly to the concept of generalisability. However, prominent case study researchers fiercely defend the method's position. Yin (2009) distinguishes between "analytic generalisation" and "statistical generalisation" and argues that, rather than enumerating frequencies (statistical), case studies can serve to expand and generalise theories (analytic), which is also useful and important (p. 15). Similarly, Flyvbjerg (2006, 2011) asserts that it is possible to make generalisations on individual cases, and that, regardless of whether this is the aim of the research or not, case knowledge is just as valuable as predictive theories and universals. The greater concern is with the internal validity of the method. How sound are the conclusions being drawn, based on the data being collected? As long as a study has strong internal validity, then it should indeed be possible to make sound (analytic) generalisations about the broader topic at hand, based on its findings (such as trans-boundary waterway management in Ireland). Here, case study research excels, providing a robust methodological framework and employing multiple methods. Case studies are a rigorous research approach and do not inherently have any more bias towards verification, or other problems with subjectivity, than do other qualitative research approaches (Denzin and Lincoln, 2011; Flyvbjerg, 2011).

There are also practical challenges inherent to the case study approach. Denscombe (2007) cautions that defining the boundaries of a case study, negotiating access to participants and/or to the setting, and mitigating the effect of the researcher's presence (the 'observer effect') can be difficult. Of these, only the first is unique to case study research; access to participants and 'the observer effect' are challenges any social science researcher using methods such as interviews or participant observation might face, as is discussed in sections 6.3. and 6.4.1. As for defining the case study's boundaries, the pre-defined, geographical limits of the Blackwater River catchment clearly provided these.

6.3.2 Case study selection

This research project's central case study, the Ulster Blackwater River catchment (chapter nine), was selected for multiple reasons. First, the catchment is very well suited in terms of this research's overarching aim: to investigate the impact of policy divergence on trans-boundary waterway management on the island of Ireland. The catchment has waterways in both Ireland and NI, and part of the Blackwater River itself runs along the course of the

border. There are significant issues in the region surrounding trans-boundary waterway management, particularly related to diffuse nutrient pollution from agriculture, something that interview and focus group respondents from the region were acutely aware of and had much to say about; the catchment was a rich source of data highly relevant to my research questions, something important in case study research. Further, issues faced in the catchment are like those faced in other trans-boundary catchments along the length of the Irish border. This offered the possibility of generalising research findings from this case study to other regions nationally, something important if this research is to have an impact in terms of policymaking. Finally, the Blackwater catchment also made sense logistically. First, its proximity to Belfast meant that repeated travel to and from the region from Newcastle was feasible. Second, as is detailed in chapter nine, there is ongoing work in the region to facilitate cross-border management of the catchment's waterways. This meant that the researcher was able to link in with existing networks and projects recruit research participants, and thus overcome a common research barrier.

6.3.3 Access

Access to the site and to participants was facilitated through collaboration with CatchmentCARE (Community Actions for Resilient Eco-systems), an EU-funded project working to improve water quality in three cross-border river catchments on the island of Ireland, including the Blackwater (CatchmentCARE, 2021; chapter five). One of the key partners in the project is the Northern Ireland Agri-Food and Biosciences Institute Belfast (AFBINI), with which the researcher is connected via a member of her supervisory team, who works for the institute. Because CatchmentCARE was already running, with local farmers willingly taking part in it, and because research was conducted alongside CatchmentCARE's existing work, it was possible to recruit research participants from the catchment without difficulty. Recruitment of famers for focus group participation was facilitated by a CatchmentCARE employee whom they knew well and trusted (discussed in more detail below). Further, the researcher was lent credibility by her association with AFIBI and CatchmentCARE, which aided recruitment of interview participants in the catchment.

6.4 Research methods

This section details methods employed in this research and explains their role in answering the research questions. Methods selected reflected the principally qualitative nature of the research but included a small quantitative element. The primary method of data collection

was semi-structured in-depth interviews with participants in both Ireland and Northern Ireland. Note that, further to the above justification for the need to understand the policymaking context across the island of Ireland, interviews took place across Ireland and NI, not just in the Blackwater catchment. Interviews were supplemented with a focus group with farmers from the Blackwater catchment, as well as secondary data including: land use maps, agricultural economic data and statistics, legislative and policy documents, and media and literature sources. A research journal was also kept throughout the research process to record thoughts, ideas and events. This information facilitated data analysis and supported reflexivity. Each method is detailed below. Underpinning these were the philosophical and methodological assumptions of the research strategy, namely that the social world is layered, complex and open to interpretation, but objectivity remains important in the research process.

6.4.1 Semi-structured interviews

In-depth, semi-structured interviews described by Hesse-Biber and Leavy (2006) as "a special kind of knowledge producing conversation" (p. 128), serve to uncover narratives and illuminate subjectivity and context (Hennink et al., 2011). The interview process allows researchers to gain an 'emic' perspective, or "the insider's view" (Hennink et al., 2011, p. 109), which can provide detailed insights into the lives, experiences and feelings of research participants, as well as contextualise these. This kind of information is not possible to collect via other methods such as surveys (Yin, 2009; Hennink et al., 2011). Aside from providing researchers with in-depth information on the topic they are studying, semi-structured interviews are also useful for exploring sensitive topics (Hennink et al., 2011). This was important in this research as the topic of land use can be politically charged, particularly in the context of significant political events such as the UK's exit from the EU. Land use management practices are also often very personal decisions.

Semi-structured interviews facilitate fluid dialogue because they take the form of guided conversations rather than structured surveys. Although they are directed by a pre-developed interview guide, interviews are flexible; an interviewer may follow a line of discussion opened during the conversation by asking new questions *ad hoc,* or the interviewee may pre-emptively answer questions in the process of answering another (Flick, 2009). This format encourages and enables participants to express their own viewpoint. However, this can be challenging; the interviewer must maintain a natural flow of conversation with the

interviewee, while at the same time follow the study's line of enquiry (Flick, 2009). Semi-structured interviews require significant sensitivity on the part of the researcher, who must be able to balance the need to pursue the line of enquiry with letting the interviewee talk about the topic in his or her own way. The researcher is also required to constantly mediate between the conversation and the interview guide, maintaining an overview of what has already been discussed, and directing the conversation accordingly (Flick, 2009) – an issue returned to below.

Interviews were used in this research to gain insights into the experiences and perspectives of those involved in influencing or making decisions around land and waterway management on the island of Ireland, either directly (i.e., farmers) or indirectly (e.g., policy makers, lobbyists, academics). An interview guide was initially developed based on the research questions, and later refined according to information gathered during the interview process. In this way, each interview built on the previous interview(s), allowing for greater depth and understanding to be achieved as research progressed (Hennink et al., 2011). A sample interview guide can be found in appendix 7.

Importantly, although each participant was asked the same questions, the language used to ask such questions differed, depending on the individual being interviewed. For example, participants in academia might be asked about actors influencing the policy process using an approach more grounded in academic theory, an approach which would be avoided with other participants. Similarly, in trying to discern farmers' understanding of agriculture-related water pollution, questions asked of farmers might follow a line of questioning related to their personal experience of addressing water pollution on their farm. In contrast, policymakers might instead be asked more about farmer engagement with government initiatives. In this way, the same questions were asked of all participants, but in different ways, so as to take account of each individual's personal experiences, knowledge and context. This was critical to building trust and rapport with participants, and by extension, uncovering useful research insights.

Thirty-five semi-structured interviews were conducted across Ireland and NI. In three instances, two colleagues from the same organisation were interviewed at the same time for logistical ease, which brought the number of interview participants to 38. Interviews ranged from approximately 60 to 90 minutes in length. The first 9 were exploratory and took place in conjunction with the literature review and before the formal start of fieldwork. These

were held with academics and practitioners (government employees, NGO workers) who are experts in the field of agri-environment regulation and governance in Ireland and NI. Data collected during these conversations helped narrow the scope of the research project and refine research questions identified through the literature review. The remaining 26 were conducted during the fieldwork phase of this research. Thirty of the 35 interviews took place in person in Ireland or NI, in a location of the interviewee's choice – most often the participant's office or another public premise during regular working hours. The two farmer interviews took place on-farm. As a result of the Covid-19 pandemic, which began during the final months of fieldwork and prevented travel (refer to section 6.7) the last 5 interviews were conducted via telephone, Skype or Zoom, according to participant preference and technological constraints (e.g., access to Wi-Fi). All interviews were audio-recorded, always with the explicit permission of the participant.

Interview participants included farmers (2); agri-food industry representatives (3); farmers union representatives (2); central government employees (e.g., representatives of agriculture or environment departments/agencies) (7); other government agency employees (e.g., Teagasc, AFBINI, CAFRE, local councils) (12); employees and volunteers at non-governmental environmental organisations (9); academics (1); and journalists (2). A detailed list of interviewees is provided in appendix 8. Note that for confidentiality purposes, when directly quoting participants in this thesis, no distinction is made between 'central government' and 'other government' employees.; they are referred to only as 'government employees' (see section 6.6.3, below, for more on confidentiality). Note also that, while some research participants wore 'two hats', for example, by being both a government employees and part-time farmers, they are listed here in the main capacity in which they were interviewed.

Alongside these interviews, 17 shorter (15 – 30 minutes, on average) follow-up interviews took place. These adhered to the same protocol as the full interviews and required the researcher to facilitate the same 'fluid dialogue' with the participant, but without the full interview guide. The main aim of these was not to understand participant 'perspectives and experiences', but to address 'knowledge gaps' that arose during data collection (although insight into perspectives and experiences was also gained). For example, should further information be required about a certain government policy or an aspect of an industry's operations, a conversation was sought with someone with specific knowledge on this.

Participants included: agri-food industry representatives (3); farmers union representatives (1); central government employees (3); other government agency employees (5); and academics (5) (refer to appendix 8).

Together, participants in interviews and follow-up interviews represented a wide-ranging set of industries, organisations and institutions. These include: 3 agricultural industries (dairy, drystock, poultry), 3 agri-food industry organisations (non-sector specific), 2 farmers unions, 13 government agencies and departments (local to national), 8 eNGOs, 3 academic institutions, and 1 media organisation. This ensured diversity of participant opinion, knowledge experience as related to this research's questions. Great care was taken in achieving this diversity; participant sampling followed best practice in qualitative research.

Interview participants were identified through multiple channels. In the first instance, connections were made via the researcher's three academic supervisors, all of whom are established in the Ireland and/or NI agri-environmental sphere in some capacity and were able to recommend key contacts. Other key contacts, such as authors of relevant journal articles or reports, or key figures in relevant organisations, were identified through the literature review. In some instances, it was possible to make direct contact with these individuals via 'cold-call' e-mails. Where this was not successful, it was usually possible to make links via the research supervisors' connections. From there, the 'snowball effect', or 'chain sampling' (Hennink et al., 2011), were relied upon, whereby key contacts were able to identify other contacts to speak to. Hennink et al. (2011) suggest that this approach to recruitment is particularly effective when the goal is to identify participants with specific knowledge or characteristics, as was the case in this research.

The final number of interviews was loosely determined by the principle of saturation – the point at which the information being collected begins to repeat itself (Hennink et al., 2011). One a natural end point for participant recruitment was reached, the list of research participants was reviewed by the researcher and her research supervisors to ensure there were no obvious exclusions. Employing follow-up interviews, as described above, also helped mitigate the risk of overlooking important knowledge or perspectives. Note that, because of this research's explicit focus on agri-environmental policy, research participants included only individuals involved directly with development or implementation of such policy. While other industries/actors, such as water utilities or waste utilities are undoubtedly impacted by agri-environmental policies and are actively involved in land and

waterway management on the island, they are not directly involved in agri-environmental policy creation or implementation. They were, therefore, not included in this research.

Hennink et al. (2011) highlight some limitations of in-depth interviews (p. 131). First, practically speaking, a lot of transcription is required, which is a very time-intensive process. As described in section 6.5, to limit this challenge in this research, support from a third-party transcription service was employed, which reduced the transcription time by approximately half (roughly 50 percent of interviews were transcribed in this manner). Other limitations relate to the skills required of the researcher, including the ability to establish rapport, to effectively use motivational probes and listen and react to participants, and to flexibly adapt the interview guide according to the direction of conversation (Hennink et al., 2011). While establishing rapport with people is not something this researcher generally finds difficult, it did indeed take time to develop the skills to respond to and direct conversation in a way that ensured the research questions were being answered, even if only indirectly. This was particularly challenging when addressing issues related to power, given they are complex and not always obvious in nature. Further to this, while most topics covered were not sensitive or contentious, it was difficult to convince participants to speak about some subjects. This was mainly the case for poultry production in NI. Drawing information on this topic out of participants required a lot of patience and effort and was often not possible (this issue is discussed further in chapter eight). In this, and in the research process generally, it was important to be aware of issues related to researcher positionality, such as making sure questioning came from a (perceived) position of neutrality and being mindful of the type of language being used in conversation (e.g., avoiding overly academic or policy-based jargon). Importantly, participants were always made aware there was no obligation to answer questions they were not comfortable with, and to support data validity, there was also always opportunity for participants to raise issues not addressed by the researcher.

6.4.2 Focus groups

A focus group is generally defined as a 'one-off' group discussion about a specific issue, or a small number of linked issues, that is facilitated by a moderator (Krueger and Casey, 2000; Hopkins, 2007; Hennink, 2014; Cyr, 2016). The conversational nature of focus groups, which often mirror every day social situations, facilitates participants to open up and talk about their thoughts and feelings (Braun and Clarke, 2013; Cyr, 2016). Carey and Smith (1994) refer to the focus group's 'group effect', suggesting that such discussions are more than the sum

of separate individual interviews because participants both query and explain themselves to each other. Braun and Clarke (2013) also highlight the value of a focus group's group-level data, something which provides valuable information about how group participants negotiate the meaning of the topic, elaborate and justify accounts of the topic, and dispute or agree on those accounts. In line with this, Hennink et al. (2011) state that, unlike semi-structured interviews, the goal of focus groups is not to illuminate narratives, personal stories or individual contexts, but to collect a range of opinions from participants to uncover the "community perspective", or the norms and values held by a community.

In this way, focus groups augmented data collected via the one-to-one in-depth interviews, providing different, but complimentary insights as opposed to more of the same type of information. Goss (1996), Morgan (1996) and Barbour (2007) indicate that researchers typically combine focus groups with other methods when using them in research, particularly individual interviews or surveys (Morgan, 1996). Whether combined with qualitative or quantitative methods, focus groups can function effectively as part of a triangulation strategy, whereby focus group findings help corroborate or substantiate findings generated through alternative methods (Cyr, 2016), and help a researcher deepen understanding of a topic (Berg, 2014).

Hopkins (2007) warns against being too prescriptive when formulating focus group research, arguing there is no ideal focus group 'form' regarding specifics such as discussion setting, group composition or topic. With this in mind, a focus group typically includes between 4 and 12 participants (Krueger and Casey, 2000; Hopkins, 2007; Hennink, 2014; Cyr, 2016). There is no consensus on the number of participants that is optimal; some argue that a smaller group is better as it allows participants a greater chance to provide input, while others believe a larger group more effectively stimulates conversation and allows for a larger pool of total ideas (Hopkins, 2007; Cyr 2016). It is generally agreed, however, that a group of more than 12 participants is hard to manage and often leads to group fragmentation and discussion breakdown (Kreuger and Casey, 2000; Hopkins, 2007). Hennink et al. (2011) highlight the importance of focus group composition, noting that it can be both positive and negative; the former if it creates a comfortable environment conducive to productive discussion, the latter if participants feel inhibited or judged by others in the group and thus provide only "superficial" information (p. 149).

A focus group[46] was included in this research to augment data collected during interviews with the 'community perspective' of the farmers operating in the border regions on the island of Ireland. This 'group' perspective was important because it offered additional insight into how farmers understand, engage with and are impacted by agri-environmental policies, adding another layer of understanding to the perspective offered by data from interviews. At the same time, focus group data served to triangulate data collected in the interviews, in many instances corroborating and supporting what other interview participants said. The focus group included nine participants, all drystock farmers operating within near the Irish border in the Blackwater River catchment (eight from NI, one from Ireland). The conversation took place in a private room at a pub in a village close to the Irish border in Country Tyrone, NI, a location familiar to and convenient for all participants. This was done to minimise the inconvenience of attending for participants, and to make them feel as comfortable as possible during the conversation. The focus group was organised by an agricultural advisor working with the CatchmentCARE project, someone with whom all the research participants were familiar. The advisor also attended the session and helped facilitate it, while the researcher and one of the research supervisors[47] directed the discussion with pre-prepared questions. That the advisor was involved in both organising and running the session greatly benefitted this study by increasing participant willingness to engage in discussion and answer questions openly.

6.4.3 Document analysis and secondary quantitative data

Document analysis

Document sources (e.g., correspondence, agendas and minutes of meetings, reports, etc.) are often used in qualitative research where they play various roles (O'Leary, 2004; Braun and Clarke, 2006; Bowen, 2009; Yin 2009). As a research method, document analysis is a systematic procedure for reviewing or evaluating documents, often used in combination with other qualitative methods as a means of triangulating research data (Bowen, 2009; Yin, 2009). This method is particularly suited for use in case study research, where triangulation is usually documents' most valuable role (Yin, 2009). Bowen (2009) highlights other key functions: providing information on the research context; highlighting additional lines of

[46] Note that, originally, three focus groups were planned, but two were unable to take place because of the Covid-19 pandemic (refer to section 6.7).

[47] The research supervisor is involved in the CatchmentCARE project in a professional capacity. She came to the session to support the researcher with note taking, and also added to the conversation with questions, where appropriate.

enquiry; providing information that augments or further illuminates research data; and demonstrating how change and development has occurred over time. In this research, documents also helped identify relevant actors and institutions to approach for further data.

Thematic analysis of 34 secondary documents (agri-environmental policies, agri-food strategies, planning strategies) was undertaken in this study. A complete list of documents analysed is detailed in appendix 9. Documents were selected based loosely on a 'policy scan' approach, which "gathers and [analyses] policies in a particular area of interest" in a systematic way (Mullen 2014, p. 2). The process involves a step-by-step process used to limit subjectivity, ensure search strategy efficacy and confirm accuracy and relevance of documents being included. More detailed analyses often involve six or more steps. However, only a few basic criteria were applied in this research given the supplementary nature of the analysis. First, policy areas of interest were identified based on their relevance to the research questions, namely: agriculture policy and strategy (e.g., national agri-food strategies), waterway management (e.g., river basin management plans), and regional and rural development (e.g., regional or rural development programmes). Important government strategies related to national economic development (e.g., programmes for government) were also included. Second, potential data sources were identified. Here, it was decided to analyse only official government documents given this research's focus on formal (government-based) policymaking areas. Third, additional criteria limiting document selection were developed, mainly to keep the scope of the analysis manageable given the time and resource available. These included the requirement that all documents be published between 2005 and 2020, to reflect the 'recent' policy environment being considered in this research, and that only 'key' policies and publications would be analysed, (i.e., national agri-food strategies, river basin management plans, etc., and not smaller, interim reports or reviews).

According to Bowen (2009) and Jacobsson (2016), the main challenge in using document analysis as a method is recognising the subjective nature of documents and how they are selected. Documents are often aligned with a particular agenda, something Bowen (2009) terms "biased selectivity" (p. 32). For example, institutional documents may have an underlying political agenda. Further, the availability of documents – what is accessible and what is not – can also tell an interesting story about the information being presented (Bowen, 2009). Jacobsson (2016) suggests that therefore researchers should therefore

consider not just a document's content, but also how and why it was written, and for whom – the context. Questions about what has been omitted from a document can also provide important information (O'Leary, 2004; Jacobsson, 2016). The challenges highlighted here are, in fact, key reasons document analysis was included as a method in this research. Examining documents with the knowledge that they are often socially and politically constructed can reveal much about underlying governance and power structures. With this in mind, key questions considered in analysing the documents included:

- What do relevant policy documents reveal about the aims and objectives of agri-environmental policies in Ireland and NI?
- What do these documents reveal about the position of actors within the agri-environmental policymaking network in Ireland and NI?
- Regarding the above questions, are there any key differences between Ireland and NI?

Quantitative data analysis

Several sources of secondary quantitative data were also employed to contextualise and supplement primary qualitative data and document analysis, an approach Goodwin (2012) suggests is often undervalued and underused in social research. However, as discussed above, this approach is common in a case study approach (Yin, 2009). Data used included economic statistics on the agricultural sector, as well as maps detailing the geography, climate and land use patterns across the island of Ireland and in the Blackwater catchment specifically. Regular reference is made to the data in this thesis, details of which are included in various appendix documents.

6.4.4 Research journal and reflexivity

A research journal was kept during this research in which the researcher's key observations and thoughts were recorded. These included, but were not limited to, insights gleaned from attending meetings and events, as well as from interviews and focus groups. This information helped formulate new questions and ideas for subsequent interviews and focus groups, and facilitated interpretation and analysis of the data during the analysis phase of research. This practice also promoted reflexivity, something that Hennink et al. (2011) suggest is intrinsic to qualitative social enquiry, and Pillow (2003) argues is integral to legitimizing, validating and questioning the research process. According to Hennink et al. (2011), reflexivity involves "conscious self-reflection on the part of researchers to make

explicit their potential influence on the research process" (p. 19). The reflexive process takes place on an ongoing basis and comprises two types of reflexivity. The first, personal reflexivity, involves consideration of the researcher's own subjectivity, and of how their own background, assumptions and behaviour affect the research process. The second, interpersonal reflexivity, refers to taking account of how research participants react to both the researcher and the research setting, and how this impacts 'the creation of knowledge' (Hesse-Biber and Leavy, 2006, p. 146). Reflexive practice thus helps manage issues of subjectivity, which both the researcher and research participants bring into research.

6.5 Data analysis

Data analysis in qualitative research requires the researcher to find connections between participants' perspectives, secondary data and the study's aims and objectives (Hennink et al., 2011). It is a continuous process, ongoing throughout all phases of the research. Given this thesis' focus on power analysis, it was important to adopt an approach to data analysis that allowed the researcher to read beyond the "'well-intentioned' passive construction of words and sentences (Evans-Agnew et al., 2017, p. 137), both in official documents and in interviews. Accordingly, this research adopted an approach to critical discourse analysis established by Fairclough (1995), which has been used to analyse social policy and practice (Hastings, 1999; Taylor, 1999; Richardson, 2000; Evans-Agnew et al., 2016; Attorp and McAreavey, 2020). This approach takes account of language and social practices (i.e., behaviours and actions), and considers the complex interactions that occur in everyday life and the ways in which people advance their interests.

All semi-structured interviews – both in-person and by distance – were audio recorded using a hand-held recorder, something agreed in advance with all participants. Recordings were transcribed verbatim. Approximately half of the transcriptions were completed by the researcher, and the other half by a Newcastle University-approved third-party transcription service. The latter was used in the interest of time saving. Supplementary conversations were not usually recorded because their main purpose was to 'fill in' data gaps and help the researcher answer specific questions that arose from full interviews and data analysis, rather than to help identify overarching themes. However, detailed notes were taken.

Thematic analysis was carried out using NVivo 12 software. Transcripts and interview notes were read and re-read multiple times, and were coded according to the key themes that arose, including issues, topics and opinions (Hennink et al., 2011). In doing so, attention was

paid to discourse, style and genre to show how language and rhetoric are used to advance particular positions (Fairclough, 2009; van Dijk, 2009).

Initial codes were developed based on overarching themes derived from concepts and theories identified in the research literature and guided by this research's central questions. Hennink et al. (2011) refer to such codes as 'deductive codes', that is, codes that originate from the researcher, not from the research data. Examples of deductive codes developed for this research include 'farmer behaviour', 'water pollution', and 'North-South relationship and issues'. Following this, 'inductive codes' (Hennink et al., 2011) were developed. These came from the research data, and therefore, as Hennink et al. (2011) suggest, "…[let] the research speak for itself" (p. 218). Examples of these include 'geography' (with sub-codes such as land base and climate – factors highlighted by many research participants as ones that significantly affects farming practices) and 'politics' (e.g., when reference was made to a specific political party, but also, where the political environment was referred to more generally). Code development stopped at the point of saturation, i.e., where no more new issues were identified in the data (Hennink et al., 2011).

Hennink et al. (2011, p. 219) state it is best that deductive codes "spur the development of inductive codes" and argue that deductive codes should not be "imposed" on data where they are not validated by the data itself. Thus, care was taken to ensure that balance between inductive and deductive codes was achieved, so that deductive codes helped foreground inductive codes, rather than the other way around. In total, 8 overarching deductive codes were developed, under which more than 300 inductive codes were loosely categorised.

This process was initiated early in the data collection phase, which allowed research questions to be refined as necessary, thereby improving the interview process and enhancing research validity. It also helped the researcher improve her interviewing technique, as she was able to reflect on how she was asking questions and otherwise engaging participants and adjust her approach where needed. Dey (1993, in Hennink et al., 2011), refers to this process as the analytic spiral.

6.6 Ethical considerations

Formal ethical approval for this project was granted in October 2019 in line with the guidelines and standards set out in Newcastle University's Code of Good Practice in Research and its Policy and Procedure for Ethical Review (Newcastle University, 2020) (appendix 10).

Efforts to adhere to good ethical conduct were made at all stages of this research, as detailed here.

Hennink et al. (2011; p. 63) highlight five important ethical considerations within qualitative research, which apply to all stages of the research process, from planning, to fieldwork, to writing up and dissemination:

> *Informed consent*. Individuals must voluntarily decide to participate in the research, contingent on being provided with sufficient, comprehensible information about the research.
>
> *Self-determination*. The right of individuals to determine their own participation in research. This includes the right to refuse participation without negative consequences.
>
> *Minimisation of harm*. Participants should not be harmed or put at risk as a consequence of participating in the research.
>
> *Anonymity.* Identity of research participants must be protected at all times.
>
> *Confidentiality.* All data records collected during research must be kept confidential at all times.

Steps to address each of these considerations within this research are as follows:

6.6.1 Informed consent and self-determination

All interviews and the focus group took place with the explicit permission of the participant(s). Before each interview/focus group, the researcher provided the participant(s) with both a written and a verbal overview of the structure and purpose of the research project, which contained all the information necessary for them to make a fully informed decision to take part (appendix 11). The researcher also made clear what participation would require (i.e., approximately one hour of their time), that participation was voluntary, that all data collected would be anonymised and remain confidential (see below), and that withdrawal from the research was possible at any time. Participants were also made aware that data would be used both as part of this thesis and in associated publications, such as journal articles. At no stage did any participant raise concerns about the nature of the research or ask to withdraw from the research.

Note that participants were not provided with incentives for their contribution to this research, nor did any participant request reimbursement for their time. The issue of incentivisation in social research is contentious. Some see incentives as reasonable reimbursement for participant time and effort, while others argue they can be coercive and may encourage participants to take part in the research despite their "better judgement"

(Grant and Sugarman, 2004, p. 279; Head, 2009). In this research, the decision not to provide incentives was taken mainly to limit risk of ethical complications. Most participants took part in a professional capacity, during their working hours, in which instance, incentivisation would not have been acceptable or appropriate. For those who participated in a non-professional capacity, e.g., farmers and some community members, most expressed internal motivations for wishing to take part, including interest in the research subject, and/or a general willingness to 'help out'.

Note also that only verbal, not written consent was sought, following guidance from Coomber (2002) and McAreavey and Muir (2011). These authors argue written consent forms are not usually helpful in social research, and at worst, can actively harm the research process or participants themselves. For example, even if a research participant grants permission for his or her data to be used, circumstances may change as research develops. A one-off form fails to account for the importance of regularly re-establishing consent with participants, rather than assuming ongoing consent because of a single signature (Ramcharan and Cutliffe, 2001; White, 2009; in McAreavey and Muir, 2011).

6.6.2 Minimisation of harm

As Hennink et al. (2011) outline, although participation in interviews and focus groups is unlikely to result in physical harm, other forms of harm such as mental harm (shame and embarrassment) or social harm (e.g., how an individual is perceived or treated by others in their workplace or wider community) are possible. Such was the case in this research. Although topics of conversation did not include anything that would be considered "sensitive personal information" (Newcastle University, 2020), some were politically contentious. Therefore, it was important that participant anonymity and confidentiality were maintained at all times. Steps taken to ensure this are outlined next.

6.6.3 Anonymity and confidentiality

All data collected in this research was anonymised and stored in line with best practice outlined in Newcastle University's data management guidelines (Newcastle University, 2021). Full details are contained in this research's data management plan, attached in appendix 12. Given the relatively small network of individuals involved in policymaking and research related to waterway management in Ireland and NI, it was also necessary to take further steps to anonymise data within this thesis and related publications, beyond those taken for data storage purposes. For example, it would often be possible to draw

connections between an individual's job title (e.g., 'catchment scientist', or 'water policy advisor'), the institution they work for (e.g., Teagasc or AFBINI), and the region in which they work. Therefore, the decision was taken to employ very broad categories when citing individual quotes, distinguishing only between 'government employees', 'eNGO employees', 'academics' and 'farmers', and every effort was made to ensure that it was not possible to infer who the individual being quoted was based on the broader textual context.

Appendix 8 provides slightly more detail about participants, to demonstrate the breadth of organisations and viewpoints represented in this research. However, as is discussed in the appendix, it is still not possible to be specific about individuals' roles within their organisations, nor to identify the organisations all individuals worked for. Ireland and NI (especially) are very 'small', both in terms of geography and population, but also societal interconnectedness. Therefore, the risk of compromising anonymity is high.

6.7 Obstacles

No major obstacles to either data collection or analysis were experienced during this research, but it must be noted that this thesis was completed during the Covid-19 pandemic, which started during the final months of the data collection phase (March 2019). Thankfully, most fieldwork had been conducted by this point, but as national 'lockdown' measures prevented travel between Newcastle and Ireland/NI for many months from the start of the pandemic, a handful of final semi-structured interviews had to take place by distance, and instead of the original three planned farmer focus groups, only one was possible (completed before lockdown was implemented). This did present some difficulties. Mainly, conducting interviews via telephone or Zoom/Skype was somewhat more difficult than in person as it was harder to establish rapport and to 'read' participants to effectively respond to them in conversation. There were also some technical difficulties experienced, such as poor internet connection or phone lines, which sometimes interrupted the flow of the interviews. However, overall, these were minor problems that did not have a significant impact on the quality of research data collected or the overall study. Further, the researcher and the research supervisors agreed that one focus group provided sufficient data to support those collected via semi-structured interviews.

6.8 Summary

This chapter outlined this research's methodological approach and design, as well as the research methods it employed. It built on the preceding chapters to argue for a flexible and

robust methodological framework that focuses on both participant perspective and the research context, and is not confined to strict methodological beliefs or a narrow set of data collection methods. The research employed a primarily qualitative approach, using semi-structured interviews and focus groups to generate in-depth data. These were supported and contextualised by secondary quantitative data and document sources. This chapter acknowledged the methodological limitations of this research approach but noted that such challenges are inherent to all research practices and that those experienced were managed effectively to ensure research validity. The following chapters presents the empirical data collected during this research and analyse what these findings highlight about the relationship between policymaking processes and waterway management on the island of Ireland.

Chapter 7: (Post-)exceptionalist policymaking on the island of Ireland

7.1 Introduction

As outlined in chapter three, finding a definitive solution to the challenge of producing food without harming the environment is a 'wicked problem' that requires compromise, with potential solutions open to conflicting, divergent arguments (Conklin, 2006; Candel et al., 2016; Kuhmonen, 2018). Until the recent past, environmental protection as it relates to agriculture has often been neglected, but, as agricultural policymaking transitions from 'exceptionalist' to 'post-exceptionalist' (Daugbjerg and Feindt, 2017), there is increased focus on "messy" policy issues such as this (Greer, 2017). This is not to say environmental awareness has resolved tensions on this front. The conflict between agricultural and environmental interests was evident in many interviews and in the focus group held during this research, with the debate often being very polarised in both Ireland and NI, as it is globally. Divisions were apparent in two main ways: first, in the challenges farmers face in making a viable living from farming without concurrently harming the natural environment; and second, in the direct conflict evident between 'the agriculture lobby' and 'the environmental lobby' in the policymaking sphere as they debate how farmers should be regulated in the face of these challenges. Because of this research's concern with governance processes and power, this thesis focuses on the latter.

This thesis argues that the way power is distributed within the policymaking arena has a significant bearing on whether/how a transition away from 'exceptional' policymaking occurs, and by extension, whether policy solutions are 'shallow' or 'deep' (chapter three). This research shows that, in both Ireland and NI, there is some evidence of a shift away from agricultural exceptionalism towards a more post-exceptionalist approach within agri-environmental policymaking. However, because the agri-food sector remains powerful and central within policymaking networks on both sides of the Irish border, this shift is minor at best. Although it is true that a key feature of policy post-exceptionalism is that the agri-food sector remains 'special' in some regard (Daugbjerg and Feindt, 2017), as this chapter argues, the agri-food sector in Ireland and NI is not just somewhat 'special', it remains firmly at the centre of agri-environmental policy networks. Other actors, including environmental ones, are not powerless, but they are less central in relevant policy networks and therefore less able to influence policy outcomes. As a result, policy interventions remain shallow and fail to challenge the status quo of agricultural exceptionalism.

A shift towards post-exceptionalism?

Chapters two and four highlight that in Ireland and Northern Ireland, as in Europe generally, the agriculture industry has historically received considerably more support and attention than many other industries, as per an exceptionalist policy approach (Daugbjerg and Feindt, 2017; Attorp and McAreavey, 2020). EU policies such as the CAP, the WFD and NiD have further reinforced this exceptionalism, creating a legacy of shallow agri-environmental policies that fail to internalise agriculture's negative externalities.

As will be discussed in this chapter, this research shows that, on the island of Ireland, closed, 'exceptionalist' agricultural policymaking networks appear to be becoming more 'open' (Daugbjerg, 1998). Two of the main ways this shift is manifest is a greater inclusion of environmental actors in the policymaking arena and an increased policy focus on mitigating agriculture's impact on the environment. As detailed in chapter three, inclusion of new actors in the policymaking network is a key feature of post-exceptionalist policymaking (Greer, 2017; Daugbjerg and Feindt, 2017), as is an increased focus on "messy" environmental issues (Greer, 2017). As public awareness and concern about environmental issues grow, both government and industry are under increasing pressure to be seen to be doing something about agriculture's impact on the environment. Involving environmental actors in policymaking networks is one way of doing this, as it lends credibility to the policymaking process. This credibility – a form of ideological power – is a resource environmental actors hold and can exchange with agricultural actors within the agri-environmental policymaking network in return for power to influence policy. Such resource exchange is a fundamental feature of policy networks (Daugbjerg, 1998).

Yet, empirical data and document analysis conducted during this research reveals that, on both sides of the Irish border, the shift towards greater inclusion of environmental actors and issues is, thus far, incomplete at best. Although environmental actors have been given a 'seat at the table', and language about sustainability and multifunctionality is increasingly included in relevant policies and strategies, this has not (yet) translated into tangible change. Focus remains on supporting the agri-food sector, while environmental actors and interests remain marginal. By extension, the roots of the problem of agriculture-related water pollution, including livestock numbers that are incongruous with water pollution targets and other environmental targets, and factors that keep these numbers high, such as a productivist mindset and a focus on increasing agricultural exports, are not fundamentally

addressed by policymakers. Moreover, the public continues to bear the cost of addressing agriculture's negative externalities, while a policy approach that promotes 'multifunctionality' means the agri-food sector is credited with, and in many cases, paid for, producing an increasing number of 'public goods', further concentrating the sector's power.

Data collected from interviews and focus groups undertaken in this research, presented here alongside analysis of relevant policy documents, help cast light why this might be the case. To reiterate points made earlier in this thesis, although this research is concerned with challenges faced in co-managing the island of Ireland's trans-border waterways, it is necessary to understand the wider policymaking context in Ireland and NI before the case of the island's trans-border catchments can be explored. While catchment-specific factors affect how trans-border waterways are managed, the policies that underpin this management are developed at national and international levels. Further, the power distributions evident among actors within the Blackwater catchment are largely the result of national-level factors, not regional ones, although as will be discussed in chapter nine, regional factors clearly affect how these distributions play on 'on the ground'. Therefore, the next two chapters (seven and eight) are concerned with the island of Ireland as a whole, setting the scene for chapter nine, which considers the trans-border case specifically.

First, in this chapter, there is an analysis of Ireland and NI's agri-food strategies and what they reveal about the structure of agri-environmental policymaking networks on the island. The power of the agri-food sector as a whole is then discussed, with emphasis on what its ongoing position at the centre of agri-environmental policy networks both north and south of the border means for regulation of agricultural pollution on the island of Ireland. In the following chapter (eight), power distributions within the agri-food sector are considered, as this thesis argues these also have important implications for policymaking. Finally, in chapter nine, the Ulster Blackwater catchment serves as a case study to illuminate what power distributions highlighted in chapter seven and eight mean for management of trans-boundary waterways on the island of Ireland. The implications of this research's empirical findings are then discussed in this thesis' final chapter (chapter ten).

Agricultural (post-)exceptionalism in policymaking: What do agri-food strategies reveal?

In this research, analysis of relevant policy documents (appendix 9) provided insight into the structure of Ireland and NI's respective agri-environmental policy networks and the actors included within them. It also revealed what the agri-environmental policy priorities are in

Ireland and NI. Ireland's and NI's agri-food strategies – influential policy instruments in both jurisdictions – provided especially useful data on this front, serving to highlight how the structure of said networks have changed over time, and what impact this has had on policy development. Analysis and discussion of these, first Ireland's, and then NI's, is presented here.

As outlined above, they do demonstrate that a shift towards more open policymaking networks is beginning to take place, with a wider range of actors included in the process over time, including more environmental actors. In addition, it appears that, in line with what would be expected of a shift towards post-exceptionalism, new and different agri-food actors are becoming central in the networks, with traditional agri-food actors such as farmers' unions competing for space with newer actors such as processors (Daugbjerg and Feindt, 2017) (something discussed in greater detail in chapter eight). This is particularly the case in NI. However, they also reveal that despite this shift, focus remains squarely on supporting agri-food interests. This means that agri-environmental policies continue to sustain the status quo of agricultural exceptionalism and, as a result, fail to address the ongoing water quality problems caused by diffuse agricultural pollution.

7.2.1 Irish agri-food strategies

The Irish government sets out its plan for supporting the Irish agri-food industry in regularly published agri-food strategies, five of which have been released since the year 2000 (see appendix 13). Development of each agri-food strategy is overseen by a committee comprising stakeholders from a range of backgrounds. The makeup of this committee has changed over time, reflecting a shift towards a more open policy network. Oversight committees of the first two strategies (Agri-food 2010 and Agri-vision 2015) involved no non-governmental environmental representatives, and not even an Environmental Protection Agency (EPA) staff member was on the first strategy board (appendix 13). In the words of a government employee interviewed for this research who was involved in the development of these, "committee members were nearly entirely industry players". More recent strategies (Food Harvest 2020, Food Wise 2025 and Food Vision 2030) have included actors from the environmental sector and academia (although representation is still largely agri-food focused - see appendix 13), and the 'collaborative nature' of these committees is regularly emphasised (e.g., DAFM 2015).

Inclusion of environmental actors on agri-food strategy boards seems evidence of the wider policymaking network becoming more inclusive and open. However, the degree to which such collaboration is equitable and representative of the interests of all committee members has been questioned by these new actors, who continue to claim such strategies are too 'industry focused'. As Daugbjerg and Feidnt (2017) argue, inclusion of new actors does not necessarily result in equal sharing of power within the network. Recent events highlight this tension. In February 2021, environmental interests[48] involved in developing Ireland's latest agri-food strategy, 'Food Vision 2030', withdrew from the oversight panel weeks before the strategy's planned launch. They publicly decried an absence of meaningful consideration of environmental issues within the draft strategy, and a lack of inclusion of environmental interests in the strategy's development:

> "…the draft Strategy…did not facilitate any meaningful public participation on the future of Irish land use. Climate and biodiversity NGO advocates were in addition given only a limited space at the table." (Environmental Pillar, 2021b)

Environmental Pillar's claims about lack of meaningful public consultation are supported by this research. Speaking of the 2010 and 2015 strategies, the government employee quoted above also said the board "never once" looked at documents submitted as part of the public consultation. Referring to strategy development more generally, the participant stated: "public consultation is done, but it is not taken account of. It is a form of lip service". This is evidence of a closed policy network, in which the interests of only central actors are considered important.

As highlighted in chapter three, conceding disproportionate power to certain interest groups can result in policies that omit broader societal interests such as concern for the environment (Foord, 2017; Benoit and Patsias, 2017; Richardson, 2018). The centrality of agricultural interests and concurrent side-lining of environmental actors is evident in the targets set in early strategies, with focus mainly on increasing agricultural production (appendix 13). For example, Food Harvest 2020 includes a target of "[Increasing] value of primary production output in the agriculture, fisheries and forestry sector by €1.5 billion" (a

[48] Represented by 'Environmental Pillar', a network of "…32 national and independent environmental non-governmental organisations [working] together to represent the views of the Irish environmental sector" (Environmental Pillar, 2021a).

33% increase on 2007-2009 average) (DAFM 2015, p. 8). Speaking of Food Harvest 2020, one government employee stated:

> "Food Harvest 2020 was about increasing production…there probably was expansion without due consideration to be honest. Sometimes the NGOs refer to it as green washing. And there might be a bit of truth in it, that okay, we [only] paid lip service to the environment."

The language and focus of these strategies have shifted to consider environmental issues as the makeup of the committees has changed and the 'messy', or 'wicked', conflict between agriculture and the environment has become more of a policy concern. This coincides with a shift towards a post-exceptionalist policymaking environment (Persson, 2007; Greer, 2017). For example, Food Wise 2025 (DAFM, 2015) placed less focus on increasing production and more on 'adding value' and 'increasing profitability' than did previous strategies[49]. Language about the need for the industry to be 'environmentally sustainable' became prominent. For example:

> "Food Wise 2025 recognises that…future food production systems must be as focused on managing and sustaining our natural resources as they are on increasing production." (Food Wise 2025, p. 4)

Agri-Food 2030 has been touted as even more environmentally focused both by Irish agri-food actors (including within government) and external observers. Speaking of the strategy before its release, a government employee interviewed in this research stated that it "will be all about the environment". Further, a recent report by the UN Food and Agriculture Organisation on food system governance in Ireland (Brouwer et al., 2021) states that within the strategy the "…balance [between agriculture and environment] has assumed greater importance, both in terms of how the strategy is written, as well as how accountability mechanisms are created to support it" (p. 13). However, as one research participant from the environmental sector argued:

[49] 'Adding value' and/or 'increasing profitability' does not necessarily mean that expansion of the industry is not being pushed for, but focus on value or profitability is less explicitly expansionist than, for example, a focus on increasing output. By extension, it can be argued that focus on the former may put less pressure on the natural environment.

> "...the difficulty with this document [Agri-Food 2030] is that it's full of our [environmentalists'] language, if you like, about sustainability…but there's nothing substantive behind it."

Indeed, document analysis conducted in this research demonstrates there has yet to be a fundamental shift in the way pollution from agriculture is regulated in Ireland. As summarised in chapter five, a range of measures are enforced in Ireland (and NI) under the NiD to limit agricultural pollution. By analysing these measures within this research's theoretical framing, it is possible to classify these interventions as 'shallow', 'deep', or somewhere in between (Table 7.1). As detailed in chapter three, 'shallow interventions' are those that are relatively easy to implement, but unlikely to effect fundamental change in a system. 'Deep' interventions can shift the 'status quo' of a system, but are much more difficult to execute (Meadows, 1999; Abson et al., 2016; Fisher and Reichers, 2018).

Table 7.1 Examples of water pollution control measures and associated 'intervention type'

Water pollution control measure	**Level of intervention (Parameters, feedbacks, design, intent)**	**Intervention type ('Shallow' or 'Deep')**
Limits on land spreading (170kg N/ha NiD; 250kg N/ha derogation)	Parameters; intent	Shallow AND Deep
Closed period (no land spreading during late autumn/winter)	Parameters	Shallow
Improving farmyard management, e.g.: • **Improving slurry storage capacity**	Parameters	Shallow
Improving land management, e.g.: • **Riparian margins; buffer strips**	Parameters	Shallow
Improving nutrient and fertiliser management, e.g.: • **Soil testing**	Parameters	Shallow
Improving pesticide application, e.g.: • **Use of appropriate pesticide application equipment**	Parameters	Shallow

As table 7.1 highlights, most regulations and interventions aimed at mitigating diffuse agricultural pollution are focused on 'shallow' parameters (Abson et al., 2016), a key characteristic of a closed policy network. Only the limit on land spreading of manure challenges industry expansion, given that it indirectly 'caps' the numbers of livestock a farm may hold. However, as discussed, the NiD derogation provides a mechanism of circumventing this limit (chapter five). There are also other ways, such as exporting manure off-farm to others with lower stocking densities, or, for industries such as poultry, exporting manure for processing via anaerobic digestion (see appendix 6 and chapter eight). Thus, while this intervention is not strictly 'shallow', it is arguably not entirely 'deep'. The existing production system is being maintained with the result that associated pressures on waterways are not being fully addressed. This issue is considered in further detail in chapters eight, nine and ten.

Clearly, including language about sustainability in policy is not the same as implementing tangible outcomes. It is evident the agri-food industry still holds disproportionate power. However, the environmental lobby is not powerless. The Environmental Pillar's withdrawal from the Agri-Food 2030 board put the government in an uncomfortable position publicly, and release of the strategy was forced to be delayed until August 2021. Speaking of the lobby's power, one research participant stated:

> "I do think [the environmental lobby] have a very strong impact. They are very well resourced and…are good at communicating their message." (Dairy industry representative)

Some argue that environmental interests – particularly those outside government agencies – may have difficulty achieving their objectives not because of lack of power, but because they adopt a combative, superior approach and make insufficient effort to work with the agri-food industry (e.g., see Allen and Walsh, 2021). As one research participant within Irish government put it:

> "In my view the Environmental Pillar are not good at politics. They tend to adopt a 'holier than thou' approach and they are not interested in compromise…As a result, they have alienated the people they need to bring on side with them."

This is a sentiment held by many within both government and industry and is likely a barrier to progress in terms of moving agriculture towards more 'sustainable' practices.

Nevertheless, analysis of Ireland's agri-food strategies and interviews conducted during this research reveal that, within the policymaking arena, the power balance remains skewed in favour of agri-food interests who are still central within a relatively closed policymaking network.

The aforementioned FAO report speaks glowingly of Ireland's approach to developing agri-food policies and the "capacity for coherence" within the process (Brouwer et al., 2021, p. 23). The authors emphasise the wide range of actors included in the development of recent agri-food strategies, as well as the comprehensive public consultation process undertaken as part of the process. This is not to say they do not acknowledge the difficulties experienced in trying to reach consensus. Speaking of Environmental Pillar's withdrawal from the 2030 strategy board, they write it is "…a harsh reflection of the difficulties involved in aligning visions, gauging trade-offs and making compromises during multi-stakeholder processes" (Brouwer et al., 2021, p. 25). Nevertheless, conclusions about the process are overwhelmingly positive, particularly regarding its potential for improving environmental sustainability of the Irish food system. Yet, as empirical data from this research shows, 'coherence' does not necessarily mean equitable representation of actors or interests. Indeed, 'coherence', which in this case manifests as alignment of agri-food interests with governmental ones, can be interpreted as further evidence of the agri-food sector's power. Environmental interests clearly remain peripheral, even if environmental actors are not entirely blameless for this.

In considering what the ongoing centrality of agri-food interests in agri-environmental policymaking networks means for policy outcomes, it is important to interrogate why the agri-food sector continues to be so powerful. Therefore, section 7.3.1 provides a discussion of what this research revealed about the sources of the Irish agri-food industry's power and the implications of this power for policymaking and waterway management in Ireland. But first, NI's approach to agri-food strategy development is considered.

7.2.2 NI's agri-food strategies

Following Ireland's lead, NI began publishing agri-food strategies in 2013. Analysis of its first publication (another is due in 2021) similarly reveals much about NI's agri-environmental policymaking network. Titled 'Going for Growth: A Strategic Action Plan in Support of the Northern Ireland Agri-food Industry', it outlines the desired direction for the region's agri-food sector: a re-orientation of NI's agri-food industry towards an export-dependent strategy based on large-scale industrial agriculture (AFSB, 2013; Attorp and McAreavey, 2020). Target figures are ambitious: create 15,000 new jobs, grow sales by 60 percent to over £7 billion, grow sales outside NI by 75 percent to £4.5 billion and increase value added to £1 billion by 2020. (AFSB, 2013; Attorp and McAreavey, 2020). Importantly, the targeted increase in value-added was a 60 percent increase over baseline (Allen, 2013). This is in line with sales targets, which indicates that focus of the strategy was on increasing production, not value. The strategy was primarily about agri-food industry expansion.

Development of Going for Growth (GfG) was overseen by an 'industry-led' board, which ostensibly undertook a comprehensive public consultation as part of the process. However, as with the Irish strategies, critics argue that GfG benefitted only a small group of 'insider' agri-food stakeholders. One research participant stated:

> "I and others of an [environmental] bent applied [to be on the GfG board], and some at least of us were interviewed, but no go. They wanted an 'industry representative' board, no science or [environmental] knowledge required." (Community member)

Attorp and McAreavey (2020) offer a comprehensive overview of critiques levelled at GfG. In short, they too argue that the GfG board was limited to industry stakeholders[50] and excluded actors such as academics, environmental NGOs and other community interest groups. Further, although the board claimed to have consulted various external actors as part of the public consultation, the degree to which this influenced the content of the final report is unclear. Benefits of the recommendations are directed mainly towards large agri-food corporations in the form of increased sales, rather than towards primary producers (Attorp and McAreavey, 2020). This exemplifies a closed policy network, albeit one with characteristics of agricultural post-exceptionalism, with actors such as food processors

[50] The GfG committee include 13 members: six representatives from some of NI's biggest agri-food businesses; two independent dairy farmers, both former presidents of the UFU; one representative from Invest NI; three government officials; and one accountant (AFSB, 2017; Attorp and McAreavey, 2020).

assuming a more privileged position than primary producers (Lang et al., 2001; Clapp and Fuchs, 2009).

As would be expected of a strategy developed by a closed network, most GfG recommendations are directed at supporting actors at the centre of that network. And, as Attorp and McAreavey (2020) argue, despite a shift in the makeup of the network, recommendations represent the status quo of agricultural exceptionalism. They cite continued reliance on "traditional" government support as evidence of this: responsibility for supporting proposed industry growth lies mainly with government, with the amount of government funding proposed in the strategy far outweighing proposed industry investment (£400 million versus £1.3 million). Furthermore, analysis conducted in this research shows that of 118 recommendations made in GfG (AFSB, 2013, p. 73), only 10 (8 percent) were 'sustainability' focused and included in a category called "sustainable growth". And of these, none were concerned with the environment in its own right; most were 'shallow' policy solutions facilitating 'sustainable intensification' of the industry. For example:

> "Government must fast track a solution for poultry waste into energy, recognising the environmental benefits and remove a key uncertainty over the growth of the Agri-Food industry in Northern Ireland." (Recommendation 26, p. 75)

As a shift towards agricultural post-exceptionalism occurs (chapter three), corporate actors play increasingly prominent roles within agri-food networks and are therefore able to influence how debates around agriculture and 'sustainability' are framed in public discourse (Clapp and Fuchs, 2009; Sacks et al., 2018). GfG's language and recommendations exemplify this (see AFSB, 2013, p. 73). Multiple research participants raised this as a concern:

> "…the environment was completely left out of [GfG]. In terms of air quality, in terms of carbon, in terms of biodiversity." (Government employee)

> "….in [GfG], you know, environment didn't feature. Well, it did, the words are there, but… it is increasing the dependence on factory farming and intensification of all sorts." (eNGO employee)

This highlights a core issue around what is meant by 'productivity' within the food system. In economics, productivity is defined as the ratio of outputs to inputs[51]. Productivity can be

[51] That is, productivity = $\frac{\text{units of output}}{\text{units of inputs}}$

improved by either producing more outputs with the same level of inputs ('output growth') or using fewer inputs to produce the same outputs ('input reduction') (Chew, 1988)[52]. As GfG demonstrates, the narrative within modern, 'conventional' agriculture is centred mainly on the 'output growth', or high output, side of the productivity argument. Businesses commonly achieve this is by growing bigger and more specialised, thereby achieving economies of scale – something evident in agriculture by the ongoing trend towards larger, more specialised farms. Vertical integration is another way this has been achieved within the agri-food system (chapter four). As evidenced here, this approach to productivity extends to the ways in which government and industry attempt to address agriculture's impact on the environment. Emphasis is placed on increasing production while simultaneously decreasing pollution, that is, decreasing the amount of pollution created per unit of food produced – again, 'sustainable intensification' (chapter two).

In this context, 'shallow' policy solutions make sense. Technological gains can help achieve these goals. For example, methane emissions from cows can be reduced by improving herd genetics and changing feed composition (Knapp et al., 2014), and ammonia emissions can be mitigated through improved slurry treatment (Hou et al., 2017) and/or spreading technology (Maguire et al., 2011). However, as is discussed throughout this thesis, although shallow interventions are not unimportant, fundamental change is unlikely to occur unless they are implemented alongside deeper interventions.

It is important to note that not all GfG recommendations were implemented. Indeed, some NI agri-food industry representatives interviewed for this research felt that, in general, the government fell short of supporting industry to the degree recommended in the strategy:

> "Some of the things that Northern Ireland agri-food could have done in partnership with government in order to ensure that we made best advantage of [GfG] have not moved as far or as fast as I believe would have happened and does happen in regions like the Republic of Ireland." (Industry representative)

However, the case remains that the strategy reflects the broader reality of NI's policymaking environment in which, as research participants from across the policymaking spectrum acknowledged, agricultural interests take precedence over environmental protection. One

[52] The term 'productivist' is used throughout this thesis, and in wider academic literature, to describe agriculture that is focused mainly on producing more food. However, this term does not acknowledge that, in economics, increasing productivity does not always mean increasing output, as is outlined here.

government employee didn't mince words: "Jesus, we don't think about the environment enough". Moreover, as is discussed in detail in section 7.3.2, because NI's agri-food sector is a powerful, central actor within NI's policy network, it is often considered 'untouchable' in terms of regulation. This is especially true of its intensive industries, namely poultry and dairy, which not only have the power to influence government policy but are more likely to do so in ways that compromise the environment (chapter five).

On the other hand, it is apparent the 'environmental lobby' lacks many of the resources necessary for inclusion in relevant policy networks. One long-time eNGO employee articulated this as a concern:

> "…the NGO sector here […] doesn't have the resource, doesn't have the strength and depth, it doesn't have the diversity that you'll get across the water [in Great Britain]."

First, as will be discussed in detail in section 7.3.2, the environmental lobby has neither the ideological nor the institutional power to challenge that of the agri-food sector. Further, the above participant cited lack of funding as a particular concern for the sector, with many eNGOs largely reliant on small government grants to operate, something which arguably limits their political independence. Because of funding limitations, eNGOs are also often under-staffed and un-coordinated, which compromises their ability to lobby government effectively. Their organisational power is relatively low. Conversely, organisations like the Ulster Farmers' Union (UFU) appear to be relatively well-resourced and are highly organised, with various staff members dedicated to management, communications and policy (Ulster Farmers' Union, 2021). This increases their lobbying power significantly because it allows them to create, sustain and disseminate a persuasive narrative about the ongoing need to support NI agriculture, which in turn, bolsters the sector's ideological power.

However, like in Ireland, as public awareness of and concern about environmental degradation grows, policymakers and the agri-food industry in NI are under increased pressure to be seen to be doing something about it. Again, including environmental actors in the policy network is one way of doing this. The 'credibility' environmental organisations have on the subject is a resource they can leverage to gain access to a relatively closed network. Some research participants suggested the NI environmental lobby's strength is growing because of this:

> "I think [environmental organisations have] a greater degree of influence now [because] the external policy environment has changed for Northern Ireland. We have had to wake up and smell the coffee of climate change and biodiversity loss." (eNGO employee)

Indeed, environmental interests have been given some tangible space in the policymaking arena. A report titled 'Delivering Our Future, Valuing Our Soils: A Sustainable Agricultural Land Management Strategy for Northern Ireland' (Expert Working Group on Sustainable Land Management, 2018) was developed following the GfG recommendation that "a strategic regional land management policy to determine the most productive use of our limited land" should be commissioned (recommendation 22, p. 75). Some environmental actors saw the report as a 'win', including a research participant who was on the report's board:

> "…the resulting report I think is pretty good […]. We got that [out of GfG], and…that's a success." (eNGO volunteer)

However, despite its focus on sustainability, the report is still about supporting expansion of the industry, as this quote highlights:

> "[The Expert Working Group on Sustainable Land Management's] aim was to produce a Sustainable Agricultural Land Management Strategy for Northern Ireland which would outline how the ambition of "Going for Growth" would be achieved in a way which improved farm incomes and environmental performance simultaneously." (Delivering our Future, Valuing our Soils, p. 3)

Moreover, none of the report's 27 recommendations are 'deep' interventions; nearly all are 'shallow' parameters (appendix 14). This is not to say these recommendations are not valuable. As discussed in chapter three, shallow interventions can be effective and are important. However, alone, they are unlikely to effect transformational change, something which is likely required in NI's approach to regulating water pollution given the persistent nature of the problem there. Further, as many argue, expansion of intensive industries will continue to put pressure on NI's natural environment regardless of how 'sustainable' the expansion is (Committee on Climate Change, 2017; DAERA, 2018; Friends of the Earth, 2018).

Lastly, it is clear that despite these recommendations being made, less importance is placed on them than on recommendations for supporting the agri-food industry, such as those outlined in GfG. For example, in a briefing on NI's 2018 – 2020 budgetary outlook (NI Department of Finance, 2018), it was suggested that the Land Management Strategy's recommendations be delayed because of forecast budgetary restrictions. The same was not true for GfG recommendations. Together, these issues highlight the agri-food industry's continued position at the centre of NI's agri-environmental policymaking network, with recommendations for both supporting (GfG) and regulating (SLUS) agriculture focused on supporting the agri-food industry.

This is not to say that players within the NI agri-food industry have not made efforts to reduce their environmental impact. In particular, the Ulster Farmers' Union (UFU) – the main body representing NI farmers – appears to be willing to engage with policymakers, scientists and environmentalists around important environmental issues, and its relationship with these stakeholders seems good, as more than one non-industry research participant pointed out:

> "We have a good relationship with the Ulster Farmers' Union…there is a partnership approach." (Government employee)

> "Farming in NI is very well represented by the UFU, they're very, very good. In my dealings with them, they've a couple of people in there that are approachable, that will listen to you, they may have a different opinion to you, but they will make changes..." (Government employee)

The UFU's role as a go-between for government and farmers is seen as important in terms of disseminating research and implementing policies:

> "If you don't bring the industry with you then…farmers will just ignore the regulations and say 'well that's unattainable so there is no point in me even trying to do anything'. So that is why we value the UFU very much..." (Government employee)

But as is argued above of Ireland's 'consensus' approach to agri-food strategy development, it can be contended that this "partnership approach" does not allow enough critical distance between government and the UFU, or the agriculture industry more broadly. The benefits of a good working relationship between the two are clear, but, as the above quote illustrates, the flip side is that this relationship keeps agri-food interests central and powerful in the

policymaking network. As long as government continues to rely on the 'resource' that is the UFU's link with farmers, the agriculture lobby is assured of continued inclusion in the policymaking network. As a result, policy solutions will be limited to those that are acceptable to the agriculture lobby and may not go far enough to protect the environment. As one government representative stated:

> "…by being on the inside of the decision making…it gave [the UFU and industry] a little bit, a lot of control over what's happening, and…they kept a lid on it, in terms of how far the regulations went, in terms of restricting intensification."

Good working relationship or not, agriculture exerts significant pressure on NI's natural environment, a trend that is set to continue, if not worsen. And, as detailed chapters four and six, there is no indication that agri-environmental supports are shifting away from the status quo of agriculture expansion and intensification, nor that regulations will go beyond 'shallow'.

In summary, analysis of Ireland and NI's agri-food strategy documents and the process through which they have been developed reveals that although there is evidence of a shift towards a more post-exceptionalist policymaking environment on both sides of the Irish border, agri-environmental interests remain firmly at the centre of policymaking networks. This has retained government focus on helping industry expand and concurrently kept environmental regulations shallow. Exploring the different sources of the agri-food industry's power, including the ways in which power is distributed within it, can help explain why this is, and what the implications are for waterway management on the island. As the following section highlights, roots of the agri-food industry's power are similar on either side of the Irish border, although this power manifests in slightly different ways north and south. Sources of the respective industries' power and the implications of that power are discussed, before we turn our attention in chapter eight to within-industry power distributions.

7.3 Power and (post-)exceptionalist policymaking on the island of Ireland

Analysis of policymaking networks helps us understand which actors are involved in the policymaking process. Conceptions of such networks as 'open' or 'closed' can further illustrate how and why policies are developed and, to a degree, which actors they favour as a result (Daugbjerg, 1998). As is detailed in the above section, in recent decades, a more diverse range of actors have become involved in agri-environmental policymaking in Ireland and NI. Policymaking networks are becoming more open there as a shift towards post-exceptionalism starts to take place. However, without a detailed analysis of the power these actors hold, including where they derive it from and how they wield it, we can obtain only partial – sometimes uncritical – understanding of what policy network structure means for policy development. The FAO report cited in section 7.2.1 offers a key example of this kind of analysis. On the surface, greater inclusion of environmental and other community actors in agri-food strategy development is a positive development, something the report's authors emphasise (Brouwer et al., 2021). However, as research presented above highlights, 'inclusion' of actors does not always result in policy change.

A deeper analysis of power dynamics allows us to move beyond shallow descriptions of policy network structure to more complex and nuanced understandings of *why* networks are structured as they are and *how* actors within them influence policy outcomes. By extension, we develop a better grasp of the problem, which becomes easier to address as a result. This is the value of qualitative research such as that carried out for this thesis. The model of power developed for this research, described in chapter three, facilitated such an analysis. By conceiving of power as a multifaceted phenomenon derived from organisational, ideological, institutional and economic sources, and as being exercised in ways that are not always directly observable, it has been possible to articulate a more complete picture of how actors exert influence in Ireland and NI's agri-environmental policymaking networks and what this means for policy outcomes there. Importantly, it also helped describe how different forms of power interact to reinforce each other (Gaventa, 1980) to produce outcomes that are not necessarily immediately obvious – something described in further detail in chapter eight.

The following sections discuss the power of Ireland and NI's agri-food industries and how this has shaped agri-environmental policymaking and influenced policy outcomes there. This is done by exploring what empirical data reveal about how different elements of power –

organisational, institutional, ideological and economic, as described in the model of power developed for this thesis (chapter three) – are operationalised by agri-food actors. This sets the scene for the next chapter (eight), which considers power distributions among actors *within* the agri-food industry, something that this thesis argues also has important implications for policy outcomes.

7.3.1 The power of Ireland's 'agriculture lobby'

> "…the farmer lobby is one of the biggest groups in this country…we have a really strong farmer lobby here." (eNGO employee)

The power of the Irish 'agriculture lobby' was widely recognised by participants in this research, but the view of who comprises the 'agriculture lobby' varied. When speaking of 'the lobby', some participants referenced organisations like farmers' unions, while others named processors such as co-operatives. The general term 'agriculture industry' (or 'industry') was also used regularly, usually synonymous with the 'farming lobby'. Because the distinction was not consistent and clear, in this section, the terms are considered interchangeable and are taken to refer to any agricultural interest, unless specified.

The lobby's strength was viewed by many participants to be to the detriment of Ireland's natural environment. Importantly, more than one government employee acknowledged it was a barrier to implementing environmental regulations:

> "Whenever we introduce any new…policy, whether it be a River Basin Management Plan or the new Nitrates Action Programmes or whatever, we would…come under fairly significant pressure from the farming industry."

> "I know the Department of Agriculture grapples with that [managing slurry exports], and the industry would be very, quite strong in terms of pushing back, and the checks and balances aren't there."

These quotes highlight the agriculture lobby's power in action. Despite the inclusion of other actors in Ireland's agri-environmental policymaking network, agricultural actors remain central in it, with power to resist the implementation of policies that counter their interests. The sources of the lobby's power are varied and interact in complex ways. They are considered, in turn, here.

Ideological power: Agriculture as an ideology

The Irish agri-food industry's power has roots in the socio-political history of the country, as beliefs about the importance of farming are deeply rooted in Irish culture (see chapter four). Language in strategies such as Food Harvest 2025 reflect this:

> "Agri-food is Ireland's oldest and largest indigenous industry, deeply embedded in the landscape, history and personality of the country." (Food Harvest 2025, p. 1)

Such beliefs are held across much of Europe (chapter two) and, coupled with the legacy of the post-World War II drive for food security, they shaped the CAP, and in turn, Irish agri-environmental policies. This is ideological power - that which "defines reality, problems and acceptable action" and therefore limits what is possible within policymaking (Smith 1990, p. 36). The ideology surrounding agriculture and its role in the Irish (and European) countryside and wider society means that solutions to agriculture-related environmental issues are limited to those that keep farmers at their centre. A countryside without farmers is not considered a viable policy option. This reinforces the position of agricultural interests at the centre of a relatively closed agri-environmental policy network (Daugbjerg, 1998). It also means that policies addressing agricultural pollution do not challenge this existing status quo and remain 'shallow' (Abson et al., 2016) (chapter five).

This ideological power is evident in the existence of a strong 'rural vote' and its influence on Irish politics, something multiple research participants highlighted:

> "…in this country, if you want to get elected, that agricultural vote is important." (Dairy farmer)

> "…we have all of these rural politicians who just […] will support the farmers until the day you die…The policies are catering more towards rural people because that sort of seems to be where a lot of their votes are coming from." (eNGO employee)

That the 'rural vote' remains important indicates that culturally, voters – and by extension, politicians – are still concerned with supporting agricultural interests. This reinforces farmers' power, with support from elected politicians extending the reach of farmers' influence in the policy arena. This, again, has implications for how agri-environmental policies are made, and in many cases, furthers conflict between the drive to support agriculture and efforts to protect Ireland's natural environment. One government employee spoke to this directly:

> "[In Ireland] they were slower to take up the Nitrates Directive, it became a very political decision. Governments…didn't want to implement [it] because of the impact on the rural vote."

Institutional power in action: The Department of Agriculture, Food and the Marine

The import and influence of the agriculture industry has also traditionally been reflected within the relative size and strength of national departments such as the Department of Housing, Planning and Government (responsible for waterways in Ireland) and the Department of Agriculture – currently the Department of Agriculture, Food and the Marine (DAFM). As Smith (1990) argues, that there is a stand-alone department for agriculture exemplifies the power the agriculture industry holds – specifically, institutional power, or "…the institutional rules and procedures which prevent certain groups or issues having access to the agenda" (p. 36). The Department of Agriculture has held a uniquely privileged position from its inception (see Daly (2002)), and more than one research participant highlighted the imbalance that is present – or at least, has historically been present – between Agriculture and many other departments within government:

> "You've had…agriculture moving forward with driving production, and…maybe not as strong an outlook on the environmental consequences. And [the Department of Housing, Planning and Government] being in a relatively weak position…[it] was small, and was competing against agriculture which is one of the biggest departments in the country….[Although] we would kind of see [them] as equals at this stage..." (Government employee)

> "You know, the Department of the Environment or the Department of Housing, is often one of the weaker ministers at the cabinet table. So, if you have a very powerful department like the Department of Agriculture, they more-or-less just get on and do their own thing." (eNGO employee)

This institutional power is evidenced not only by the fact that agriculture has its own department, but also that the department has historically had access to more resources (finances, personnel, etc.) than other departments with interests that may run counter to it, such as those responsible for environmental concerns. For example, in 2021, the DAFM budget was £1.8 billion[53], whereas the Department of Environment, Climate and

[53] Note, this figure does not include other state support agriculture receives via the CAP.

Communications (DECC) budget was 57 percent of this, at £0.77 billion (DAFM, 2021; Department of Finance, 2021). Although it was not possible to find 2021 data on how much of the DECC budget was allocated to the EPA, in 2018, the figure was £0.42 billion (OECD, 2020, p.20). Staff numbers reflect a similar picture: currently (2021), DAFM employs 5,079 people (DAFM, 2021), while the EPA employs only 420[54] (OECD, 2020)[55].

This governance structure and distribution of resources has meant that agricultural interests have often been placed front and centre in the policymaking arena, with environmental protection trailing in importance. It can be argued that – as one government employee interviewed in this research put it – "'Agriculture' is no longer considered a major ministerial post". However, the historical imbalance between the Department of Agriculture and Department of Environment (and their various previous iterations), or other departments responsible for Ireland's natural resources, has created a legacy in terms of policy development and implementation, as the above quotes highlight. In particular, concerns remain around the availability of resources for monitoring of environmental pollution (not only from agriculture) and enforcement of environmental regulations. For example, a recent EPA[56] report on implementation of the second phase of the Water Framework Directive in Ireland indicates "limited progress" has been made on water finance, regulatory frameworks and monitoring and evaluation (O'Riordan et al., 2021) (see appendix 15). This means that even existing 'shallow' policy interventions are not being implemented fully, further reducing their efficacy. Moreover, finance is a resource which can be exchanged for inclusion in a policy network. Without it, it is likely environment agency actors will remain at the network's periphery, thus reinforcing a legacy of shallow interventions and preventing transformational change.

Power through organising (organisational power)

A sector's influence is also determined by its organisational power, or its ability to collectively lobby for its own interests. At the European level, farmers' organisational power has significantly shaped CAP policies and broader environmental regulations. For example,

[54] 2018 figure – the most recent data available.

[55] Presenting figures this way paints a simplistic, incomplete picture of how resources are allocated. In reality, the situation is far more complex and too difficult to clearly articulate here (e.g., changes in departmental structures and responsibility make it nearly impossible to identify funding allocations over a period of time, and data is not always available). However, this gives a general indication of where government priorities lie. For more information, Department of Finance (2021) provides a useful general overview of historical funding allocations.

[56] Currently, part of the Department of Environment, Climate and Communications.

recent protests by Dutch farmers against NiD regulations have resulted in some Dutch localities suspending or scrapping proposed tighter legislation (e.g., Schaart, 2019). French farmers are also notorious for their powerful protests (e.g., Reuters, 2021).

The organisational power of the Irish agriculture lobby is widely recognised in Ireland, including by those within it:

> "You see we [farmers]…have probably always been punching a little bit above our weight because we have been organised over the years." (Dairy farmer)

Farmers' unions are a key organisational tool for farmers. While multiple unions exist in Ireland, the largest, and by far the most powerful, is the Irish Farmers' Association (IFA). Many respondents made specific mention of the IFA's power, particularly in terms of lobbying politicians and influencing policy:

> "The main organisation is the IFA and there is a couple of other smaller organisations as well…but they [the IFA] are still the main organisation when it comes to fighting in Europe, which is where most of the real decisions are made…" (Dairy farmer)

Other unions, such as the Irish Creamery Milk Suppliers Association (ICMSA), were also mentioned as powerful, but featured less frequently in conversation and are clearly less dominant. Importantly, smaller unions representing drystock farmers seem to be much less influential and were not usually mentioned. This is one example highlighting how power is distributed within the agriculture sector, something discussed in detail in chapter eight.

This ability to organise has enabled the 'agriculture lobby' to obtain key resources that keep it central in the agri-environment policymaking network, including political links, both formal and non-formal, at the European and national levels. One research participant, an environmental NGO employee, lamented the fact that the IFA seemed to have access to policymakers in a way that eNGOs do not:

> "You know I have seen the guy from the IFA just go up to the Minister, shaking hands, patting each other on the back, hale fellow, well met…and you know they have meetings with them quite regularly."

These types of political connections are critical because 'meetings outside of meetings' are often where the 'real' policy agenda is set, with more formal fora (such as the agri-food strategy boards) often serving more as a front for inclusive 'due process' than a place of real decision making (Héritier, 2017; Schoeller et al., 2017; Norton, 2019). As Schoeller et al.

(2017) write, in such meetings, powerful actors can "strike a deal with one or a few crucial actors" ahead of formal negotiations, enabling them to emphasise their own preferences and accelerate negotiations (p. 1212). Norton (2019) also refers to less direct forms of 'influence' that are cultivated outside of formal meeting spaces.

The importance of these connections is clear: the Irish government currently employs eight agricultural attachés who represent "Irish agricultural interests" abroad, and are, in the words of DAFM minster Dara Callery, "crucial to Ireland's efforts to gain new market access" (DAFM, 2020c). There is no EPA equivalent. The agri-food industry also regularly employs lobbyists whose main responsibility is to cultivate important political connections. One research participant, an industry representative, was straightforward about his role:

> "I am a run of the mill lobbyist. That is still a pejorative term here, but that is what I do."

While larger environmental organisations may employ lobbyists, most eNGOs are small and lack the financial resource to do so. This resource inequity is felt acutely by many environmental actors, as this participant from the eNGO sector articulated:

> "I feel like if our sector was better resourced [we could] offer a counter voice to the IFA's message. Because theirs is dominant, because they have the powerful political connections, but also because they have the resources."

As outlined in chapter three, actors who lack resources necessary for inclusion in policymaking networks are unlikely to influence policy in meaningful ways (Daugbjerg, 1998). This is clearly the case for environmental actors in Ireland who struggle to compete with the country's much better-resourced agriculture lobby for influence.

Economic power

Agri-food is Ireland's largest indigenous industry. While the primary agriculture sector accounts for only 1.6 percent of the economy's GVA, the wider agri-food sector, which includes food and drink processing and marketing, generates 7 percent GVA and employs 10 percent of Ireland's population (Teagasc, 2021). Its relative economic importance sometimes seen overblown, with soaring language about its contribution to the economy prominent in agri-food strategies and in other industry communications. For example:

> "…in terms of direct and indirect employment and wealth creation, [agri-food's] impact across the country is unparalleled." (Food Wise 2025, p. 1)

Smith (1990) and Daugbjerg (1998) argue that, if a pressure group or actor can convince policymakers of its economic importance, it can increase its political influence. Importantly, they suggest that a *perception* of economic importance is sometimes just as important as actual importance. Such communications represent a clear effort to bolster this perception, which is likely aided by the sector's historical economic importance (chapter four).

However, it is true the sector remains a main economic driver in Ireland's rural areas where it employs up to 14 percent of the population in some regions (Department of the Taoiseach, 2021). Further, according to Teagasc (2021), because it relies heavily on domestic inputs, its local economic multiplier effect is stronger than the equivalent activity of other sectors. This economic power mutually reinforces the sector's other sources of power, particularly ideological. As one government employee stated:

> "Farming is part of the local community, and community economics need to be improved."

This highlights how different forms of power intersect to reinforce each other (Gaventa, 1980; Smith, 1990). Power is derived from and creates resources (political connections, finance, votes) that become part of a mutually reinforcing cycle. The Irish 'agriculture lobby' still has access to significantly more resources, and by extension, power, than the 'environmental lobby', meaning that it remains closer to the centre of the policymaking network. The shift towards post-exceptionalism is still in its early stages in Ireland. As a result, policies regulating agricultural pollution remain shallow.

7.3.2 The power of the Northern Ireland's 'agriculture lobby'

As in Ireland, many NI research participants explicitly acknowledged the power of the NI 'agriculture lobby':

> "In Northern Ireland…the agricultural lobby is very strong" (eNGO employee)

In interviews, the terms 'farming lobby' and 'agriculture lobby' were used interchangeably, and most often referred to the UFU, which is evidently the key mechanism through which farmers influence politics and policy:

> "The Ulster Farmers' Union is the major body representing farmers in Northern Ireland." (eNGO employee)

> "The farmers' union here has been a very loud voice and would certainly have the ear of…most politicians and across the political divide." (Government employee)

No other major organising bodies, such as dairy co-operatives, are prominent. While another farmers' union does exist – the Northern Ireland Agricultural Producers' Association (NIAPA), which is apparently the representative for drystock farmers in NI – it almost never featured in conversation, and it proved impossible to find someone at the organisation to speak to for this research (an issue returned to in chapter eight). Conversely, one cannot have a conversation about farming in NI without talking about the UFU, and it was not at all difficult to arrange interviews with UFU representatives. Interestingly, a distinction seems to exist between the 'farming lobby' – i.e., the UFU – and 'industry', which, in NI, usually refers to broiler chicken producer Moy Park, NI's largest private sector employer. This likely reflects the (partial) shift towards agricultural post-exceptionalism taking place in NI, as discussed above, with actors such as processors becoming more prominent in the agri-food network. Both the general farming lobby and poultry industry wield considerable political influence, but sources of their power differ somewhat, as do their political and policymaking goals. The general sources of the agri-food sector's power, which benefit both the UFU and Moy Park, are discussed next. Consideration of the different ways power is distributed within the sector and what this means for NI's waterways follows in chapter eight.

Ideological power: Agriculture as an ideology

Like in the South, the island of Ireland's socio-political history contributes to the NI agri-food industry's power (chapter four). Although agriculture's cultural importance is arguably less strong in the North than in the South, it clearly remains important in the psyche of the NI public:

> "[The] farming industry…it's been very, very powerful culturally" (Academic)

As discussed in chapter two, 'traditional' agricultural landscapes are integral to many Irish people's social and cultural identity (Howely et al. 2012; Howley et al., 2014), and a rhetoric of 'family farming' continues to underpin the agri-food narrative in NI. This is clearly a resource employed by the traditional agriculture lobby; even GfG, a strategy focused on expanding intensive agriculture with little regard for small producers, needed to incorporate a 'family farming' narrative to remain credible:

> "At the core of our Strategic Action Plan are recommendations that will help the industry to grow through more effective promotion of its key characteristics which include our rich heritage in lush grassland, quality and safe food and the provenance from family farms operating to the highest standards..." (AFSB, 2013, p. 10)

As in Ireland, the strength of the so-called 'farming vote' indicates that the NI agriculture industry remains culturally significant, with support from elected politicians reinforcing farmers' power:

> "Now when it comes to the creation of policy in relation to what you're talking about, yes the DUP[57] is very strongly influenced by a…farming lobby."
> (eNGO employee)

> "…you very rarely get a politician criticising farming or agriculture here."
> (Government employee)

> "[The agriculture lobby] has got its own man in government with Edwin Poots[58] being a farmer himself, haha…and he has a fairly conventional view on how farming should be as best supported." (eNGO employee)

Like in Ireland, a countryside without farmers is not a viable political option in NI, and agri-environmental policies reflect this. The ideological power of NI's agri-food industry is particularly evident in the way agri-environmental regulation and support has played out under devolution in the UK, with differences set to become starker following the UK's exit from the EU. As discussed in chapter four, NI has retained more support for its agri-food sector than Britain and shows no signs of moving away from a regulatory regime based on 'shallow' interventions. Agricultural actors remain at the centre of a relatively closed policy network in NI.

Agriculture's institutional power: The Department of Agriculture, Environment and Rural Affairs

In NI, agriculture had its own department and minister until 2016 – again, an example of institutional power. A stand-alone agriculture department, coupled with strong political ties, is part of a legacy of policymaking that favours the agri-food industry. Although the department is no longer solely dedicated to agriculture, having joined the ministry of environment to form the Department of Agriculture, Environment and Rural Affairs (DAERA), some argue the focus of the new department remains on supporting agri-food interests. Multiple research participants raised concerns about the environment department being

[57] The DUP, or Democratic Unionist Party, is joint-largest political party in NI.
[58] NI Minister of Agriculture, Environment and Rural Affairs, from 11th January 2020 – 28th May, 2021, and Leader of Democratic Unionist Party, 28th May – 30th June, 2021. Farmer.

subsumed into a department with agriculture. Some argued it was a way for the agriculture lobby to retain power in the policymaking sphere:

> "…the last thing [the farming lobby] would want is an independent environmental agency going off and doing their own thing. They made sure that the system was fitted down in the department of agriculture, with the very purposeful reason of keeping them under control." (eNGO employee)

Others expressed concern that having conflicting interests within the same department is problematic:

> "We have a situation…that you have Northern Ireland Environment Agency who promote environmental standards…are now subsumed into [DAERA]. So, there's one part of the department that's promoting agriculture [and] another is trying to stop it…and that makes it quite hard to have a coherent policy." (Government employee)

> "You know, there is a minister at the top who is trying to wear these two hats, and they often conflict with each other." (Government employee)

But not all research participants believed this to be problematic:

> "…it's a benefit. I think it's much more likely to actually see a consistent process, and the environmental concerns being addressed." (Government employee)

> "I…think it's a better arrangement than having two separate departments, often which would be in direct conflict. So at least having people in the same room...there is going to be an understanding, we're all the same department now." (eNGO employee)

The argument was also made that the structure of DAERA mirrors that of its Westminster counterpart, the Department of Environment, Food and Rural Affairs DEFRA, and therefore is not problematic. However, the agri-environmental policy network is arguably more open in England and Wales than in NI, with environmental interests on a more equal footing with agriculture there (chapter four). Thus, power imbalances within DEFRA are perhaps less likely than in DAERA, which operates in an environment where agricultural interests remain strong.

Such power imbalances are, again, reflected in the way resources are distributed within the NI government, with limited resources cited as one of the biggest challenges facing those

working to regulate environmental pollution, including that from agriculture. For example, in 2018/19 and 2019/20 financial years, among DAERA's five 'strategic groups', "Food and Farming" received approximately twice the resource funding of "Environment, Marine and Fisheries" (DAERA, 2020d; p. 99). In line with this, multiple participants, including those employed within NI Environment Agency (NIEA), suggested the agency is under-resourced and limited in its capacity to undertake monitoring and enforce environmental regulations. For example, NIEA staff currently undertake annual inspections on only one percent of NI farms (five percent for derogation farms) – the EU required minimum – despite widespread acknowledgement that some farmers do not comply with regulations because they know they are unlikely to get caught with such low inspection rates:

> "[The] difficulty that we have was that whenever the Nitrates Directive actually came in, farmers fully complied with it. Virtually all farmers became aware of it, were frightened of it. Thought 'my glory, I am going to be sat on. These people are going to be looking at my farm'. And then they realised over the next ten or fifteen years, 'I haven't seen an inspector. Why am I getting excited?' And they have gotten comfortable with the regulation, and now they are not actually complying…because they are just never going to be inspected." (Government employee)

The impact of this is tangible: although improving NI's water quality is one of DAERA's 50 key targets[59], it continues to be unmet. Notably, 27 percent of the 15 targets (4/15) related to DAERA's strategic objective of "a clean, healthy environment" (SO2; DAERA, 2020d, p. 18) were not met in 2019/2020 (three of which were directly related to agricultural pollution), versus only 14 percent of targets (2/14) related to the "Sustainable, Agri Food, Fisheries, Forestry and Industrial Sectors" objective (SO1; DAERA, 2020d, p. 18).

Power through organising (organisational power)

Many research participants argued that the NI 'farming lobby' is powerful because of its ability to organise. For example:

> "…farmers in Northern Ireland have a relatively loud political voice…[they] are better organized and better integrated into the political parties, influencing them, you know." (Government employee)

[59] "By 31 March 2020, secure a 5 percent decrease in Soluble Reactive Phosphorus (SRP) against the average in order to support the draft Programme for Government Outcome 2 indicator (improve water quality) and the 2021 EU Water Framework Directive water quality status target." (DAERA 2020d, p. 25)

As discussed above, the NI farmer 'voice' unites under the banner of the UFU. This cohesion likely contributes to NI farmers' organisational power. Rather than multiple farming organisations vying for political favour, one well-resourced central actor represents all farmers within the policymaking arena, something exemplified by the close working relationship between NI policymakers and the UFU. As argued in chapter eight, this does not mean all farming interests are represented equally. Moreover, as a shift towards agricultural post-exceptionalism occurs and 'non-traditional' actors such as processors (i.e., Moy Park) are included in the policy sphere, the unique position of the UFU is being challenged, with implications for what type of farming is supported in NI. An even greater shift towards intensive agriculture is apparent. Despite this, the UFU remains a powerful, organised voice for NI farmers and is still a central figure of the NI policy network, where it works hard to maintain agricultural interests at the fore.

Economic power: (a perception of?) economic importance

The NI agriculture industry contributes only 1.3 percent of NI's GVA[60] and employs 2.8 percent of its population. When the food and drink processing sector is included in these figures, percentage of GVA rises to 3.5 percent and share of employment to 4.6 percent (DAERA, 2020b; appendix 16). Although not insignificant, this still pales in comparison to the services and manufacturing sectors, which employ 81 percent and 11.6 percent of NI's population respectively (NISRA, 2020). However, there seems to be a strong perception among NI policymakers that the sector is economically important, as this quote exemplifies:

> "Flipping agriculture is a big part of the economy here, a big employer and everything else here. So, I suppose…you are always going to support agriculture." (Government employee)

It appears that, although this perception is greater than the reality, it nonetheless affords the sector economic power (Smith, 1990; Daugbjerg, 1998). This is not to say it has no economic importance, particularly in employment terms. DAERA argues that up to 100,000 people are employed within agri-food, either directly or indirectly (DAERA, 2020, p. 3) – a figure not necessarily fully captured by standard employment data.

Regardless of whether the reality of the sector's economic importance is unduly amplified, it is clearly difficult to implement any regulation that might limit growth[61] of the sector,

[60] Here, the value of an industry's outputs less the value of intermediate inputs used in the production process.
[61] NB – here, growth refers to general industry expansion, not to growing value added, which, as will be

something which is usually directly at odds with environmental protection. Speaking of poultry producer Moy Park, one participant made the problem clear:

> "Northern Ireland isn't sort of over endowed with economic options. Moy Park are a big, sophisticated company that know that. And they know that they don't have many areas to expand, where they can…not break the rule books. NI…is very agricultural by British standards. By bringing an existing agricultural population base into the Moy Park franchise system…they have got, they have got a lot of room for expansion." (Journalist)

The issue of intensive agriculture and economic power in NI is discussed in greater detail in the following chapter.

7.4 Summary

This chapter provided an overview of how agri-environmental policymaking networks are structured in Ireland and NI. Both empirical data and secondary data analysis show that, despite a move towards more open policymaking networks both north and south of the Irish border, the policymaking environment remains quite closed and exceptionalist there. Focus on agri-food interests is retained as other actors and interests remain on the periphery. As a result, policy outcomes remain shallow and agriculture's negative environmental externalities continue to be addressed ineffectively. Analysis of the sources of the agri-food industry's power and the way these interact and manifest provide a deeper understanding of why this is. Discussion of what this means for the future of agri-environmental policymaking on the island of Ireland takes place in chapter ten. But first, chapter eight further considers the governance structures and power distributions inherent in Ireland and NI's policymaking environment. It highlights the ways in which power is distributed among actors *within* the agri-food industry on the island of Ireland, and discusses how this, too, impacts policy outcomes.

discussed in chapter ten, is less likely to threaten environmental quality.

Chapter 8: Power distributions within the agri-food sector and implications for waterway management on the island of Ireland

8.1 Introduction

In trying to address agriculture's impact on the environment, policy attention is typically focused on meso-level relations that consider the agriculture industry a monolith. This is not unimportant; as the previous chapter highlights, power relations between 'the agriculture lobby' as a whole and actors such as the government and environmental NGOs significantly affect policy outcomes. However, such an approach fails to convey a complete picture, including complex power relations between farmers and processors, input suppliers and farm advisors. This thesis argues we cannot understand how water policy is developed and implemented without looking beyond meso-level interactions to consider how different types of farmers engage with and are impacted by it, and how other agri-food actors influence it. 'The agriculture lobby' comprises multiple autonomous actors, not all of whom have the same objectives or agency in realising them.

Empirical data highlighted in the previous chapter show that in both Ireland and NI, the agri-environmental policymaking environment remains relatively exceptionalist, with agri-food actors still central within a relatively closed policymaking network. This chapter highlights how, within the agri-food sector on both sides of the Irish border, certain actors – the dairy industry in the South, and poultry and dairy industries in the North – are more central in the agri-food policy network than others. They have more influence within the policymaking arena: stronger representation on advisory boards, closer political connections and greater ability to lobby government from the outside. In this way, they benefit more directly from agri-environmental policies and government interventions, sometimes to the detriment of other, less-powerful players within the sector and those outside it with interests counter to theirs, such as environmental NGOs.

As a result, intensive agricultural industries receive ongoing government support to expand, despite recognition of the increasing impact that animal manure from such operations is having on the island of Ireland's waterways and wider natural environment. Meanwhile, extensive industries are maintained on the land, while their contribution to water pollution is misunderstood and often overlooked. This compromises the efficacy and sustainability of existing policy instruments, with the consequence that Ireland and NI are failing to meet existing water quality targets, and are likely to continue to do so unless change occurs.

The following sections shed light on the ways different agri-food actors influence and engage with water policies. They explore the sources of these actors' power and the ways in which different types of power interact to influence actors' position in policymaking networks, and by extension, produce the policy outcomes detailed in this thesis. As in chapter seven, this is done by interrogating what empirical data reveal about how different elements of power – organisational, institutional, ideological and economic, as described in the model of power developed for this thesis (chapter three) – are operationalised by agri-food actors. In this chapter, explicit focus is placed on how this impacts interactions *within* the agri-food sector. Again, this thesis argues that it is important to interrogate power at this level, because without a detailed understanding of why and how actors operate within policymaking networks, our understanding of policy outcomes is incomplete. If appreciable change is to be made in the way waterways are regulated on the island of Ireland – that is, if deep interventions are to be implemented – we need a better understanding of why policies have failed to effect change in the first place. To this end, section 8.2 considers power distributions within Ireland's agri-food industry and discusses what impact this has had on waterways there. Section 8.3 follows and does the same in NI context.

8.2 Power distributions within Ireland's agri-food industry and implications for waterways

In Ireland, the policymaking conversation is focused on two sub-sectors of the agri-food industry: dairy and drystock. Other sub-sectors such as pig, poultry, arable and horticulture are present in Ireland, but hardly seem to factor into policy considerations and conversations about the agriculture sector[62]. This research observation was often confirmed by research participants, e.g.:

> "I would say the conversation is, from an agricultural side of things, typically dominated by dairy and drystock conversations." (Government employee)

Indeed, during research interviews, conversation nearly always centred on dairy and drystock. Unless the interview participant was specifically prompted, other industries were either not brought up or mentioned as an afterthought only. Document analysis supports this finding. While dairy and drystock were mentioned an average[63] of 29 and 37 times per

[62] N.B. Although they do not have a significant presence at the national level, the poultry and pig industries are increasingly important players in Ireland's border regions and are discussed in chapter nine.
[63] Total times mentioned across all documents analysed, divided by the number of documents.

document respectively, the poultry industry was mentioned only 12 times, the pig industry 10 times, arable 6 times and horticulture 8 times (appendix 15).

This is testament to the strength of the ideological power conferred to the dairy and drystock industries by the historical importance of cattle farming in Ireland (chapter four), and to the organisational power these sectors gain through sheer numbers. Although it is argued that dairy is also powerful because of its economic performance, other sectors are often more profitable in real terms, adding relatively more value to the economy and relying less on EU subsidies to operate (DAERA, 2020; DAFM, 2020. See also appendix 15). However, since the latter lack the numbers (organisational power) and cultural importance (ideological power) of the dairy and drystock industries, their economic power alone appears insufficient to make them central players in the agri-food network. Because of this, focus of this section is on Ireland's dairy and drystock sectors as the two main players in Ireland's agri-food industry. Note that this does not mean that the actions of actors from other sectors (arable, horticulture, poultry, pig) are inconsequential in terms of water policy development and implementation. Indeed, as is discussed in chapter nine, the poultry industry's relative exclusion from the policymaking arena has significant implications for waterway management in the island of Ireland's trans-border catchments. However, because the vast majority of land use in Ireland remains devoted to cattle rearing, whether for the drystock or dairy industries (see chapter four), and because the policymaking narrative is centred on these industries, for reasons explored in detail below, the decision was taken in this research to focus mainly on their power, to the exclusion of other industries.

Although the dairy and drystock industries are 'powerful' in the sense that both are central within policymaking networks, while other industries are not, of the two, dairy is far more powerful and 'successful', with the drystock industry lagging in many respects. As a prominent agricultural economist stated during a panel discussion at one conference: "The dualism of Irish agriculture is striking". This translates into an asymmetrical distribution of power between the sectors, evident both within organisations such as the IFA and the 'agriculture lobby' more broadly. Many participants suggested the IFA tends to represent the larger, more profitable farmers and overlook smaller farmers[64]. For example:

[64]While these distinctions tend to map onto industry-specific designations, i.e., more dairy farmers are large/intensive than are drystock farmers, this is not always the case.

> "…the main priorities in government are usually…very aligned with…with large farmers…usually smaller farmers are not well represented by the IFA, and they just don't have the political clout." (eNGO employee)

This power distribution affects the position of these industries within Ireland's wider agri-environmental policymaking network and influences how they engage with development and implementation of agri-environmental policies. This is discussed next as consideration is given to the sources of each industry's power.

8.2.1 Intensive agriculture and water pollution: Ireland's dairy industry

The Irish dairy industry's power was widely acknowledged by research participants. One government employee summed up the consensus: "…the dairy industry…[wields] a massive amount of influence in rural Ireland". This thesis argues that the dairy industry is more powerful than the drystock industry because it has greater economic and organisational power. First, as discussed in chapter four**,** it is the most economically dominant sub-sector of Ireland's agriculture industry; it accounts for nearly a third of the country's agricultural exports, and its products are in demand globally. In an export-focused economy, this gives it considerable economic power, because, when governments are 'picking winners' to boost the economy, they are more likely to support those industries that are competitive in the global market. As one policymaker told me: "Bord Bia[65] […] tells us what the market wants. And what we try and do is design policy that will help farmers meet market requirements". This can be a self-perpetuating cycle: industries that are competitive receive more government support while struggling industries continue to be left behind. However, this may again be an example of perceived versus actual economic importance (Smith, 1990; Daugbjerg, 1998). While it is clear dairy enterprises do make profit, their incomes are still heavily supported by CAP subsides, and compared to other industries such as arable or poultry, which are typically unsubsidised[66], may not add the same value to the economy (see appendix 16). Regardless, because of Ireland's export-focused strategy, the industry is seen as an economic winner, and the government supports it as a result.

[65] The Irish Food Board, responsible for promoting Irish Food globally.

[66] Detailed discussion of this is outside the scope of this thesis, however, in short, most CAP payments are delivered on a per-hectare basis. These industries typically operate on a smaller land base than dairy and drystock farmers, and thus do not receive CAP payments.

Second, the industry has unparalleled organisational power, because, unlike other agricultural industries, it operates on a co-operative basis[67]. A handful of large co-operatives process most dairy produced in the country[68] and their power is well recognised:

> "The big milk co-ops […] would have a powerful voice all round you know." (Dairy farmer)

Dairy farmers typically have a strong sense of pride in, and loyalty to, their co-operative (Briscoe and Ward, 2006), which provides a mechanism through which they can collectively lobby government for policies and strategies that reflect their interests. Co-operatives also enable dairy farmers to pool resources to expand their production, for example, by purchasing new milk processing equipment, which supports their profitability, and thus, economic power – another example of difference sources of power interacting to mutually reinforce each other. Co-operatives also come together under umbrella organisations such as Dairy Industry Ireland (DII) or the Irish Co-operative Organisation Society (ICOS) to lobby government and advance the position of the Irish dairy industry within Europe and around the world through marketing campaigns, trade envoys, etc (e.g., see Ornua, 2018; ICOS, 2021).

Because the dairy industry has the organisational and economic power to build relationships with key government actors at both national and EU levels, the sector's interests are often advanced at the policy level, which reinforces its power. As discussed in chapter four, growth of the industry has been marked since the EU lifted quotas on dairy production in 2015, something many participants suggested the Irish government actively lobbied for. The Irish government also lobbies the EU on behalf of industry (e.g., Irish Times, 2006; Irish Examiner, 2017) to maintain the NiD derogation for the approximately 6,500 farmers (most of whom are dairy farmers[69]) who rely on it to maintain a profitable (higher) number of cattle on their land (DAFM, 2019). This tight connection between the rules of the wider agriculture industry and the interests of the dairy industry exemplifies dairy's power in action.

[67] Note that power analysis could be taken even further here to consider how power is distributed between dairy farmers and dairy processors within individual co-ops. Even though farmers technically 'own' their co-op, as Murphy (2011) argues, they do not always have much agency in terms of co-op operations. However, for the purposes of arguments being made in this thesis, this level of detail is not necessary.

[68] There are currently 17 dairy co-operatives in Ireland, although the three largest processors, Glanbia, Dairygold and Kerry, process approximately 70 percent of the total milk pool (Donnellan, et al., 2015).

[69] Approximately half of Ireland's dairy farmers make avail of the NiD derogation.

Although intensive farmers do not always cause more water pollution problems than their less-intensive counterparts (chapter five), growing numbers of dairy cattle and an ever-present drive to expand and intensify dairy production is an issue in direct conflict with the need to maintain and improve the quality of Ireland's waterways, not to mention mitigate other environmental pressures such as greenhouse gas emissions. This is a classic wicked problem, with conflict between economic and environmental goals evident. One government employee articulated this challenge clearly:

> "The intensification is the thing that is harder to deal with, because it has been driven by policies, by land eligibility, and…profit. So that is a bigger, more long-term problem to look at, the intensification versus the protection for the environment."

The dairy industry's power is not all bad news for water quality. First, government and industry are acutely aware that Irish dairy's 'environmentally friendly' credentials (chapter four) underpin the industry's commercial viability, particularly in international markets. An industry representative was frank about this in conversation:

> "[Irish dairy's] commercial interests… are based on metric-based environmental credentials…and [those] metrics are declining. So, stop resting on bullshit laurels if you are serious about protecting the commercial viability of your industry and the USP that Irish dairy has, presently."

Government employees also echoed this. For example:

> "…what we say to farmers is it is not enough about being compliant with a directive or regulation, it is about the market. We want to keep our clean, green image. [The] marketing story that is sold for us abroad is a clean green environment…"

Further, the NiD derogation has come under threat recently because Ireland has not made enough progress in meeting its targets under the WFD (Kiernan, 2019; Kelleher, 2020). Losing the derogation would be a crisis for the dairy industry, as one government employee explained:

> "[The dairy industry] knows that if things are going in the wrong direction, that derogation is gone. And that investment that dairy farmers have put stands to be lost, and their reputation and all the rest of it…They know that there are significant risks in losing the derogation on which the whole dairy expansion is built on. That would be a serious…blow if they lost that."

In response to both these issues, the dairy industry has actively engaged with the EPA and DAFM to develop initiatives to demonstrate its commitment to tackling its water pollution problem. A key example of this is 'Dairy Sustainability Ireland', a collaboration between Bord Bia, DAFM and multiple dairy co-ops, all operating under the DII umbrella (DII, 2020). The Agricultural Sustainability Support and Advisory Programme (ASSAP) (chapter five; appendix 3) is a joint initiative between Dairy Sustainability Ireland and Teagasc. In addition, in the lead up to the 2021 NiD derogation review, the Irish government conducted a voluntary mid-term performance review, with a goal of identifying and mitigating any issues preventing Irish industry (all agriculture sectors) from meeting conditions of its derogation (Nolan et al., 2019) (Although it should be noted that this, once again, demonstrates a tight connection between policy and dairy industry interests).

Not only does the industry seem willing to address its water pollution problems, but most dairy farmers can engage with water quality improvement initiatives, unlike many drystock farmers. Because most dairy farmers farm full-time and their businesses make profit[70] (chapter four), they are able to devote both time and resource to understanding policy and regulations, and to engaging with education and extension services. They can also usually afford to implement pollution mitigation measures (e.g., watercourse fencing) and/or give time to applying for funding for them. They face fewer structural constraints than their drystock counterparts.

> "[Dairy farmers] are making a profit…they have a viable income into the future, and if it means tweaking their system to put in actions, measures for water quality, they are probably, in my opinion, most likely to do it." (Government employee)

Additionally, farmers who have been granted an NiD derogation know their profitability and ability to grow their business rests on them meeting its terms and will work hard to do so. Being under derogation also means that they are more likely to be regulated[71].

> "The really intensive guys are very aware of [water issues]…because they have their nitrates derogation. So, they know what they have to do, and they are prepared to do it because they are making money." (Government employee)

[70] Again, with the caveat that this profit often includes significant public subsidy.
[71] Up to five percent of derogation dairy farmers receive an inspection visit each year, as compared to three percent of non-derogation farmers.

> "…dairy farmers, because they are regulated quite extensively and tend to be more inspected [by] the Department of Agriculture or the county council…they tend to be more aware of it." (Government employee)

However, despite these positives, the power of the dairy industry within a relatively closed agri-environment policymaking network means water pollution mitigation measures still do not challenge the status quo of agricultural intensification. For example, none of the initiatives implemented through DSI/ASSAP such as improving slurry stores (see chapter five) are at 'deep' leverage points. The central narrative within both the dairy industry and government is about technical solutions for increasing industry efficiency, not about fundamentally re-structuring the sector and the way it is regulated. This means that pressures placed on waterways in Ireland by intensive industry are likely to persist.

8.2.2 Extensive agriculture and water pollution: Ireland's drystock industry

The drystock industry is a central player in the Irish agri-food network because of both its size – 73 percent of Irish farmers are drystock farmers (Donnellan et al., 2020) – and its cultural significance. CAP policies have long supported the (demonstrably unprofitable) EU drystock industry on the grounds of its cultural importance and role in maintaining the countryside that many Europeans have come to identify with (chapter two). This is a clear example of ideological power. The historical importance of beef farming in Ireland contributes to the sector's ideological power, with public support for the sector seemingly even more culturally ingrained than elsewhere (chapter four). Indeed, the strength of Ireland's rural vote is likely largely attributable to this combination of ideological power and the drystock sectors' 'strength in numbers' – one facet of organisational power. However, the drystock industry lacks the dairy industry's economic power and has less organisational power, which means that drystock farmers do not have the ability to influence policy in the same way as their dairy counterparts. In effect, drystock farmers are powerful enough to be retained on the land by public subsidies, but not sufficiently so to otherwise influence the policy agenda.

The industry has lower economic power than the dairy industry because drystock farming is generally unprofitable (often because of land base and climate – see chapter four), and although beef and sheep meat comprise a significant proportion of Irish agricultural output, their contribution to the Irish economy is smaller than dairy's, with only half the export value. They are also not as competitive in the global market, which puts the industry at a

disadvantage in Ireland's export-focused economy (chapter four). This highlights the role structural constraints (e.g., land base and the global economy) can play in limiting actors' power. Alongside this, the drystock industry has less organisational power than the dairy industry because drystock farmers do not operate under a co-operative structure, and therefore, lack a structured means of collectively engaging with policymaking and lobbying for their interests. As one industry representative interviewed in this research suggested, this makes them less of "a force" than dairy farmers. The industry's lack of economic power appears to translate into less representation in organisations such as the IFA as well, further compromising its ability to advance its interests at the policy level, as more than one research participant highlighted:

> "…I would see that there is becoming a bit of a divide now between the haves and the have-nots in terms of farming…I think the IFA, in particular, are leaning more towards the higher end productive guys, and the more extensive farmers are probably getting left behind a small bit." (Government employee)

Their sheer number does afford drystock farmers the organisational power to effect action through mass protests, such as those recently staged against low beef prices which temporarily brought the beef processing industry to a halt (Kane, 2019). However, such protests have historically effected little change. They are far less formalised and constructive than the dairy co-op mechanism, which is better suited to implementing sustained, long-term pressure on policymakers.

The peculiar way these different forms of power interact to simultaneously keep drystock farmers on the land but also on the periphery of the agri-food policymaking network impacts Irish waterways in ways that are often overlooked. As is discussed in chapter five**,** drystock farming indisputably causes water pollution. However, drystock farmers' lack of influence in the policymaking arena, combined with a prevailing but erroneous narrative equating intensity with water pollution, exacerbates practical challenges that make it difficult for many drystock farmers to effectively mitigate their pollution.

As discussed in chapter four**,** most drystock farmers operate on a part-time basis only. This means they often have neither time nor energy to engage with education services, keep up with changes in policy, or otherwise farm in a way that reflects 'best-practice'. This issue was raised by many research participants, including both those working directly with farmers, and those working in policy:

> "…a lot of drystock farmers…are part-time farming. So, when they are gone at 8 o'clock in the morning, they are not back until 6 in the evening, you know, they have maybe 2 hours in the evening and then they have [the weekend] to do some stuff…they have to prioritise what they do…The environmental action will be well down the list of priorities." (Government employee)

> "Awareness is a pretty big thing, particularly with the extensive farmers. They probably don't even engage with mainstream training programmes; I think that is a real challenge." (Government employee)

Additionally, many pollution mitigation measures, such as fencing-off water courses, can be costly. Because most drystock enterprises are not profitable, they typically have neither financial resources available to invest in implementing water pollution mitigation measures, nor economic incentive to invest in their business in this way. There is not usually money available from government (Irish or EU) for such initiatives either.

On top of this, because water pollution policy is still underpinned by the assumption that drystock farmers do not cause water pollution problems (chapter five), drystock farmers are regulated less closely than dairy farmers. As a result, there is less impetus for them to follow regulations and keep up with policy guidance and regulatory changes. This was clearly a point of frustration for some practitioners and regulators:

> "…your dry stock farmer, if you talk to them about the River Basin Management plan or Water Framework Directive or whatever, they would have no concept of it at all." (Government employee)

Because drystock farmers are currently at the periphery of the agri-food network, they are not in a position to shape policies that might better support them to address these challenges. It is unlikely that most drystock farmers wish to be more closely regulated. However, there is a trend towards stronger environmental regulation across the board (chapter two), and if stricter regulations are implemented without concurrent consideration of how drystock farmers can be supported to meet these, regulations are likely to fail. Clearly, addressing water pollution from extensive farming requires a re-think, or what Meadows (1999) and Abson et al. (2016) refer to as a deep policy shift. This is discussed further in chapter ten. But first, focus shifts to Northern Ireland, where similar challenges are faced in addressing agriculture-related water pollution problems.

8.3 Power distributions within Northern Ireland's agri-food industry and implications for waterways

As discussed in chapter seven, like in Ireland, agri-food interests remain central in NI's agri-environmental policymaking network. Further, as this section argues, intensive industries similarly form the core of the 'agri-food lobby'. However, power is distributed somewhat differently within the NI agri-food sector. Although the NI dairy industry has a strong presence, it is not the lone 'superstar' industry like in the South; the NI poultry industry also enjoys a privileged political position. This is evidence of a shift towards post-exceptional policymaking in NI, with the central position of traditional agri-food actors such as farmers' unions being challenged by newer actors, including food processors (as is discussed in section 8.3.1, the vertically integrated nature of poultry farming privileges poultry processors). Drystock farmers feature prominently as well but are less powerful in the policymaking arena than either dairy or poultry.

Other industries, including pig, horticulture and arable, also have a presence in NI, but do not appear to factor into most policy conversations and were rarely mentioned in interviews in this research. Therefore, they are not considered in this thesis[72]. Again, aside from their smaller overall contributions to economics and employment (chapter four), their low profile in the policy arena may be due to the same issues around a lack of cultural importance (ideological power) and low numbers (organisational power) faced by their southern counterparts. As the situation is similar in Ireland and is discussed in detail above (section 8.2), it will not be covered again here. However, this highlights once more that power is complex and multi-faceted; actors derive power from multiple sources and one type (e.g., economic) alone is rarely enough to guarantee a central position within policy making networks.

Mirroring the previous section (8.2), what follows is a discussion of power distributions within NI's agri-food sector and the implications of these for water pollution in NI. To re-iterate points made earlier in this chapter, these power distributions significantly influence the structure of NI's agri-environmental policymaking network and resultant agri-

[72] The researcher does note that, in terms of environmental impact, pig production presents a significant and growing problem in NI and is a politically contentious issue in some localities. See Gladkova (2020) for a comprehensive overview.

environmental policies. Therefore, understanding of these is critical to developing more effective water policies in NI.

8.3.1 Intensive agriculture and water pollution: Northern Ireland's dairy and poultry industries

NI's dairy industry is typically more intensive and thus puts more pressure on waterways than Ireland's dairy industry (Appendix 1). Further, industries such as poultry and pig, which operate under a vertically integrated, intensive model, have a greater presence in the North than in the South (chapter four). However, despite widespread understanding that NI's soils and waterways are beyond capacity in terms of phosphorous loads especially – a problem mainly related to high levels of animal manures from intensive agriculture being spread on the land (chapter four) – intensive industries have successfully petitioned against regulations that might constrain profits or limit their growth and lobbied for significant government support to expand their activities. Here, the power of the poultry and dairy industries and its implications are considered in turn.

Poultry

Research participants regularly singled out NI's poultry industry for its power, and in doing so, were typically referring to broiler chicken[73] producer Moy Park. Although poultry waste currently accounts for approximately only 5 percent of the phosphorous load in NI's soils, the industry has garnered considerable political support for expanding intensive agriculture and, therefore, its power has serious implications for waterway management.

Attorp and McAreavey (2020) outline how Moy Park influenced and benefitted from the development of NI's 2013 Going for Growth Strategy. In short, the Chairman of the GfG board was, at the time, a director at Moy Park. Many – including participants in this research –argue this individual, and by extension, Moy Park, had undue influence in the policymaking process:

> "[GfG] was largely targeted at one particular sector, largely because of the individual who chaired that. So, the poultry got a disproportionate focus, and the environment was completely left out of it." (eNGO employee)

This exemplifies an insidious and hidden element of power (Lukes, 2005) in which favourably placed individuals are able to manipulate policymaking to their own benefit (Goldstein and Keohane, 1993; in Skogstad, 1998 and Attorp and McAreavey, 2020). Attorp and McAreavey

[73] Broiler chickens, or table chickens, are those raised for meat.

(2020) also detail how this support played out in practice, with Moy Park benefitting heavily from two 'green energy' subsidy programmes: The Renewable Heat Incentive (RHI) and an anaerobic digester scheme, which were part of the Northern Ireland Renewables Obligation (NIRO). Both allowed the company (and the poultry industry in general) to expand rapidly with the help of considerable public finance, under politically questionable circumstances (McBride, 2019) and at the expense of the natural environment. It is not clear that other agricultural sub-sectors benefitted in the same way. More than one research participant highlighted this as evidence of Moy Park's outsized political influence:

> "Do you know what RHI means? Don't need to say any more than that. That's the influence of Moy Park. Huge." (eNGO employee)

Indeed, the flaws in the RHI scheme – in which Moy Park was directly implicated – resulted in a political scandal that brought down the NI government in 2017 (McBride, 2019; Attorp and McAreavey, 2020). A subsequent public inquiry into the scandal delivered a withering assessment of the governance failures related to the scheme's delivery, citing lack of transparency and poor leadership within government as key contributing factors (Coghlin et al., 2020). As Peters (1997) and Richardson (2018) argue, policy effectiveness can be compromised when governments grant interest groups excessive power, something exemplified by the RHI scandal. Richardson (2018) calls this "a central paradox in government/interest group relations" (p. 228).

Many research participants cited Moy Park's economic power as a key reason for its political influence:

> "Moy Park is big business. Money talks." (eNGO employee)

> "Because [Moy Park] is such a big employer, and because it is so important to the NI ag industry, you know, people don't want to tackle it head on." (Government employee)

The poultry industry gains economic efficiency through its intensive, vertically integrated model, and contributes more value-added to the NI economy than any other agri-food sub-sector (DAERA, 2020d). However, its influence in the policy arena seems outsized given the small number of poultry enterprises that exist as compared to dairy or drystock; they account for only 2.6 percent of farm businesses in NI (DAERA, 2020d). Even when poultry processing is considered, the number of people employed in the sector are comparatively

small (appendix 15). Thus, although the poultry industry garners influence through its strong economic performance, other factors must also contribute to its power.

Because the industry is vertically integrated, the locus of its power lies with the integrator – e.g., the processor – not individual farmers or a collective of farmers. Individual farmers are small players within a much larger production chain. Thus, lobbying power is primarily held by the processors, not farmers. In NI, this is mainly Moy Park. The following interview exchange with two research participants highlights this:

> Participant 2 (eNGO employee): [Moy Park] have a pretty big clawback, don't they? And also, if you don't meet their standard, they can come and shut you down. So, they kinda own ya, don't they?
>
> Participant 1 (Government employee): Oh completely! […] But legally it's your investment that's tied up. But they completely run…you're a herdsman for them.

This structure likely facilitated the situation whereby one influential individual – here, a Moy Park Director – was able to garner such power within policymaking. Further, there is lack of transparency within the industry, likely due in part to the fact power is so concentrated within it, unlike the dairy or drystock industries where multiple, autonomous players are at the table. One participant said pointedly:

> "… the poultry industry is…there is a real kind of closed door on that […] Poultry is something that is…a bit of a mafia in terms of how it has been dealt with." (Government employee)

In this research, it was difficult to gain access to the industry to discuss topics such as waste management and water pollution. Even research participants not directly linked to the poultry industry were unwilling to discuss it, with many asking to speak off the record, and some flat-out refusing to broach the subject. As Bachrach and Baratz (1970) and Lukes (2004) argue, what is kept off the agenda is just as important as what is on it. This is hidden power in action. The consequences of this power for waterway management are discussed in further detail in the following chapter (nine).

The industry's structure has other implications for regulations. While, for example, dairy farmers have a seat at the policy making table via involvement with the UFU, and, importantly, have agency around how they influence and interact with policy, poultry farmers typically must follow a regimented production system set out by the agri-business

they supply. On one hand, this can make regulating farmer practices easier, as one farmers' union representative articulated:

> "So, basically [farmers are] linked completely to the processing company. So, there's...a line of communication and there's a real emphasis on compliance. Which is sort of kind of...coming top-down from the processor. Whereas in other sectors, there's not that same degree of integration with the companies. So, I suppose…it's that kind of corporate responsibility almost, within the poultry meat sector, in particular."

Applying regulations in an integrated system can be easier than trying to regulate the behaviour of multiple autonomous farmers. However, if the government is unable to regulate the poultry industry effectively in the first place, then the benefits of vertical integration may be limited in this regard. Moreover, the current approach to regulating agricultural pollution relies mainly on traditional levers such as CAP cross-compliance payments (chapter four), which are targeted at individual farmers and therefore have a limited impact in terms of regulating poultry.

Dairy

Although the NI dairy industry operates under a co-operative structure, NI dairy co-operatives do not appear to wield the same political influence as their southern counterparts. Neither the main organisation representing NI dairy co-operatives, Dairy Council Northern Ireland, nor any of NI's four main dairy co-operatives, were ever mentioned by research participants. One interviewee stated: "In the South, there is a better appreciate of co-ops and what they do, and there is there is also a better co-op structure generally" (industry representative). [74] Thus, it seems the UFU is the more important channel through which dairy farmers influence policy. However, dairy farmers do seem to have a privileged position within the union, something more than one research participant raised:

> "…I have never experienced myself, but I have heard, is that the UFU is more representative of big farmers, of big industry, you know, dairy, and maybe not…the people who are not being listened to, or maybe don't have so much of a voice, are lower-intensity beef and sheep farmers who are scraping a living on the land..." (Government employee)

[74] Likely an artefact of the history of co-operatives on the island. Refer to appendix 1.

As in Ireland, this is likely due to the industry's economic power, which again, is bolstered by its ideological power (discussed above). As detailed in chapter four**,** NI's dairy industry is quite closely integrated with Ireland's, and is similarly successful in international markets. Given the NI government's focus on expanding agri-food exports, this clearly puts dairy in a favourable position. Dairy is also seen as profitable, although caveats similar to those made about Ireland's dairy industry (section 8.2.1) can be made regarding profitability.

While dairy's intensive, export-focused model brings it economic benefits, the high volumes of nutrient-rich slurry it generates puts major pressure on NI's waterways and wider environment. However, once again, as discussed in chapter five, all current efforts to mitigate related pollution problems are 'shallow' technical solutions such as improved slurry spreading machinery, that, at best, will stop the problem from getting worse for a time. Dairy's powerful position within the NI agri-food network has likely played a role in preventing more effective, 'deep' solutions from being developed.

Intensive agriculture: general challenges

Compounding the environmental problems posed by the power of the poultry and dairy industries is the fact that environmental regulators do not have the resources to properly monitor manure from these industries. Although there is a system in place to track where manure is spread, multiple participants, including those within government, admitted it is not sufficiently robust. While all farmers are required to declare how much manure they spread on their own land and how much they export to other farms, and/or, in the case of poultry, to anaerobic digestors, many interviewees referenced 'paper acres' – the fact that these declarations may be correct on paper, but do not reflect reality on the ground. These abuses occur because government does not have capacity to properly regulate this activity:

> "…anecdotally there are a lot of paper exports as well. So, it is somebody saying 'I have exported X amount of slurry to another farm', and it never goes. They are still spreading it to their own farm…" (Government employee)

> "There is an online system for manure exports and stuff. But to be honest, we don't have a lot of follow up and verification. And people can just…falsify and say they are exporting when they are not. And that is one of our main issues." (Government employee)

This, again, points to an imbalance in the respective institutional power of 'agri-food' and 'the environment' within government. While a system is in place to regulate manure produced by NI's agri-food industry, it is not sufficiently resourced to make an impact. This demonstrates a clear bias towards agri-food interests, regardless of whether or not there is explicit intention to favour it.

However, as in Ireland, many NI research participants also pointed out that full-time intensive farmers are more able to engage with policies and regulations related to waterway management, and to implement measures to mitigate nutrient runoff, because they both have time to do so, and can afford to, financially. For example:

> "The dairy farmers are generally – I use this very generally OK – but they are more, kind of, business people. They are earning serious money to run their farm. And very often they will have people employed. And they are not working off-farm, they are working on-farm constantly." (Government employee)

Intensive farmers in NI are also more likely to be closely regulated because of participation in the NiD Derogation, for example, or, in the case of large poultry units, be subject to more stringent regulations than other farmers. However, the fact remains that NI's soils and waterways are at a critical stage in terms of nutrient saturation and that much of the responsibility for this problem rests with its intensive agricultural industries. And because intensive industries' power has kept regulations shallow, preventing any real limitation on their expansion, no real progress has been made in addressing the pollution problem. This issue is discussed in further detail in chapter ten.

8.3.2 Extensive agriculture and water pollution: Northern Ireland's drystock industry

Extensive drystock farming also places serious pressure on waterways in NI. However, like elsewhere, its contribution to the problem is not fully recognised. This situation is further complicated by the fact that NI's agri-environmental policy remains focused on mitigating pollution from intensive enterprises (chapter five). This research shows that, as in the South, problems created by a prevailing 'intensity equals pollution' narrative are compounded by the ways the drystock industry's power manifests itself, and by practical considerations that limit drystock farmers' ability to limit their water pollution problems.

Like their Irish counterparts, NI drystock farmers have low economic power because their enterprises are typically unprofitable and the industry contributes relatively little to the

agriculture industry's economic output, particularly in terms of exports (chapter four). This appears to translate into less influence within the UFU, as this focus group exchange highlights:

> Interviewer: "Do you feel that the Ulster Farmers Union represents your interests or is that very dairy-centric would you say?"
>
> Participant: "It is practically what I said earlier on, it is a wee bit steered towards the better land[75]."

Lack of representation within the UFU is compounded because, while there is a union – Northern Ireland Agricultural Producers Association (NIAPA) – that ostensibly represents drystock farmers' interests, it is conspicuous in its absence from political and policymaking conversations. Focus group participants also made clear the union does not actively represent their interests:

> *Interviewer 2*: "Do you feel like [NIAPA]…facilitate your interests or put your interests forward?"
>
> *Participant*: "They wouldn't be very active in this area."
>
> ___
>
> *Interviewer 1:* "…do you feel like NIAPA represents you at the policy level?"
>
> *Participant*: "Most of the farming unions…all they want to do is sell me insurance."

On top of this, as discussed above, there are no NI drystock co-operatives. In the absence of co-operatives and effective representation within unions, drystock farmers' organisational power is limited. This, in combination with low economic power, keeps them somewhat peripheral in relevant policymaking networks, as quotes above highlight.

But again, this does not mean drystock farmers are powerless. That they hold power is evidenced by the fact that public subsidies have maintained their unprofitable enterprises on the land for decades and are likely to continue to do so in NI, even as England and Wales leave these types of policies behind. As in Ireland, drystock farmers derive organisational power from their huge numbers (approximately 19,500, or 79 percent of farmers in NI (DAERA, 2020a and 2020b)). Again, they make up a considerable element of 'the rural vote',

[75] NB – Here, 'better land' refers to the fact that larger, intensive farmers tend to operate on better land. Drystock farmers typically farm on marginal land (chapter four).

a key mechanism for advancing the sector's power. As the above quote about Edwin Poots – a farmer and former NI Agriculture minister – highlights, the overlap between the agri-food industry and politics remains strong. They also hold significant ideological power, which, like in Ireland, is likely derived in part from the historical and cultural importance of cattle farming on the island. In fact, it may be argued that much of the ideological power retained by the wider Northern Irish agri-food industry is owed to the drystock sector, because it is mainly drystock farmers who maintain NI's rolling green agricultural landscape. As mentioned above, small 'family farms', the majority of which are drystock farms, are for many, an integral part of NI culture, a narrative that is regularly advanced, including by participants in this research:

> "What we're renowned for which is our family farms, our rural communities based around those. [If you lose those], you lose that kind of fabric, that selling point on that uniqueness." (Farmers' union representative)

From an environmental point of view, many, including environmental actors, argue that extensive farmers play an integral role in supporting and managing NI's biodiversity, an important reason to keep them on the land (e.g., McAdam and McEvoy, 2009; RSPB, 2021). Narratives around the *need* to keep these farmers on the land for environmental benefits were evident in this research:

> "…if you don't have farmers, you're not going to get the environmental improvements that you need. You need them [the farmers] there as well." (Farmers' union representative)

This is another way in which drystock farmers' ideological power manifests. It is also testament to the fact that a countryside without farmers is not a viable policy solution in NI exemplifies the way in which the narrative of multifunctional agriculture has become central in policy discourse.

Whether or not drystock farmers are truly needed from an environmental perspective (an ongoing debate, discussion of which is outside the scope of this thesis), it is clear drystock farming is causing water pollution problems which are not being addressed. First, drystock farmers simply are not perceived as part of the problem. As highlighted by focus group participants, policy measures remain targeted at intensive farmers:

> "CAFRE[76], a lot of their advice…is one size fits all. And we [drystock farmers] just can't apply a lot of the stuff on our type of land you know. That would suit good land. And that's…it has always been a problem…"

There is also evidence that initiatives by DAERA and CAFRE do not engage most drystock famers. For example, DAERA/CAFRE run business development groups (BDGs) for NI farmers, one of the primary fora in which the department engages with farmers on environmental issues (DAERA, 2021a). Approximately 3,000 farmers take part in these, but as one government employee admitted, participants mainly represent larger, intensive operations:

> "There is a…large group of farmers out there that simply don't engage…it could be up to over half the farmers that we probably would never see or talk to, at least…largely from the beef and sheep. […] There are a few bigger beef and sheep men yes, but I mean you are talking less than a 1,000 of really what we would say progressive beef and sheep farmers."

This is compounded by practical limitations. As in Ireland, most NI drystock farms are run as part-time enterprises (chapter four). Multiple NI participants pointed out that lack of time and financial resources often limit drystock farmers' ability to engage with education materials and training from DAERA and CAFRE, follow updates in rules and regulations, and implement 'best practice' on their own farms:

> "A beef farmer may not have as much time to clean his farmyard, because he's gotta go home and go out building, do other things on the farm…while the dairy farmer may be there all day and have time to do that." (Government employee)

> "…part time farmers, they don't have the same time as well, obviously, to read and to attend meetings and focus on best practice…" (Farmers' union representative)

This was, in some instances, clearly a source of frustration for regulators and others working in the agri-environment sphere:

> "[Drystock farmers'] facilities are rubbish, they are ill-equipped. They use poor machinery to spread their slurry. Their farmyard management is abysmal. You know

[76] College of Agriculture, Food and Rural Enterprise (CAFRE) is a public tertiary level land-based college funded by DAERA. It supports the agri-food sector by providing training in agriculture, food technology, horticulture, equine and agri-business (CAFRE, 2021).

there is leaks in their silos. Their middens are leaking. They don't know the rules and regulations." (Government employee)

Farmers in the focus group also raised these issues. Frustration was evident on their behalf as well, not only because they were aware of such opinions of them, but also because they felt constrained in their ability to farm, despite a desire to farm well. Lack of time seemed a main factor:

> "In most people's eyes we wouldn't be counted as farmers [laughter]. Waste of resource. I mean everybody here has to work, and it is very hard to do things right. If you are working, it is very hard to farm the way you should be farming." (Drystock farmer)

Because drystock farmers are not actively shaping the policy agenda when it comes to water pollution, these issues are not being addressed. And, as one research participant pointed out, maintaining thousands of farmers on the land without adequately addressing their contribution to water pollution is problematic:

> "…remember, our dairy, our pig, our poultry…yes, they are big, intensive farmers, but there is as much [sic] nutrients in our less-intensive farmers. Those 18,500 farmers I talk about…I mean they still hold a very significant proportion of the livestock in Northern Ireland. Forty percent of it or whatever." (Government employee)

Despite these hurdles, some progress is being made. For example, projects such as CatchmentCARE and Source to Tap recognise drystock farmers' contribution to water pollution and the challenges they face in mitigating it. As such, they are working to find innovative solutions to the problem (see chapter five and chapter nine). However, as empirical research presented here shows, this approach is not indicative of the wider policy approach adopted by DAERA and CAFRE. This suggests there is a long way to go if this problem is to be addressed effectively. As will be discussed in the following chapter**,** the UK's exit from the EU may present further difficulties on this front: both CatchmentCARE and Source to Tap are both EU-funded projects whose funding is not set to be renewed past 2023**.**

To underscore points made above in section 8.2.2, the practical challenges of mitigating diffuse pollution from drystock farming are compounded by the ways in which the sector's different forms of power interact. Drystock farmers are clearly somewhat peripheral in agri-

environmental policymaking networks in NI, as they are in Ireland. However, it is not sufficient to say they are not powerful enough to influence policy. Empirical data shows they are powerful in ways that keep them on the land, and this means that, that if water pollution problems are to be addressed, it is necessary to make them part of the solution. Additionally, the underpinning narrative that assumes extensive farming does not contribute significantly to water pollution needs to be further challenged. Both changes will likely require a 'deep' shift in the current policy mindset, a challenge that is discussed further in chapter ten.

8.4 Summary

Empirical data from this research highlight the conflict between agricultural and environmental interests on the island of Ireland, and how the tendency to treat the agri-food industry as exceptional persists (chapter seven). As a result, policy focus continues to support the expansion of the agri-food industry and ensure that agri-environmental regulations remain shallow, meaning that the island's water pollution problems persist. As this chapter highlights, this research also finds that, because of the centrality of agri-food actors in agri-environmental policymaking networks, power distributions *within* the agri-food network have major implications for how water pollution is regulated. Dairy and drystock sectors hold prominent positions owing to their ideological power which is rooted in a legacy of cattle-based family farming both north and south of the Irish border. However, dairy farmers have more economic and organisational power than their drystock counterparts and therefore more influence in the policymaking arena. In NI, as a shift towards post-exceptionalism begins to take place, poultry processors are also becoming prominent in the policymaking network. As a result, policy tends to favour the dairy and poultry industries whose expansion continues to put pressure on waterways. Further, although drystock farmers are powerful enough to be kept on the land, they are not central enough in policymaking networks to influence water policy in a meaningful way, which means their contribution to water pollution is not being addressed effectively. The following chapter presents a case study of the Ulster Blackwater catchment and gives consideration to what the challenges highlighted in chapter seven and eight mean for trans-border waterway management on the island of Ireland.

Chapter 9: Trans-boundary case study: The Ulster Blackwater catchment

9.1 Introduction

Chapters seven and eight have set out the challenges faced in regulating diffuse agricultural pollution and managing waterways across the island of Ireland. It is clear that, in both Ireland and NI, agri-environmental policymaking is affected by a complex array of socio-political factors. The distribution of power within the policymaking environment is of particular importance as it determines who is consulted, who gains influence, and ultimately, who helps to shape policy. Developing an understanding of the agri-environmental policymaking environment at an all-island level was the first step in understanding how diffuse agricultural pollution is regulated and waterways are managed in the island's trans-border catchments – a central aim of this research, and focus of this chapter.

As chapter five details, case study research allows for in-depth exploration of context-dependent issues related to human behaviour and social interactions. Such an approach is particularly useful where the study's contextual conditions are highly pertinent to the research questions being asked, and where there are many variables at play (Yin, 2009; Flyvbjerg, 2011; Harrison et al., 2017).The trans-border Ulster Blackwater catchment provided an excellent case to consider because of its topography, abundance of interconnected waterways, rapidly expanding agricultural industry, powerful corporate interests, and complex regulatory systems in two separate countries. Water pollution due to agricultural activities is a growing problem in many parts of the catchment, so analyzing and understanding the many contributing factors, including multiple layers of administrative complexity and the challenges faced by regulatory agencies, is an essential first step in the ongoing struggle to improve water quality. By exploring how the socio-political factors highlighted in chapters seven and eight play out in a practical context, it is possible to identify the key obstacles to substantive change. Many of the lessons and insights gained here can no doubt be applied to other regions on the island of Ireland that also suffer water pollution problems related to agricultural practices.

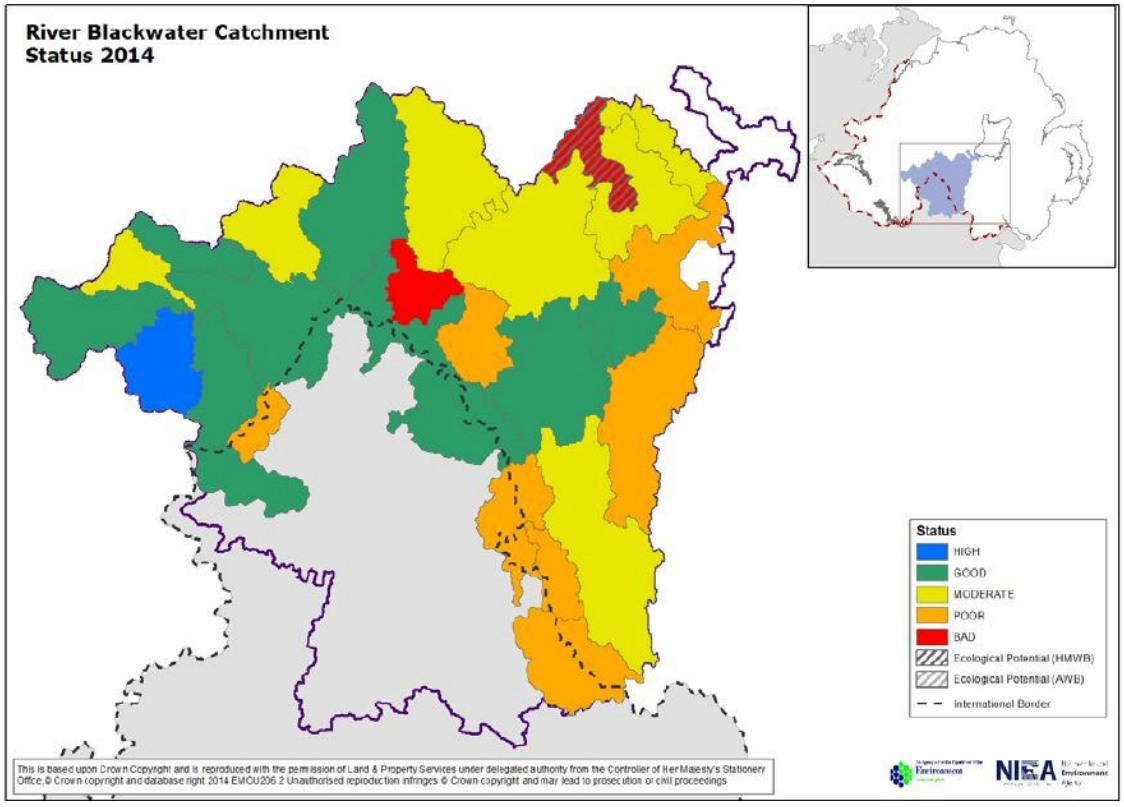
Section 9.2 describes the case study context, detailing the waterways and other physical features present in Ulster Blackwater catchment, and providing an overview of agricultural activities taking place there. Section 9.3 discusses the pressures these agricultural activities are placing on waterways in the catchment and the challenges faced in addressing these. Finally, section 9.4 considers what this empirical data from this case study reveals about

addressing these challenges across administrative boundaries, both regional and international.

9.2 The Ulster Blackwater catchment: Overview

The Ulster Blackwater River is situated within the Neagh-Bann International River Basin District (IRBD) and is one of six major inflowing rivers into Northern Ireland's Lough Neagh, the largest lake in Great Britain and Ireland (Jordan et al., 2008; Lough Neagh Partnership, 2017). The river is encompassed by a 1,480km^2 catchment that straddles the Irish border and therefore has jurisdictions in both Northern Ireland (Counties Armagh and Tyrone; 74 percent) and Ireland (County Monaghan; 26 percent) (Jordan et al., 2008; CatchmentCARE, 2021) (figure 9.1). It passes through several urban areas including Monaghan (Ireland), Armagh (NI), Dungannon (NI) and Portadown (NI) (NIEA, 2015).

Figure 9.1 The Ulster Blackwater catchment



Source: NIEA, 2015

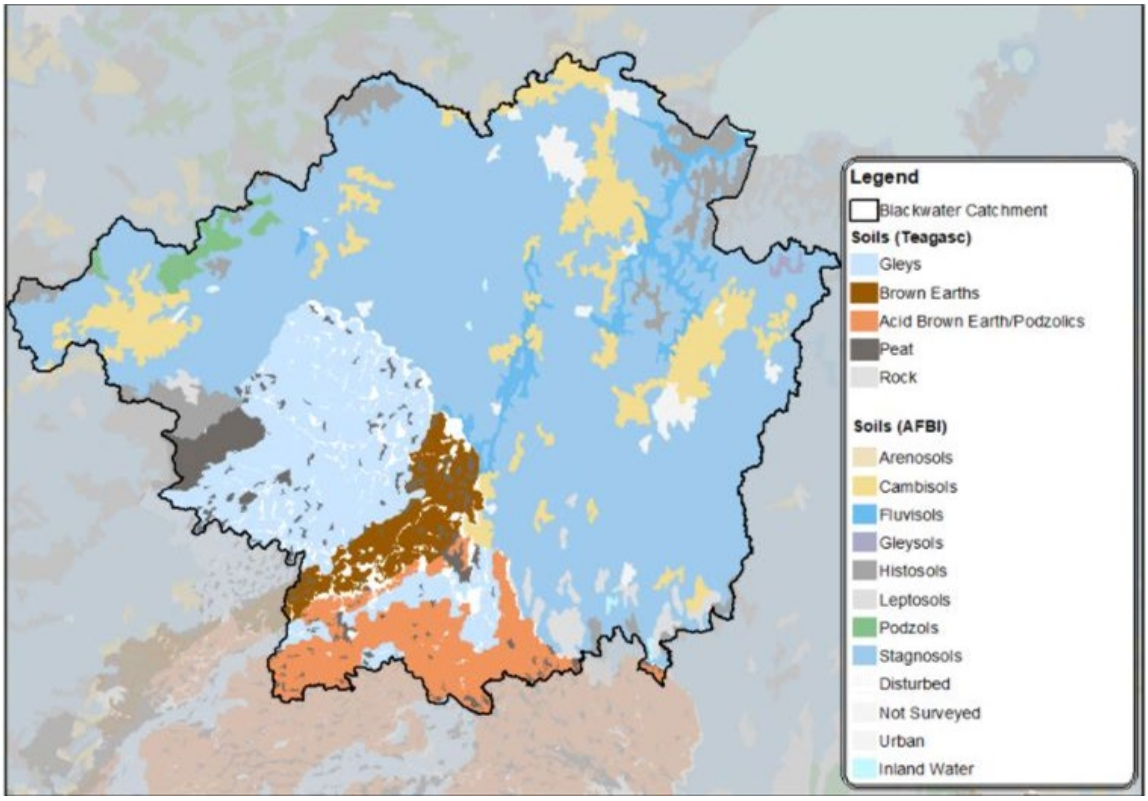
9.2.1 Catchment geography, topography and land use

The Ulster Blackwater catchment's topography is glacial in origin, like most of the north of the island of Ireland. Drumlins[77] predominate, with wet marshy areas, fens, basin peats and

[77] Oval-shaped hills.

lakes dominating the landscape between them. Soils are mainly gleys and humic gleys (i.e., compact and poorly draining) and are based on dense clay till (see figure 9.2 and refer to appendix 11 for additional detail on soil types). Rainfall in the region is approximately 800 – 1000 millimetres annually, up to 70 percent of which is runoff (Jordan et al., 2008; CatchmentCARE, 2021b). Some of the waterbodies in the catchment have been deepened and/or otherwise modified as part of ongoing flood risk management (Jordan et al., 2008; Northern Ireland Environment Agency, 2015), and drainage schemes (e.g., channelization and arterial drainage) were undertaken along the Blackwater River during the 1980s to improve agricultural land (Jordan et al., 2008).

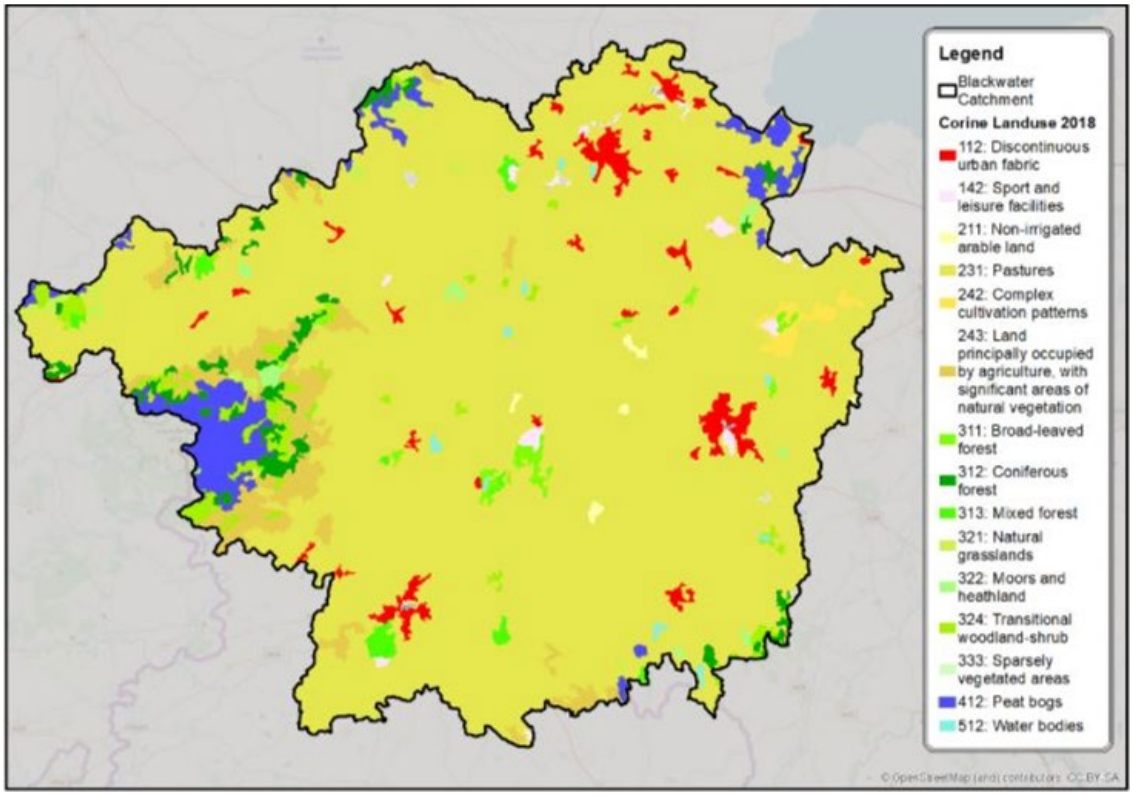
Figure 9.2 Soil type in the Ulster Blackwater catchment



Source: CatchmentCARE, 2021b

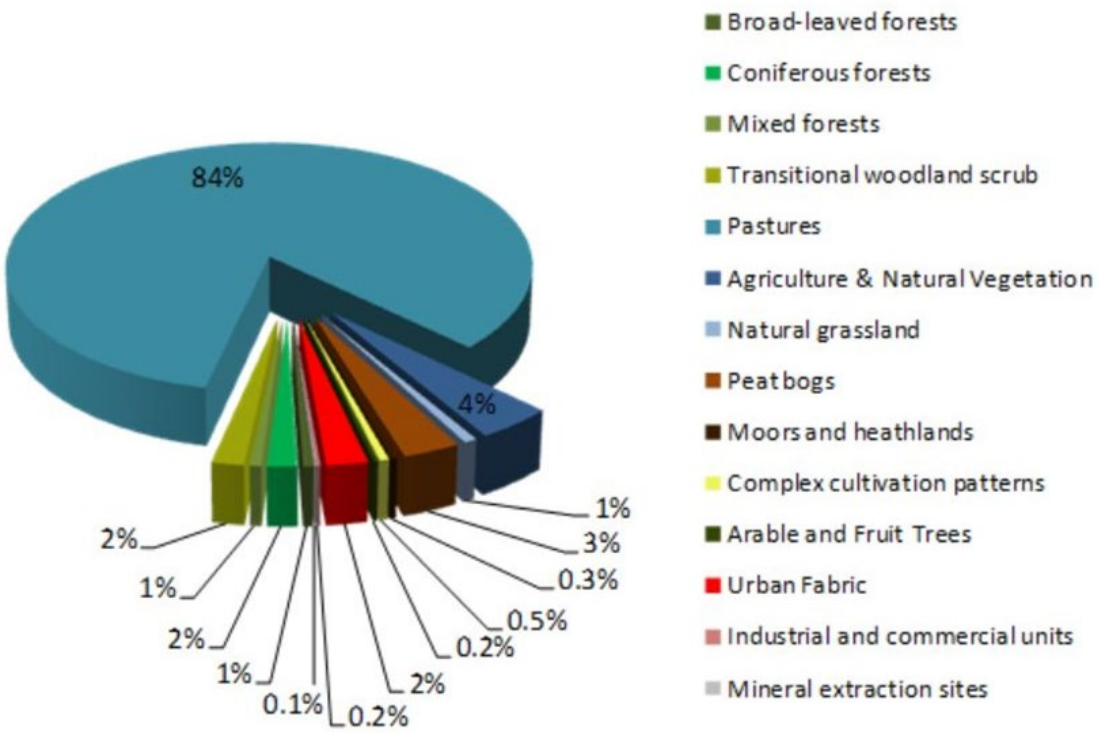
Land use in the catchment is heavily agriculture-focussed: the vast majority (89 percent) is grassland managed as pastures and silage meadows for sheep, beef and dairy farming (Jordan et al., 2008; CatchmentCARE, 2021). Figures 9.3 and 9.4 illustrate land use in the catchment, including both agricultural and non-agricultural activities. Section 9.3, below, describes the type and distribution of these agricultural activities in further detail and discusses what empirical data from this research revealed about challenges faced in mitigating the impact of these on the catchment's waterways.

Figure 9.3 Ulster Blackwater catchment land classification map



Source: CatchmentCARE, 2021b

Figure 9.4 Land use categories in the Ulster Blackwater catchment



Source: CatchmentCARE, 2021b

9.2.2 Waterways in the Ulster Blackwater Catchment

The catchment contains 57 river water bodies, 9 lake water bodies and 14 groundwater bodies. River water bodies ultimately drain north[78] into NI's Lough Neagh and out to the Irish Sea. Status of all water bodies in the catchment, as of 2018, is summarised in table 9.1. Twelve of the catchment's river water bodies changed status in the 2018 assessment, with 5 declining and 7 improving (CatchmentCARE, 2021b). Pressures on these water bodies come mainly from agriculture, hydromorphology[79], and urban and domestic wastewater treatment, although diffuse urban runoff and 'licenced discharges[80]' are also a problem.

Table 9.1 Status of waterbodies in the Ulster Blackwater catchment

Status	High	Good	Moderate	Poor	Bad	PEP/BEP/MEP[81]	Unclassified
River waterbodies	3	13	19	9	2	6	5
Lake waterbodies		1	1				7
Groundwater bodies		11		3			

Source: data adapted from CatchmentCARE (2021b)

It is worth noting here that, because there are multiple sources of pollution threatening waterways in the catchment, as is the case across both Ireland and NI, farmers often feel they are being scapegoated when focus related to the issue is placed on them. Several research participants highlighted this challenge, and one based in the Ulster Blackwater catchment articulated it clearly:

> "…the other real issue then is, in terms of sewerage discharge, this legacy of very poor government investment, and the continued inadequate investment in sewage treatment. […] People who are representing agriculture…will often say that if the government and the department of housing and water, and Irish Water the utility, are still causing all of this pollution, then actually it makes it very difficult for them… They

[78] Most trans-boundary waterways in the east of the island of Ireland flow northwards, while waterways in the west flow south. Thus, failure to address water pollution problems in eastern catchments ultimately poses more of a challenge for NI, whereas the opposite is true in the west.
[79] Hydromorphology = the physical character and water content of waterbodies. Pressure may include, e.g., watercourse channelisation/straightening, which increases waterflow speed and erosion (Houlden, 2017). As highlighted in section 9.2.1, this is clearly an important consideration in the Ulster Blackwater catchment.
[80] E.g., discharges from industry.
[81] Poor/bad/moderate ecological potential.

> are trying to convince farmers to buy into making changes on their farm to improve water quality. But there was a big press release yesterday saying that there was still raw sewerage from nearly 80,000 people being pumped into our rivers. So, it makes it difficult to them if government in a semi-state agency can't get it right, and then they are pointing the finger at the farmers."
>
> (Government employee, Ireland)

This is an important consideration in terms of securing 'buy in' from farmers when implementing water policy and agri-environmental polices more broadly and is highlighted here to demonstrate that this research recognises that agriculture is not the only pressure on waterways in the catchment (or on the island of Ireland). Nevertheless, the case remains that it is one of the biggest. Thus, addressing its contribution to the problem is imperative if the decline in the quality of the catchment's water bodies is to be halted. For this reason, and because of this thesis' concern with diffuse agricultural pollution, the remainder of this chapter focuses on the impact agricultural activities have on waterways in the Ulster Blackwater catchment.

9.2.3 Agriculture in the Ulster Blackwater catchment

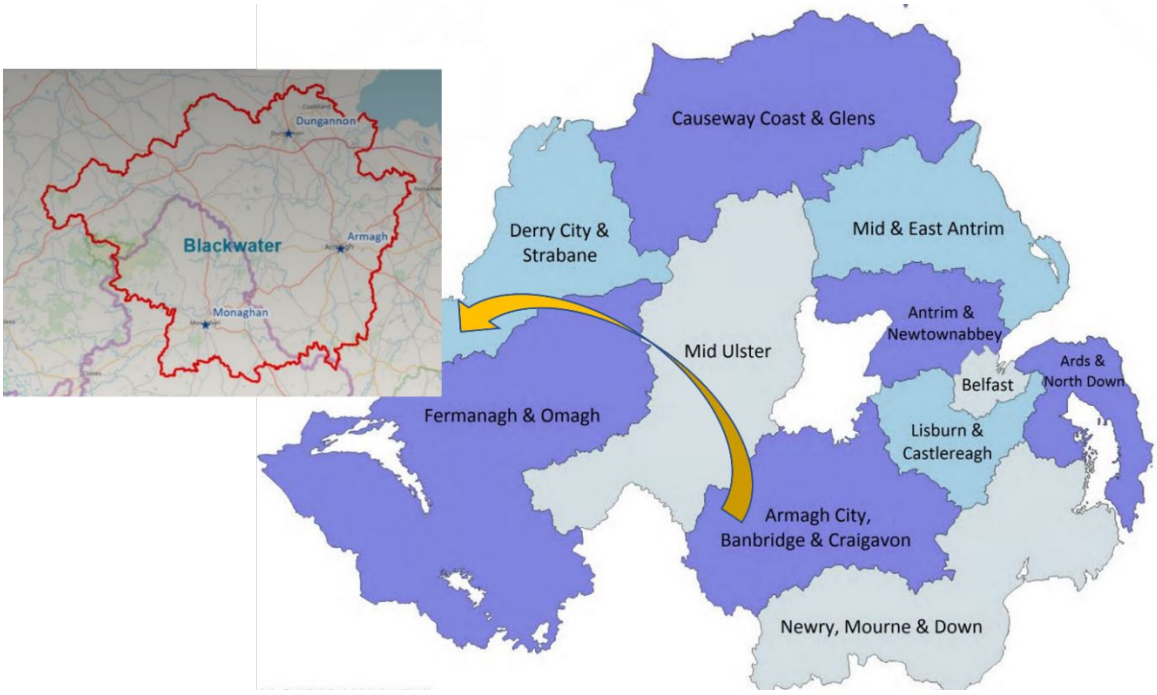
Although there is currently no detailed data available on how many of each kind and type of agricultural enterprise exist in the catchment more widely, figure 9.5 presents data extracted from NI's Neighbourhood Information Service farm census (NINIS, 2018), which provides a rough idea. In NI, the catchment lies mainly within Armagh City, Banbridge and Craigavon Council and Mid Ulster Council, but it also dips into Newry, Mourne and Down Council (see figure 9.6). Thus, overlaying data from figure 9.5 onto figure 9.6 gives some indication of how agriculture activity is distributed within the catchment. Note that, because it was not possible to source similar data for county Monaghan in Ireland, data presented here provides an incomplete picture. However, as 74 percent of the catchment sits in NI, it is sufficient for the purposes of this discussion.

Figure 9.5 Farming enterprise number by council, Northern Ireland

LGD2014	2018												
	Farms	Lfa farms	Non lfa farms	Area farmed in hectares	Crops in hectares	Grass in hectares	Cattle	Sheep	Pigs	Poultry	Farmers	V. Small farms	Small farms
Northern Ireland	24,895	17,298	7,597	1,022,395.30	44,936.90	950,775.40	1,629,068	2,005,998	633,644	26,030.58	30,685	19,188	2,824
Antrim and Newtownabbey	872	465	407	42,174.60	1,521.50	39,847.30	78,259	79,060	22,903	1,137.73	1,102	612	125
Ards and North Down	696	69	627	32,557.70	6,251.20	24,909.50	66,122	40,506	8,979	184.70	924	443	92
Armagh City, Banbridge and Craigavon	3,253	1,392	1,861	107,713.30	9,230.30	96,970.70	247,598	121,828	173,944	3,765.02	4,048	2,421	366
Belfast	31	21	10	2,360.30	77.50	2,186.30	3,321	1,384	1,617	0.00	38	25	1
Causeway Coast and Glens	2,501	1,543	958	143,897.60	8,340.70	133,246.50	182,296	399,256	22,183	2,882.94	3,220	1,740	352
Derry City and Strabane	1,771	1,453	318	97,080.40	4,201.50	89,958.30	110,207	281,756	29,851	346.82	2,183	1,324	230
Fermanagh and Omagh	5,094	4,947	147	209,030.00	614.30	204,352.30	277,970	281,242	43,580	2,978.94	6,090	4,220	503
Lisburn and Castlereagh	842	292	550	35,719.10	4,103.90	30,415.10	64,226	36,401	24,981	804.59	1,058	615	90
Mid and East Antrim	1,793	1,392	401	83,047.70	980.60	81,097.20	117,628	261,244	14,854	3,288.21	2,223	1,310	246
Mid Ulster	4,162	2,826	1,336	146,408.00	3,338.50	140,568.40	265,271	222,144	229,958	9,049.98	5,111	3,254	457
Newry, Mourne and Down	3,880	2,898	982	122,406.60	6,276.90	107,223.80	216,170	281,177	60,794	1,591.64	4,688	3,224	362

Source: NINIS, 2018

Figure 9.6 Location of the Ulster Blackwater catchment in relation to NI council areas[82]



Source: data adapted from CatchmentCARE (2021b) and NI Department for Communities (2021)

[82] Note that data is presented here based on council areas, not on county areas, because this is what is available. This highlights a key challenge in researching catchments: administrative and hydrological boundaries rarely align. This is discussed further in section 9.4, below.

Data presented in figure 9.5 does not disaggregate dairy enterprises from drystock enterprises, but it does indicate the number of enterprises (farms) operating on land classified as 'less favoured' (LFA). As discussed in chapters four and eight, enterprises operating on such land are more likely to be drystock, not dairy. Therefore, as the majority of farms in Mid Ulster and Newry, Mourne and Down counties operate on LFA land (figure 9.6), it is possible to generalise that, where the catchment lies within these, drystock farming is likely more prevalent than dairy. In Armagh City, Banbridge and Craigavon council there is a more even distribution of LFA and non-LFA farms, with the latter being more common. Therefore, it is logical to conclude that there is a greater dairy presence in the central part of the catchment. Although the researcher was unable to obtain more specific data confirming this, interview participants also suggested this was the case. In addition, they confirmed that, within the catchment, drystock farming predominates in the region immediately straddling the border, as it does along the border's length. Dairy farming is therefore given little focus in the remainder of this chapter, although it is acknowledged that challenges related to regulating it, highlighted in chapter eight, must also be faced in the region.

The other point to highlight is the high concentration of poultry enterprises in the catchment, something unique on the island of Ireland. As discussed in chapters four and eight, poultry production has expanded in NI at an exceptional rate in the past decade. Mid Ulster council has, by far, the largest number of poultry enterprises in NI (9,049.98 thousand birds). Armagh City, Banbridge and Craigavon follows in second (3,765.02 thousand birds). Data detailing the distribution of poultry enterprises within the councils is not publicly available[83] so again, only broad generalisations can be made. However, it is clear that, within NI, poultry production is heavily concentrated in and around the Ulster Blackwater catchment. Notably, Moy Park, one of Europe's largest broiler chicken producers (see chapter eight), is based in the catchment – headquartered in Craigavon (in Armagh, Bainbridge and Craigavon Council) (Moy Park, 2021).

While it was not possible to obtain equivalent data for county Monaghan, multiple research participants confirmed that there is a significant and growing presence of poultry enterprises there as well (and in neighbouring county Cavan, also a border county), a trend that stands out starkly because poultry production exists almost nowhere else in Ireland, save for a few small pockets. According to one interview participant (an Irish government employee), 469

[83] To the best of the researcher's knowledge.

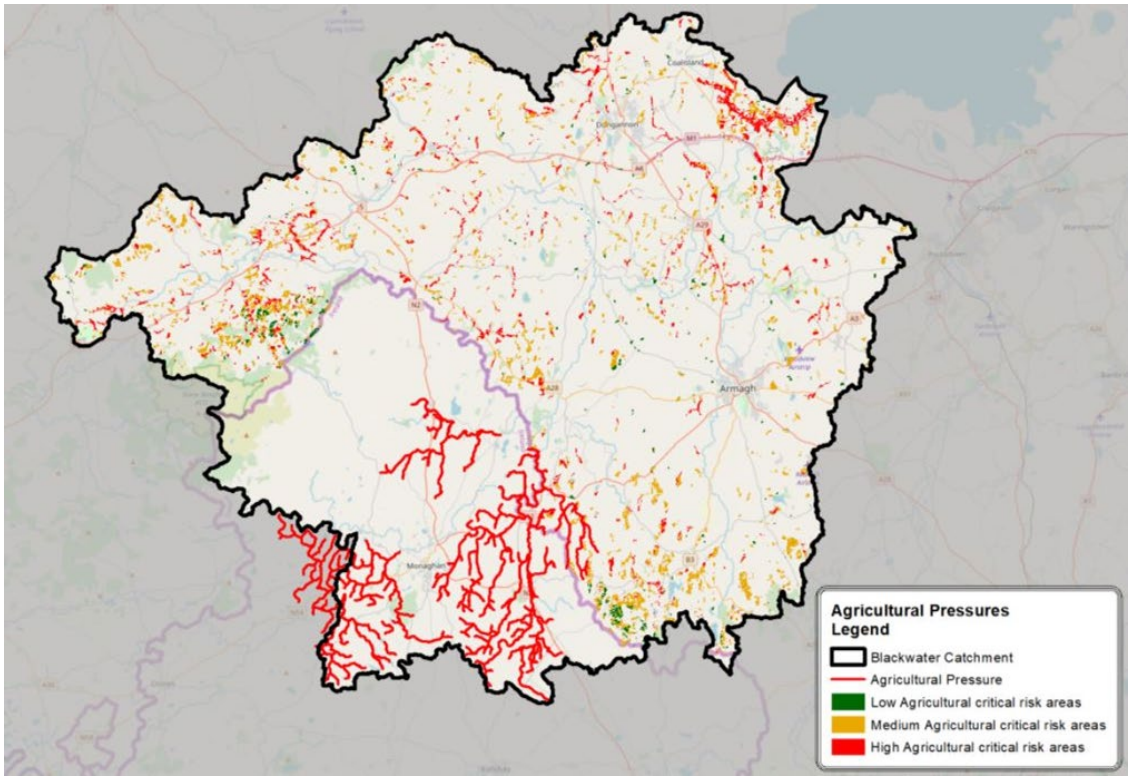
planning applications for new poultry sheds were made in the county between 2011 and 2019. The majority of those were made (and approved) from 2015 onwards.

The next section considers the pressures that these agricultural activities are placing on waterways in the catchment. It then builds on empirical data presented in chapters seven and eight to discuss some of the broader challenges faced in regulating diffuse agricultural pollution in a trans-border context.

9.3 Agriculture and waterways in the Ulster Blackwater catchment

Distribution of agricultural pressures within the catchment are highlighted in figure 9.7, below. Notably, there is a high concentration of high and medium risk agriculture areas immediately surrounding the border, which points to a need for research specifically addressing management of waterways in this region. It is also worth noting that some of the island of Ireland's highest quality waterways are situated in the catchment and in the wider border region.

Figure 9.7 Agricultural pressures in the Ulster Blackwater catchment



Source: CatchmentCARE, 2021b

This research highlights that, despite broad similarities, clear north-south differences exist in terms of how respective agriculture industries are structured and the impact this has on land and waterway management (chapters four and eight). However, as various interview

participants emphasised, many of these differences disappear when focus is narrowed to consider the border region. A key reason for this is that topography and climate are the same on either side of the border; a political line does not affect natural features of a region[84]. By extension, the agricultural enterprises operating there are similar and the problems faced in managing water quality are largely the same.

> "As you say, the topography and the land use aren't wildly different. So, the practices that are ongoing would be similar either side of that imaginary line, essentially." (Government employee, Ireland)

As the above section details, drystock farming predominates in the region immediately surrounding the border and has a strong presence across the catchment generally. As discussed in chapter eight, the practical challenges faced in mitigating water pollution from these types of farms are largely the same in Ireland and NI: lack of time and financial resources limit drystock farmers' ability to implement measures to reduce nutrient runoff from their land, a problem exacerbated by poor soils and hilly land. The latter challenge is a particular issue in the border region of the Ulster Blackwater catchment where the apparently infamous "stony grey soils of Monaghan" (eNGO employee, NI) are especially problematic in terms of facilitating overland phosphorous flows (refer to appendix 11). The topography of the catchment exacerbates this issue:

> "When you think of Cavan and Monaghan you think of…drumlin country, so basically what you have is lots of hills and hollows. And obviously it is deep, sloping and poorly draining. So, when you have farming activity going up on the hills…they are rounded and sloped…and down at the bottom you have lakes and rivers and channels. So, the topography is a big issue in that area, for a start." (Government employee, NI)

However, again, because a narrative equating intensity with pollution prevails in both Ireland and NI, the challenges faced in managing diffuse pollution from extensive drystock enterprises in the border regions are frequently overlooked. On top of this, as this thesis has argued, drystock farmers are peripheral in agri-environmental policy networks across the island of Ireland and are therefore not in a position to influence policy in a way that might better support them to mitigate diffuse pollution from their enterprises (chapter eight).

[84] Although outside of the scope of this thesis to discuss, there are likely various social and cultural similarities in the region underpinning this as well.

Together, these factors make addressing water pollution in the catchment, and in Ireland's wider border regions, very difficult.

The high concentration of poultry enterprises in the catchment presents different challenges. It is very likely the poultry industry is negatively impacting water quality there. As research in England and Wales highlights, the burgeoning poultry industry is placing significant pressure on waterways in places like the Wye valley (Caffyn, 2021a and 2021b), and it is improbable the same is not true in Ireland and NI. However, because of difficulties in accessing information about the industry, its impact is currently unclear.

As some research participants highlighted, it is difficult understanding how the industry operates in Ireland, and, by extension, how it impacts waterways there, because it is so peripheral in Ireland's agri-environmental policymaking network:

> "I think there is a gap in terms of...they [poultry farmers] could be flying under the radar a little bit. That's not to say that they...they are under regulations and those regulations are enforced for them. But in terms of the general conversation and the general focus that's given, poultry is rarely considered." (Government employee, Ireland)

Because of the geographical location of Ireland's poultry enterprises, this means that this presents problems for trans-boundary waterways, specifically:

> "…in terms of waste management for poultry farms, it's a bit of an unknown, a grey area. Very little focus on it. There's an enormous percentage of Ireland's chickens that are farmed in Monahan and Cavan...and [there are] plenty of cross-boundary water bodies within that area. There needs to be a bit more focus on that side of things within the border region." (Government employee, Ireland)

In NI, although the industry is much more central in the policy network, as discussed in chapter eight, the industry's power makes it difficult to regulate. Speaking of its impact in the Ulster Blackwater catchment specifically, one government employee stated:

> "Now, we're aware of [the poultry industry operating in the catchment], but we haven't really given it much consideration. For a couple of reasons: it's quite a political issue, in terms of the power of Moy Park, that whole story. It's not something we would be able to impact on much. So, we haven't really engaged with it. It is an issue."

This is another tangible outcome of the NI industry's 'hidden' power (Lukes, 2005): again, the ability to keep certain issues off the agenda.

There is also a lack of scientific data on the issue. First, as discussed in chapter six and appendix 6, the link between the number of poultry enterprises in a region and the amount of manure being spread on land, is indirect and difficult to monitor. Unlike manure from other industries, which is typically spread on or near the farm where it is produced, broiler litter is typically transported off-site to be spread on land elsewhere or processed via anaerobic digestion. The situation is made further challenging by the fact that much litter is transported across the border, which adds multiple layers of administrative complexity (an issue returned to below in section 9.4.2). Many research participants highlighted the trans-border nature of manure exports as an issue:

> "What we have found is there is a gap in the regulation in the movement of those manures. Both some over the border and also within counties, you know, between counties…" (Government employee, NI)

> "I know in the North now there is a little bit of concern about, not just the North but in the border too, about the movement of digestate[85]" (Government employee, Ireland)

One research participant also highlighted that the issue goes beyond where manure and litter is spread; effluents from poultry units themselves is a little understood problem:

> "…the effluents [from poultry houses] are not the controlled waste. In other words, what is leaking out into the environment from the poultry houses themselves. We don't know anything about that."

This lack of data is likely partly a result of the industry's ability to 'fly under the radar', so to speak, something quotes highlighted above underscore. In Ireland, it is not researched because it is not considered to be a problem. In NI, because the industry is so powerful as to be considered untouchable (section 8.3.1), it is difficult to conduct research on it. Inability to regulate the industry well also stems from fact that, as discussed in chapters seven and eight, the agencies responsible for monitoring it are under-funded and lack capacity to do so effectively. They lack institutional power. This is particularly an issue in terms of poultry litter because where it is spread is evidently not straightforward. As will be discussed below (section 9.4.2), this is further exacerbated by the fact that multiple government departments

[85] The by-product of anaerobic digestion. Refer to appendix 12.

are responsible for different aspects of regulating the poultry industry (and agriculture generally), and communication among them is not always effective.

General challenges related to regulating diffuse pollution from drystock and poultry enterprises have already been discussed in detail in chapter eight of this thesis. Similarly, governance structures and power distributions within Ireland and NI's agri-environmental policymaking networks, and the impact these have on waterway management were discussed in chapters seven and eight. Since the implications of these issues are the same in the Ulster Blackwater catchment as elsewhere on the island of Ireland, they will not be further covered here. What data collected in the catchment do serve to highlight are the challenges present in regulating agricultural pollution of waterways (or other shared resources) across multiple jurisdictions, particularly in an international context. This is the focus of the next section.

9.4 Addressing trans-border waterway pollution on the island of Ireland

> "a river is not a respecter, and a water table is not a respecter of a border."
> (Government employee, NI)

Addressing Ireland's trans-border water pollution requires collaboration and co-ordination between policymakers, practitioners and farmers north and south. This is particularly important when it comes to managing river catchments, because, as the above quote speaks to, waterways do not respect administrative boundaries. Empirical data from this research shows that there is a clear willingness to collaborate across all institutions and at all levels, local to national. However, collaboration requires effective communication, which must be facilitated by appropriate institutional structures and processes, and it is apparent the latter are lacking on both sides of the border. This is a major barrier to addressing pollution in Ireland's trans-border waterways.

9.4.1 Managing trans-border waterways: A need for international collaboration

As outlined in chapter six, early Water Framework Directive (WFD) initiatives and the establishment of International River Basin Districts (IRBDs) on the island reflect understanding of this. Collaboration under the first phase of the WFD was apparently strong. However, in recent years it has waned due in part to the fact that Ireland and NI progressed into the second stage of the WFD at different times, and that Ireland has since re-structured its own WFD classification. Some policymakers acknowledged this issue:

> "The first-generation River Basin Plan…there was North-South working group in water quality, which met on a regular basis, at least twice a year. However, we ran into trouble with our second River Basin Plan…We lost momentum, effectively we fell behind…. At that point we probably decoupled from Northern Ireland…there was no point us dragging them behind." (Government employee, Ireland)

> "I think the issues start when you look at the River Basin Management Plans. That's where the cross-border management is disjointed. Even to the point where some water bodies have different targets for the WFD, where the same body may have poor status on one side and moderate on the other. That's where the problems begin." (Government employee, NI)

Despite this national-level divergence, policymakers and practitioners working in the catchment on both sides of the border demonstrated a clear willingness to work with each other:

> "Cross-border collaboration needs to be there. It should always be there" (Government employee, NI)

> "There is an openness there at the moment, and…we are on first name terms. People know the people in the North now that are doing similar work to ourselves. Which is good…[and] the lines of communication are really open and between ourselves and NIEA." (Government employee, Ireland)

Moreover, collaboration has continued in a more regional fashion, with EU-funded trans-boundary catchment projects working to address specific border region issues. The Ulster Blackwater catchment is one of three[86] trans-border catchments that are a focus of NI-based CatchmentCARE[87] (Community Actions for Resilient Eco-systems), a project which aims to develop policy, catchment and community actions to:

> "…address water quality issues relating to hydromorphology, point and diffuse sources of pollution, farm nutrient management practices, characterisation and monitoring of groundwater quality, lag times in response to the implementation of measures and an

[86] Other project catchments include the Finn and Arney, both of which are also trans-boundary (CatchmentCARE, 2021a).

[87] Partners involved in the Blackwater-based project include NI's Agri-food and Biosciences Institute (AFBI), Ireland's Local Authority Waters Programme (LAWPRO), Donegal County Council, Ulster University, the River Blackwater Catchment Trust and the Lough Neagh Landscape Partnership (CatchmentCARE, 2021a).

economic analysis of the cost of achieving the objectives of the Water Framework Directive in the three catchments." (CatchmentCARE, 2021a)

The project is focused on addressing diffuse agricultural pollution from drystock farming in particular. Another project, Source to Tap, is doing similar work in the trans-border Ern and Derg catchments (Source to Tap, 2021). Research participants spoke favourably of both CatchmentCARE and Source to Tap:

> "So far there's been good buy-in from farmers…that kind of on-the-ground approach with the right people is positive, has positive benefits. We would like to see loads more Catchment CARE and Source to Tap [-type projects]."
> (Farmers' Union representative, NI)

As discussed in chapters seven and eight, in a regulatory context, close alignment between the goals of agri-food and environmental/regulatory interests can be an indication that the power of the agri-food actors is limiting that of environmental actors. The possibility of this being the case in this context cannot be ignored. Nevertheless, that these projects are working to actively address water pollution caused by drystock farming – something which, as discussed throughout this thesis, is necessary and important, but still receives insufficient policy focus – and moreover, are being well received by farmers, is undoubtedly positive.

However, the approach taken by CatchmentCARE and Source to Tap does not reflect that taken at the national level, particularly in NI. While in Ireland, ASSAP and LAWPRO are taking a more active approach to working with smaller, extensive drystock farmers, there are no equivalent examples in NI. This is something highlighted by focus group participants in this research, all of whom are farmers based in the Ulster Blackwater catchment:

> Participant 1: "That's right, but he [a farmer in Ireland] is getting educated by Teagasc[88] and stuff like that."
>
> Participant 2: "Well, they [Teagasc] are on top of stuff like that to be fair like."
>
> Participant 3: "There is nobody here, there is nobody round here like Teagasc."

ASSAP and LAWPRO are imperfect projects. As highlighted in chapter eight, the types of interventions they are implementing are 'shallow' and insufficiently funded. In absence of

[88] ASSAP is, in part, a Teagasc initiative, and LAWPRO works very closely with, and is supported by, Teagasc (see appendix 9).

additional, 'deep' interventions, they are unlikely to fully address Ireland's agriculture-related water pollution problems. Despite this, they are a step in the right direction, and are actively working in Ireland's border regions, making an important contribution to improving water quality there. However, in the absence of a similar national-level approach in NI, collaborative work in the region will remain a challenge, something the UK's exit from the EU has significantly exacerbated.

First, as highlighted in chapters four and six, there are major concerns about national-level policy divergence. Research participants working in the border regions highlighted this as a key concern. For example:

> "…the UK have released their draft legislation on agricultural reform. And from an environmental perspective, that's got a focus on paying farmers for delivery of public goods. And that's a complete divergence from where the Irish and EU legislation really focuses on. So, from a trans-boundary perspective, we're going to be having, depending on which way the rivers are flowing, of course, we're gonna be having divergent management of land surrounding those watercourses. So that's going to cause water quality issues on both sides of the border over the course of time." (Government employee, Ireland)

As has already been discussed, the impact of policy divergence at this level is difficult to discern because of the length of time it will take for new policies to be developed and to take effect. Further, the NI Protocol is likely to limit the scope for policy divergence on the island of Ireland. However, there are more immediate and tangible implications for the island of Ireland's border regions.

Regarding trans-border waterway management specifically, both CatchmentCARE and Source to Tap are funded by the EU's INTERREG V programme under the 2014 – 2020 Multi-annual Funding Framework (MFF) (European Commission, 2020; CatchmentCARE, 2021a; Source to Tap, 2021). While funding for these programmes will continue until their agreed end in 2023, the UK will not be taking part in INTERREG VI, running from 2021 - 2027 (HM Treasury, 2020). How such programmes will be funded in future is currently unclear. Although WFD commitments have been retained in UK law and the NI protocol provides further impetus for NI to continue working to improve its water quality (chapter four and six), commitment to waterway-specific collaboration is not immediately evident.

Even without the challenges 'Brexit' presents, some research participants suggested collaboration on trans-border waterway management and environmental regulation in general already does not go far enough, or, in some instances, does not happen at all. Lack of resource was frequently cited as a barrier[89]:

> "We have the odd phone call if there is a specific issue, nothing else." (Government employee, Ireland)
>
> "It is hard enough to know what people in your own department are doing some of the times, never mind in a different country I suppose. And just the way the departments and the councils are all set up, people having different responsibilities, it takes a fair bit of work just to get an understanding of those. But I think that has improved these last couple of years." (Government employee, NI)
>
> "When I talk to NIEA or to the EPA, I don't see any really close collaboration between them…in terms of a coordinated effort to manage cross-border catchments, I don't think they have the time or the resources to do it properly." (Government employee, NI)

This once again speaks to issues around power distributions and resource allocation, highlighted in chapter seven. The lack of resource experienced by environmental regulators both north and south of the border, which, as argued above, is a result of their comparatively weaker political and institutional position (power), has clear implications for collaboration on shared waterways. Although the will to collaborate is there, it is evidently not being supported at the institutional level and is not taking place as a result. Yet without it, trans-border waterway issues cannot be addressed effectively.

On top of this is the fact that, as was apparent in this research, trans-border waterway issues appear not to be on the radar of many national-level policymakers interviewed, including those working directly in water policy. This was particularly the case in Ireland. For example, more than one interviewee (inaccurately) asserted that, since hardly any waterways cross the border, the issue was not significant:

[89] On top of communication challenges, catchment scientists participating in this research highlighted technical issues in terms of how each country quantifies and monitors its water pollution problems. Different soil testing techniques, waterbody classification schemes and dataset compatibility were all raised as barriers to closer collaboration. While discussion of this is outside the scope of this thesis, it is worth noting this additional barrier to co-ordination.

> "To be honest, we wouldn't have a lot of interaction with the guys in the North. And part of it is on that basis, is that we don't have a lot of shared water bodies. And there isn't necessarily a huge need for it, you know compared to mainland Europe where you have got some of the major rivers flowing through, six or seven different member states." (Government employee, Ireland)

> "Very little water flows over the border, in either direction…you know, there are no major water bodies that traverse…To be honest, we wouldn't have a lot of interaction with the guys in the North. And part of it is on that basis, is that we don't have a lot of shared water bodies." (Government employee, Ireland)

This may be an artefact of the focus on intensive agriculture-related pollution and the general centrality of the dairy industry within the Irish policymaking sphere. If the drystock industry is not perceived as part of the pollution problem, and the poultry industry does not even factor into conversations, it is perhaps unsurprising the border region is ignored on this front. However, if key national-level policy makers are not even aware there is a problem, it is unlikely that resource will be allocated to address it. Moving forward, this may be an important barrier to improving water quality in trans-border catchments.

9.4.2 Managing trans-border waterways: regional challenges

Regional-level issues apparently exacerbate barriers to collaboration on trans-boundary waterway management faced at the international level. As difficult as co-ordinating international collaboration is, it becomes nearly impossible if regional management is not coherent, something this research found to be a significant – and unlikely unique – problem in the Ulster Blackwater catchment.

Regulating diffuse agricultural pollution's impact on waterways is administratively complex, as there are often multiple departments or agencies responsible for this. Again, because waterways do not usually align with administrative boundaries, it is not unexpected that this is the case. But, as this research highlights, even within the same administrative areas there are often multiple agencies responsible for different but inter-dependent elements of regulation. Success of this regulation logically depends on information being shared in a way that facilitates collaboration. However, it was evident in this research that effective information sharing frequently does not happen. This was particularly clear in conversations about regulation of poultry enterprises and poultry litter transport in the catchment. Various research participants expressed frustration with difficulties arising from the fact that multiple

agencies had different responsibilities, and that communication among these agencies was limited.

One Monaghan-based government employee interviewed for this research[90] spoke extensively about these challenges. According to this participant, although the local authority is responsible for regulating agricultural pollution locally, it has no control over licences granted to large poultry operations. These are the remit of the (national-level) EPA[91]. By extension, the local authority is not allowed to monitor these enterprises directly (the EPA assumes this role), even though they may have a direct impact on the wider local environment, e.g., if manure or litter is transported off-site (monitoring of which *is* the responsibility of the local authority). This might be less of a problem if information about these enterprises was shared between the EPA and the local authority. However, according to this participant, there is no communication on the matter. Other interview participants based in the region also highlighted this as an issue:

> "...the regulation [of manure transport] is complex because there is three different…agencies or public bodies that have roles and responsibilities. And then, with the arrival of GDPR, there is no sharing of information with the one public body which is supposed to police what is applied to land. So, they don't get any information." (Government employee, Ireland)

> "Good agricultural regulations are policed by the local authority. But they are at the bottom of the food chain when it comes to information about the intensive enterprises […] There is two or three roles and responsibilities, or agencies with roles and responsibilities, and then that is the gaps and the breakdown I think comes in. It is almost impossible then for local authorities to deal with that." (Government employee, Ireland)

It is hard to discern what exactly these issues, as they relate to regulation of the poultry industry, mean for waterways in the Ulster Blackwater catchment. As discussed in chapter eight and in section 9.3, little data is available on the impact poultry enterprises are having on waterways in Ireland and NI generally, and in this research, it was difficult to get people to

[90] Unrecorded interview, therefore, no direct quotes available.
[91] Poultry enterprises housing more than 40,000 birds require a specific licence (IE/IPC) from the EPA to operate, monitoring of which remains EPA responsibility (see EPA, 2021). Although note that this monitoring is concerned only with the enterprises' physical facilities, not with the litter produced by the chickens housed there. Monitoring of the latter is the responsibility of the local authority.

speak to the issue directly. Therefore, it cannot be said with certainty that the administrative challenges cited here directly contribute to water pollution in the catchment. However, given the rate that poultry enterprises have proliferated in the catchment in recent years, this is clearly a topic that demands further research. And, even if this data does not allow for definitive conclusions to be drawn about the poultry industry's impact on waterways, it does highlight the administrative complexity surrounding agri-environmental regulation in the catchment. Clearly, joined-up communication is lacking. This presents challenges for regulation of diffuse agricultural pollution regardless of the industry producing it.

This problem is apparent north of the border as well. More than one NI research participant detailed how recent (2015) changes in NI's planning system (see NI Department of Infrastructure (2021) for details of these) and government departmental structures (refer to chapter 7) have made it difficult to discern who is responsible for some elements of environmental regulation[92]. For example, the planning system re-structure granted local councils greater planning powers. Alongside this, a new system (the Shared Environmental Service [SES][93]) was created to allow councils to conduct environmental assessments for new planning applications. Yet, according to one research participant (government employee)[94], "the reach" of the SES in relation to that of other, centralised governmental departments such as DAERA and NIEA, is still not always clear. The participant suggested this has sometimes given rise to miscommunication about and subsequent misalignment in regulations set out by respective agencies. As a result, some attempts to effectively regulate the agri-food industry have failed.

For instance, in 2020, the SES was forced to withdraw new guidelines for assessing the impact of ammonia from new agricultural planning applications after push-back from the UFU. The latter was able to argue that the new regulations would unfairly limit NI farmers' ability to "build and develop their business" (Farming Life, 2020)[95]. This participant indicated that part of the reason the UFU was successful in forcing this withdrawal was that the SES

[92] Writing about public administration in NI generally, Knox and Carmichael (2006) give a comprehensive overview of similar issues faced across NI government.

[93] Although detailed information about the SES seems not to be publicly available, according to research participants, the SES is responsible, on behalf of councils, for: Habitats Regulations Assessments (HRA) on planning applications; HRA for the preparation of Local Development Plans; and the consideration of the implications from development on European Sites (e.g.,1 Special Areas of Conservation and Special Protection Areas). Mid and East Antrim host the SES, on behalf of other councils, with staff employed directly by the council.

[94] Also based in the catchment.

[95] Note that these regulations would mainly have impacted intensive dairy, poultry and pig enterprises.

guidance on ammonia emissions did not clearly align with that set out by DAERA. This is a very clear example how 'regulation gaps' (chapter three) can be exploited by powerful interests – here, the NI farming lobby – to advance their own interests, with the result that environmental regulation was yet again restricted.

Fully understanding this problem would require detailed analysis of Ireland and NI's planning systems and how these align (or fail to align) with other regulatory bodies in government, local to national. This is outside the scope of this thesis but is another potential topic for future research. What empirical data from the Ulster Blackwater catchment does reveal is how multiple layers of administrative complexity exacerbate existing challenges around regulating diffuse agricultural pollution. On top of 'gaps' created by competing policy channels such as rural development, environmental protection and public health, there are 'gaps' created by regulatory miscommunication and misalignment, even among agencies with similar policy goals. This creates opportunities for actors to advance their own interests. It may be achieved passively, e.g., by continuing to operate in ways that harm the environment because regulations are not being effectively implemented, or actively, such as in the aforementioned example about ammonia regulations.

To reiterate points made in chapters seven and eight, many of the issues detailed here are also likely to some extent a result of challenges created by the under-resourcing of agencies responsible for regulating the agri-food industry and reducing its impact on the natural environment. In the absence of sufficient resource, it is no surprise that there is limited capacity for different administrative bodies to communicate well with each other. Again, this thesis argues that this is, at least in part, due to the way power is distributed within agri-environmental policy networks, with less powerful environmental actors remaining peripheral in Ireland and NI's networks. This power imbalance, combined with a complex administrative environment, appears to be compromising the management of waterways in the Ulster Blackwater catchment.

9.5 Summary

This chapter presented empirical data from the Ulster Blackwater catchment, which served as a case study to illustrate how the complex challenge of regulating diffuse agricultural pollution on the island of Ireland, detailed in chapter seven and eight, plays out in a trans-border context. Empirical data presented in this chapter show how administrative complexities, coupled with under-resourced regulatory agencies, have provided

opportunities for different agri-food interests to advance their interests at the expense of the Ulster Blackwater catchment's natural environment. While many policymakers, practitioners and farmers' agencies on both sides of the border would like to collaborate in addressing the water pollution problem in the catchment area, a lack of scientific data and information sharing is a major factor hindering efforts to develop and implement effective pollution-control strategies. In some cases, key national level policy makers do not even recognise that animal waste from drystock farming and poultry operations poses a problem. This lack of awareness, although far from universal, has had a negative effect in terms of resource allocation, research and policy development.

The next, final chapter consolidates this research's key findings and identifies its contributions to knowledge. These focus on theoretical implications for social policy research but also provide insights relevant to policy and practice. The chapter ends with a reflection on the research process and suggests areas for further research.

Chapter 10: Agricultural pollution and waterways on the island of Ireland: Towards effective policy solutions

10.1 Introduction

In both Ireland and Northern Ireland, the challenge of continuing to support a socially and politically important agri-food industry while simultaneously addressing increasingly pressing environmental challenges (water pollution being just one of many) was evident in this research. This is a classic wicked problem, which Irish, UK and EU policymakers have grappled with for decades. Concerning water pollution on the island of Ireland specifically, tensions are evident between the drive to support the expansion of intensive dairy and poultry industries in an export-focused economy; a socio-cultural need to keep an economically unviable drystock industry on the land; and a social and legal obligation to address diffuse pollution created by all these industries. Meeting all these competing objectives simultaneously is not possible. Thus, finding a 'multi-dimensional social optimum' must be the goal of policy: if all objectives cannot be met, how can balance be achieved?

This research contributes to literature on wicked policy problems by helping to improve understanding of the complex social factors that underpin and influence the policymaking process on the island of Ireland, particularly as it relates to addressing the wicked problem of diffuse agricultural water pollution. It argues that the structure of, and power distributions within, agri-environmental policymaking networks on the island of Ireland have significant implications for policy outcomes. It also demonstrates how actors within these networks capitalise on gaps left by multiple competing policy channels and complex administrative environments to advance their interests.

The trans-border Ulster Blackwater rive catchment provided a case study for this research, which was concerned with two main questions: First, who are the actors involved in developing agri-environmental policy in Ireland and NI, and what does this reveal about the governance structures of and power distributions within agri-environmental policymaking networks on the island of Ireland? Secondly, are there any differences in the agri-environmental policymaking processes north and south of the border, and if yes, what impact do these differences have on shared management of the island's trans-border waterways?

This research explored these questions with the aim of shedding light on how governance structures and power distributions within agri-environmental policymaking impact the

quality of the island of Ireland's shared waterways. In developing this understanding, this research also revealed much about how governance and power arrangements impact waterway management across the island. As such, it illuminates some of the reasons why, after more than two decades of concerted effort, little progress has been made in improving the overall quality of the island's waterways, and why diffuse agricultural pollution remains a major contributor to the problem.

This chapter consolidates this research's findings as they relate to these research questions and identifies how the findings contribute to knowledge about agri-environmental policymaking on the island of Ireland and in Europe more broadly. In short, empirical data shows that, in both Ireland and NI, the agri-food sector is central within a relatively closed, or 'exceptionalist', agri-environmental policy network. This has resulted in limited policy innovation and prevented meaningful progress in addressing agriculture's contribution to water pollution on the island. The situation is exacerbated by the presence of multiple competing policy channels and a complex administrative environment, which together leave 'gaps' for powerful agri-food actors to exploit and advance their interests. Focus is placed on the theoretical implication of these findings, but insights that are relevant to policy and practice are also highlighted. The chapter concludes by identifying areas that might benefit from further research.

10.2 Power and governance in (post-)exceptional agri-environmental policymaking on the island of Ireland: Whose voices are heard and what does this mean for trans-border waterways?

Again, although this research set out to understand the challenges faced in co-managing the island of Ireland's trans-border waterways, it was necessary to first consider the policymaking context at the all-island level, because the policies that underpin trans-boundary waterway management are developed at national and international levels. Further, the power distributions evident among actors within the Blackwater catchment are largely the result of national-level factors, not regional ones, although regional factors clearly affect how these distributions play on 'on the ground' in the catchment (chapter nine).

Diffuse agricultural pollution remains a pressing issue on the island of Ireland. Policies and initiatives implemented under EU legislation such as the Water Framework Directive (WFD), Nitrates Directive (NiD) and Common Agriculture Policy (CAP) have resulted in improvements

in the quality of some of the island's worst-polluted waterbodies. However, quality of the island's most pristine waterbodies continues to decline, and little progress has been made towards meeting the WFD target of having 70 percent of waterbodies achieve 'good' or better status by 2027. It was widely acknowledged by participants in this research that, on the island of Ireland at least, these targets will not be achieved. This is a pressing issue facing Irish policymakers.

This thesis argues that a key reason policy has failed to effectively address this challenge is that the agri-food sector is still treated as relatively 'exceptional' across the island, while agri-environmental policy networks at both European/ Ireland and NI levels remain toward the 'closed' end of the spectrum. Empirical data from this research show that, within these networks in Ireland and NI, actors representing intensive agriculture are most central, while other non-agri-food interests, such as environmental actors, are peripheral. The effect has been to limit policy innovation and prevent meaningful change. Most policy tools implemented thus far, including regulations set out under the WFD and the NiD, have been 'shallow' and have failed to fully internalise agriculture's negative externalities. They have not fundamentally challenged the status quo of productivist agriculture or how it is regulated, and therefore its contribution to water pollution has not fully been addressed (chapter seven). As Daugbjerg (1998) states, closed policymaking networks rarely produce policies that bring about meaningful transformation.

This research also reveals that, because of the centrality of agri-food actors in Ireland and NI's agri-environmental policymaking networks, power distributions *within* the agri-food industry also determine how water pollution is regulated. This is a key contribution of this research; such power dynamics are often overlooked in policy research, which typically treats 'farmers' or the 'agriculture lobby' as a monolith. As chapter eight highlights, the strength of the dairy and drystock sectors' ideological power has helped them retain much policy support both north and south of the border. However, because the dairy industry has more economic and organisational power than the drystock industry, it is more central and therefore has more influence in policymaking arenas on the island. In NI, poultry processors have also assumed a central position in the policymaking network as a shift towards post-exceptionalism begins to take place. Because of this, policy tends to favour the dairy industry in Ireland, and dairy and poultry industries in NI. Expansion of these industries continues to put pressure on waterways. Meanwhile, although drystock farmers have enough ideological

and organisational power to be kept on the land, they are not central enough in policymaking networks to meaningfully influence agri-environmental policy. This means they are not 'at the table' influencing policies in ways that might help them address their contribution to water pollution—a contribution that, in many cases, remains almost entirely overlooked.

10.2.1 Power distributions: challenges for the island of Ireland's trans-border waterways

Empirical data from this research show that these power distributions have a tangible impact on land management in the island of Ireland's trans-border water catchments. As chapter nine details, diffuse pollution from drystock farming is one of the greatest sources of water pollution in the trans-border Ulster Blackwater catchment, as it is in catchments along the Irish border. Practical challenges that underpin drystock farming's contribution to water pollution, including farmers' lack of time and financial resources to effectively manage their land in a less environmentally damaging way, are compounded by the border region's thin soils and hilly topography. However, while many practitioners (e.g., catchment scientists, agricultural advisors) working in the region are aware of, and concerned about the problem, this is not true of all practitioners on the island, nor of many policymakers, or even most drystock farmers themselves. Extensive farming is still largely perceived as a non-issue when it comes to water pollution, particularly in NI. Lack of understanding is compounded by the ways in which the drystock industry's power manifests itself: successfully keeping drystock farmers simultaneously on the land but also at the periphery of policymaking networks.

Together, these factors mean that measures to address the problem are incomplete and inconsistent. While initiatives such as LAWPRO, ASSAP and CatchmentCARE are directly addressing drystock farming's contribution to water pollution and do go some way towards addressing the problem, they are not resourced in a way that is likely to effect appreciable change in the long term. Neither LAWPRO nor ASSAP have funds to support farmers to implement the changes advisors suggest would mitigate runoff from their farms. CatchmentCARE has some of such resource but is only funded until 2023. As the EU funding scheme that supports the project comes to an end, it is unclear where future funding might come from, particularly since CatchmentCARE's approach is not currently in line with that of institutions such as DAERA and CAFRE, which continue to overlook extensive agriculture's contribution to the problem.

This research points to another likely concern for trans-border waterways: the significant and growing presence of the poultry industry both in the north-east of Ireland and in NI. Data from regions with similar concentrations of poultry enterprises, such as they Wye Valley in the UK, does make clear that their presence is a major problem for waterways in the region. However, as discussed in chapters eight and nine, it is difficult to make conclusive arguments about the industry's impact on waterways in Ireland and NI given the dearth of information available on the subject there. Complex and arguably ineffective monitoring processes mean it is unclear where much of the manure and litter produced by the industry ends up. According to participants in this research, 'paper acres' are rife. There is also lack of scientific data on the impact of effluent being released from poultry houses themselves, potentially a major data gap given how concentrated production units are becoming in the region. Furthermore, in Ireland, the issue is not even on the radar of most policymakers or practitioners, while in NI, it is highly controversial and often avoided by policymakers who are wary of an industry that has so much political influence and economic clout. For researchers, it is therefore very difficult to obtain information, even if it is available.

These challenges highlight the ways in which the poultry industry's power is playing out in the island of Ireland's border regions. In NI, the industry is a powerful, central actor in the agri-environmental policy network, so much so that it has been able to keep discussion of its contribution to water pollution off the table. It has also used its power to facilitate expansion of intensive agriculture in the region. Conversely, in Ireland, the industry is on the periphery of a network dominated by dairy interests. Although this means it is not actively influencing policy, it has been allowed to expand somewhat 'under the radar'. This clearly has implications for waterway management on both sides of the border, but because of power manifestations, they are not being considered, and therefore, not addressed. Given the concentration of poultry enterprises in the border regions, this poses a particular problem for waterways there.

This also points to other ways power is distributed within the island's agri-environmental sphere, which still treats agri-food as exceptional. Because environmental regulators have relatively less institutional power than their agri-food counterparts, they are under-resourced and not able to effectively regulate pollution from the poultry industry and others. 'Paper acres' would likely be far less of a problem if regulators were resourced to conduct on-the-ground monitoring, which they currently are not. However, as is argued in chapter nine,

the issue is not only a result of power imbalances, but also of the difficulties inherent in regulating pollution across ecosystems that traverse multiple administrative boundaries, regional to international. Further consideration is given to this challenge below, in section 10.3.

10.2.2 Pollution of trans-border catchments: Not just a problem for the border regions

That both drystock and poultry farming's contributions to water pollution are not being fully considered or addressed, not only in the border regions but across the island of Ireland, is a problematic blind spot for policymakers and industry alike. First, as discussed, under the WFD, both Ireland and NI are legally obligated to improve the quality of their waterways. If efforts continue to focus on mitigating pollution from intensive industries, particularly dairy, then only part of the problem is being addressed and legal commitments are unlikely to be met. Second, as is highlighted in chapter five, the NiD derogation has been awarded to Ireland and NI on the condition that waterways there do not continue to deteriorate. However, quality of the island's highest quality waterways has declined in recent decades, and many of these are in the border regions. Neglecting to address diffuse agricultural pollution issues in the island's trans-border catchments may, therefore, consequently threaten the renewal of the derogation, and indirectly threaten the viability of the dairy industry, which relies heavily on the derogation to operate at an intensity that is economically viable (chapters five and eight). It is therefore likely in the best interest of the dairy industry to ensure that the drystock and poultry industries are more effectively engaged in managing the country's water pollution problems, not only in the border regions, but also across the island.

This underscores the 'wicked' nature of the water pollution problem on the island of Ireland. Powerful actors such as Ireland's dairy industry have been able to advance their interests at the policy level and ensure that policy solutions do not compromise their expansion. However, because of the complex ways in which other actors' various forms of power manifest (highlighted above), other, unexpected outcomes also occur. While a focus on the interests of the diary industry has served to help keep the drystock industry peripheral in Ireland and NI's policymaking networks, something true of Ireland's poultry industry as well, pollution from these interests may indirectly undermine dairy's interests.

10.3 Agri-environmental policymaking in Ireland and Northern Ireland: Divergence and impact?

A central aim of this research was to understand whether differences in agri-environmental policymaking processes in Ireland and NI exist, and if so, whether these have any impact on the co-management of the island of Ireland's shared waterways. Potential policy divergence resulting from the UK's exit from the EU was a key concern, as were the challenges inherent in regulating ecosystems that traverse multiple administrative boundaries.

Regarding the UK's exit from the EU, it is increasingly evident that it will be many years before there is clarity about what this means for policy. Because NI has remained part of the EU's single market under the NI Protocol, policy and trade divergence issues are more likely to be between NI and Great Britain than NI and Ireland (chapter four). This does not mean such differences will not be an issue on the island of Ireland. However, with the practical implications of implementing the NI Protocol only just becoming apparent, it will be some time before it is understood what these mean for land and waterway management on the island. What analysis of this research's empirical data offers is a greater understanding of the social factors that underpin the policymaking process in Ireland, NI and in Europe more broadly, and how these interact with complex administrative structures and policymaking environments to produce policy outcomes. This insight can improve understanding of the impact that political events such as the UK's exit from the EU may have on future policy outcomes.

What is clear is that in years ahead, ongoing negotiations surrounding policy arrangements dictating the relationship between the UK, Ireland and the rest of the EU will introduce multiple new competing policy channels and complicate existing ones. For example, as detailed in chapter four, even though agri-environmental policy is a devolved competency in the UK, and NI continues to have some freedom to develop policies best suited to its needs, this degree of autonomy is constrained by trade commitments agreed at the UK level. NI's decisions about agri-environment policy will compete with UK-wide decisions on trade. Further, under the NI Protocol, NI is obliged to maintain regulatory alignment with Ireland on certain elements of food production, and international obligations, such as those agreed to under the Water Framework Directive, still apply.

These competing policy channels are overlain on an already complex and incohesive administrative environment. As discussed in chapter nine, multiple departments and

agencies are responsible for regulating agriculture's impact on waterways in Ireland and NI. This is not unusual, given that waterways, and ecosystems do not typically align with administrative boundaries. However, this research shows that administrative complexity is a problem even within the same administrative regions, with multiple autonomous agencies responsible for regulating different aspects of agricultural pollution. Empirical data from the Ulster Blackwater catchment show how the poultry industry, in particular, has benefitted from this complexity in the island's border regions (chapter nine). They also show that lack of communication and cohesion at the regional level means that monitoring issues like trans-border manure transport is nearly impossible. Regional level administrative complexities compromise the ability of governments and senior regulatory agencies to collaborate internationally. With the UK leaving the EU, administrative complexity is likely to increase.

More competing policy channels and even greater administrative complexity will likely increase the policy gaps that allow different actors to capitalise on and advance their own interests. This research's case study of the Ulster Blackwater catchment reveals how governance structures and power distributions within these north and south of the Irish border have hampered efforts to improve water quality. Specific challenges arise from a lack of research and information sharing and lack of coordination between various agencies on both sides of the border. This has facilitated expansion of the poultry industry in particular, to the detriment of the catchment's waterways.

10.4 Addressing diffuse agricultural pollution: A need for 'deep' policy interventions?

In Ireland, NI and across Europe, policymakers and practitioners have been working for decades to address agriculture's impact on waterways. However, this thesis argues that, because of the continued tendency to treat the agri-food sector as exceptional, policy interventions implemented under the WFD and NiD have been mainly 'shallow'. Thus, they have failed to fundamentally address the root causes of diffuse agricultural pollution on the island of Ireland. These include an export-oriented agri-food system which encourages intensification and expansion of the island's agri-food industries, a parallel, socio-cultural logic that views farmers to be the sole legitimate custodians of the countryside, and an associated regulatory system that does not fully internalise agriculture's externalities.

This does not mean shallow measures are unimportant; they are the most readily available tool available to policy makers and are a necessary component of any regulatory regime (Abson et al., 2016). However, if diffuse agricultural pollution is to be addressed in a

meaningful way, there is likely a need for 'deep' policy solutions to be introduced. As outlined in chapter three, these require interventions that address the 'design' and 'intent' of a system. To revisit these terms: a system's design includes "the social structures and institutions that manage feedbacks and parameters[96]"; system intent refers to "the underpinning values, goals and world views of actors that shape the emergent direction to which a system is oriented" (Abson et al., 2016).

Changing a system's design and/or intent can fundamentally shift how it operates by changing the way power is distributed within in it. This can change the way policymaking networks are structured and, in turn, result in the development of new and different policy outcomes that challenge the 'status quo' (Daubjerg, 1998). This is, of course, somewhat of a 'chicken and egg' argument. Making changes to the design and intent of a system requires change in the behaviour of actors within the system. However, as systems typically benefit the interests of actors who are central in policymaking networks, those key, powerful actors are likely to resist any weakening of their influence. Regardless of this reality, it is clear there can be no major progress in addressing the water pollution issue on the island of Ireland without a redistribution of power within governance systems. Until the design and/or intent of the systems change, it is unlikely that policymaking networks will change.

It is not the intention here to recommend what, or even if, 'deep' policy solutions should be implemented. However, it is worth exploring what such solutions might look like as they relate to agri-environmental policymaking on the island of Ireland, because doing so also helps articulate how some of the challenges outlined above – administrative complexity, competing policy channels and closed agri-environmental policymaking networks – interact to prevent diffuse agricultural pollution from being addressed effectively there.

10.4.1 The 'design' of agri-environmental institutions on the island of Ireland

A key component of a system's 'design' is the structure of institutions within it. Empirical data presented in chapter seven shows that imbalances in institutional power continue to exist between departments and agencies responsible for supporting the agri-food industry and those responsible for regulating it, with the former retaining the upper hand. This research demonstrates that these imbalances have multiple implications for regulation of diffuse agricultural pollution.

[96] Feedback and parameters are elements of shallow interventions (chapter three), the latter comprising policy tools usually targeted by policymakers, such as those implemented under the WFD and NiD (chapter five).

First, institutions responsible for regulating agriculture, e.g., environment and planning agencies, do not have the institutional power to develop agri-environmental regulations that too closely restrict the agri-food industry. As argued throughout this thesis, this is an outcome typical of exceptionalist policymaking environments. On top of this, because regulatory agencies are under-resourced as a result of their limited institutional power, regulations that are in place are not well enforced. This renders them further ineffective. Moreover, as discussed above, proactive interventions (as opposed to regulations) are not resourced in a way that enables them to effect long-term change (examples include initiatives such as ASSAP and CatchmentCARE).

If diffuse agricultural pollution is to be regulated effectively, existing institutional structures will need to change in a way that affords regulatory institutions more institutional power. As highlighted in chapter seven, this shift is beginning to take place, with, for example, the importance of the Agriculture Department declining in Ireland, and Agriculture no longer being a stand-alone department in NI. However, their institutional power still clearly outweighs that of their environment-focused counterparts, and regulation of diffuse agricultural pollution remains ineffective as a result.

This research demonstrates that another element of 'structure' inherent in the 'design' of the policy environment in Ireland and NI is administrative complexity. There is clear lack of cohesion between regulatory authorities and other relevant institutions at all levels, regional to national. Again, such challenges are commonly faced in regulating ecosystems, as they usually do not align with administrative boundaries. However, as this research shows, such structural challenges exist even within the same administrative regions. Lack of cohesion and communication results in administrative inconsistencies that powerful actors can capitalise on to advance their interests. Specific examples related to regulation of poultry litter transport and, separately, ammonia emissions, highlighted in chapter nine, demonstrate how this plays out in practice.

As this research makes clear, this system design is due in no small part to the way power is distributed within agri-environmental policymaking networks in Ireland and NI, both of which remain relatively exceptionalist. Structures inherent in the system are not accidental; it is in the interest of the agri-food actors central in the network to uphold them. As the following section argues, a key reason these actors continue to retain so much power is that

the 'intent' of the system (that is, its values and goals) supports it. The design of the system cannot change if a shift in system intent does not also take place.

10.4.2 The 'intent' of the agri-food system on the island of Ireland

One of the key challenges faced by regulators is that current attempts to address agriculture's environmental impact focus mainly on one half of the problem – the pollution created by a fundamentally productivist agriculture system – without addressing the productivist logic, or 'intent', of the system itself. As has been argued throughout this thesis, the agri-food sector continues to be treated as a 'special case' in both Ireland and NI. However, power analysis conducted in this research reveals that although agri-food may still be very much 'exceptional', and that other interests, including environmental ones, continue to be side-lined, a shift towards post-exceptional policymaking is taking place.

While, under more traditional forms of agricultural exceptionalism, actors such as primary producers – via farmers' unions – were central in the 'agriculture lobby', it appears that processors have now assumed this position. A re-orientation of system intent towards globalised, market-oriented food systems has enabled them to assume a central position in the policymaking sphere, a position that has been reinforced by the productivist, export-focused logic of Ireland's and NI's agri-food systems. A parallel intent, inherent in a 'multifunctional' approach to regulating and supporting agriculture, is that policy should remain focused on supporting 'farmers' as managers of the countryside. However, because a focus on 'multifunctional agriculture' has helped keep the agri-food sector at the centre of agri-environmental policymaking networks, it is indirectly reinforcing the power of these actors. These arguments are developed in the following sections.

Farmers: Still 'legitimate' custodians of the countryside

Even as societal expectations concerning rural landscapes have changed and the concept of 'the multifunctional countryside' has come to underpin EU agri-environmental and rural development policy, agricultural landscapes retain strong social and cultural importance across Europe. 'Farmers' are still considered the most 'legitimate' custodians of the countryside (see chapter two). This research has demonstrated that this is particularly the case on the Island of Ireland where the socio-cultural and historical importance of the 'family farm' remains deeply ingrained. This is a core value underpinning the 'intent' of the agri-food system there. As a result, agri-food actors continue to hold considerable ideological power,

which has helped them retain a central position within agri-environmental policymaking networks.

Because of this core value, policy solutions aimed at addressing agriculture-related pollution keep farmers at the centre. As is argued in chapter two, within the wider concept of the multifunctional countryside, a concept of agriculture as multifunctional has facilitated a policy situation in which 'farmers' are credited with an increasing number of public 'goods', while responsibility for dealing with agriculture's negative externalities are passed on to other actors (most often, the taxpaying public). However, because of how power distributions within the agri-food sector have changed as the system re-orients itself towards post-exceptionalism, much of the value of this is being captured by processors, not primary producers. Although most primary producers[97] are retained on the land via public subsidy (because agriculture is still 'exceptional'), the profits generated by the food they produce is captured by processors and actors further down the food supply chain. Even industries such as poultry that tend not to receive CAP direct payments do receive other public subsidies. Green energy schemes such as the NI Renewable Heat Incentive, discussed in chapter eight, are an example of this.

This is a clear example of how competition between parallel policy channels can have unintended consequences. Next, this section explores how the export-focus of Ireland and NI's agri-food sector is compounding this situation.

A focus on intensification and export growth: Power to the processors

A major factor underpinning and driving the productivist logic within Irish agriculture is the fact that in both Ireland and NI, approximately 90 percent of livestock-based agri-food products (beef, sheep meat, poultry meat, dairy) are produced for export (chapter four) and the overarching focus of supporting the agri-food industry is placed on supporting and growing exports. A focus on growing exports also means that, ultimately, focus is placed on growing production. Economically speaking, it is processors who benefit most from growth in production in an export-focussed market, because value is produced primarily at the processing and distribution end of the food chain. As a result, the share of the 'food dollar' primary producers receive has declined significantly in recent decades and continues to.

[97] As is highlighted in chapter four, this is true to at least some extent of even sectors considered 'economically viable' such as the Irish dairy industry.

A natural response to this pressure is for primary producers to increase productivity to remain viable. As discussed in chapter eight, this can be achieved though both 'output growth' and 'input reduction'. However, as analysis of agri-food strategies show, emphasis at policy level has been placed on growing outputs (chapter seven). In line with this, much of the support from institutions such as Teagasc or CAFRE, as well as from processors (e.g. co-operative demonstration farmers), is focused on how to continue growing production. Far less consideration is given to the 'input reduction' side of the productivity argument within agriculture, i.e., ways in which farmers might increase profitability through on-farm efficiencies such as reducing inputs like feed or fertiliser, or even decreasing herd size.

Input reduction-focused interventions could create value at the farm scale, and thus have potential to increase farmer profits. Furthermore, instead of forcing farmers to cap production in a way that limits the money in their pockets and pushes them into a productivist loop of producing 'more for less', re-orienting production systems to be profitability-focused at farm-level – a shift in system intent – might naturally cap stocking numbers and associated pollution. This does not necessarily require a wholescale shift away from exporting, or from 'intensive' production. Simply shifting the intent of the system to focus on the 'input reduction' side of the profitability equation could bring about much of the change required. However, because this approach does not increase outputs, and may in fact reduce them, it is simultaneously likely to compromise profits further down the value chain. Given the centrality of processors within the agri-food network, both on the island of Ireland and globally, it is thus unlikely that such a shift will occur with the network structured as it currently is.

It should also be highlighted here that, fundamentally, there is a tension between the economic goals of expanding production in an export-oriented economy and meeting environmental objectives. This tension creates competing policy channels that put primary food producers in a bind. Under the current system, it is difficult to be economically viable without growing, but growth generally (although not always) increases environmental pressures. It is possible for some producers to tap into niche markets (for example, the 'organic' market) which allow them to produce less but higher quality food and be paid higher margins for this. However, this approach works only so long as producers retain agency (power) over the product they sell, for example, through direct marketing to consumers. If the supply chain lengthens, again, the additional value is often captured by

processors and retailers. Moreover, the success of such products is often dependent on markets for them remaining 'niche', which, by definition, excludes most farmers from adopting this approach[98]. The case remains that for many producers, intensifying and/or getting bigger are the most logical options available to them if they want to stay economically viable. Again, this approach ultimately privileges processors.

As is argued here, an export-oriented, production-focused agri-food system concentrates the power of agri-food processors. It is telling that the most powerful industries on the island are dairy (Ireland and NI) and poultry (NI). Although dairy farmers technically 'own' the co-operatives they sell to, the balance of power (i.e., control of profits) lies with centralised processors, not individual dairy farmers. Similarly, within the vertically integrated poultry industry, it is the processor who is in control of the production system and profit generated by it, not individual poultry framers (see chapter eight). As long as the intent of the system continues to underpin processor power, their centrality in agri-environmental policymaking networks is assured. As is argued throughout this thesis, this means that policies aimed at addressing agricultural pollution will continue to be shallow and water pollution problems on the island of Ireland will persist, not only in catchments Ireland and NI share, but also in those that lie wholly within one or the other jurisdiction.

10.5 Summary, contribution to knowledge and areas for future research

Wicked problems are resistant to solution, cannot be understood or addressed in isolation and are grounded in competing value frameworks. Because of their complex nature, any potential resolutions are open to conflicting and divergent arguments and it is not possible to develop final, definitive or explicit solutions to them. Agriculture-related water pollution, a persistent and significant challenge on the island of Ireland, as it is across Europe and globally, is a classic wicked problem. There is a clear need to mitigate this pollution, given that the quality of waterways continues to decline in both Ireland and NI, including in catchments shared by the two countries. In an export-focused economy, there is also a parallel and competing need for farmers to produce sufficient food at prices that are competitive in the global market. It is also socially and politically important to preserve the

[98] It also raises ethical questions about 'two tiered' food systems, in which people who can afford to pay more for food are able to access 'better' food, while those who cannot is relegated to consuming food considered less 'good'. This argument is tangential to the one being made here but is important to note.

countryside that Irish people are culturally attached to, to maintain a vibrant rural community, and support the 'goods' produced by a multifunctional countryside.

As this research shows, it is not possible to maximise all these outcomes simultaneously. It is thus the role of policymakers to attempt to develop polices that, if not resolve this wicked problem, at least develop solutions that deliver a 'multi-dimensional social optimum'. However, without a clear understanding of how different actors influence the policymaking process and operationalise their power within complex policy environments, it is difficult to arrive at solutions that are indeed 'optimum'. Frequently, powerful actors exploit policy 'gaps' created by competing policy channels, such as those outlined above. This can result in ineffective policies being developed.

This research contributes to the literature on wicked environmental problems by considering the challenges faced in addressing the wicked problem of diffuse agricultural pollution in the island of Ireland's trans-boundary waterways. In doing so, it simultaneously illuminates how the problem is playing out more widely across Ireland and NI. It draws on theories of agricultural post-exceptionalism, policy network analysis and leverage points to describe governance structures and their influence on agri-environmental policymaking on the island. It also develops a framework of power that describes how actors within the Irish and Northern Irish agri-food sectors obtain and employ power within the agri-environmental policymaking arena.

This framework, built on Luke's 'three faces' model, describes power as being derived from multiple sources – ideological, organisational, institutional and economic – and argues that these interact to reinforce each other and produce outcomes that are not always immediately obvious. This thesis argues that such a model allows us to move beyond shallow descriptions of policy network structure to develop more complex and nuanced understandings of *why* networks are structured as they are and *how* actors within them influence policy outcomes. It contends that much policy analysis fails to do this, and therefore arrives at incomplete conclusions about policy outcomes and their impact. As a result, it is difficult for such analysis to effectively critique policies and develop sound policy solutions. The model of power developed for this thesis helps address this challenge.

This research further contributes to theoretical debates about agri-environmental policy by arguing that, to properly understand how such policy is developed and implemented, it is important to move beyond meso-level policy analysis, which typically considers 'farmers' or

'the agriculture lobby' to be a monolith. Empirical data reveals that power distributions *within* Ireland and NI's agri-food industry also determine how water pollution is regulated.

In applying these concepts to this research, it was found that the agri-food sectors on the island of Ireland are still treated as 'exceptional' and agri-environmental policy networks in Ireland and NI remain relatively 'closed'. Within these networks, actors representing intensive agriculture are most central, and environmental actors are peripheral. This thesis argues that this has limited policy innovation and kept most policy tools 'shallow'. As a result, they have not challenged the status quo of productivist agriculture and how it is regulated, and therefore its contribution to water pollution persists.

This research also demonstrates that, because of the centrality of agri-food actors in Ireland and NI's agri-environmental policymaking networks, power distributions within the agri-food industry have significant implications for how water pollution is regulated. The island's dairy and drystock sectors have considerable ideological power, which helps them attract much policy support. However, because the dairy industry has superior economic and organisational power, it is more able to influence policy. In NI, as a shift towards post-exceptionalism begins to take place, the poultry industry's economic power and vertically integrated structure means it is similarly central the policymaking network there. Thus, policy tends to favour the expansion of intensive industries on the island – dairy in the south, and dairy and poultry in the north. This is putting considerable pressure on waterways, but because policy solutions aimed at addressing the problem are shallow, an outcome of a closed policy network that favours agri-food interests, water pollution from intensive industries persists. Meanwhile, although drystock farmers have enough ideological and organisational power to be kept on the land, they are not powerful enough to meaningfully influence policy outcomes, and their contribution to water pollution is therefore not being addressed successfully. In many cases, it remains nearly entirely overlooked.

The combination of poorly regulated intensive industries and overlooked extensive industries highlights the wicked nature of the island of Ireland's water pollution problems. The challenge is exacerbated by the presence of multiple competing policy channels and a complex administrative environment. The latter is set to worsen following the UK's exit from the EU. As this research shows, together, these leave multiple 'gaps' for powerful agri-food actors to exploit and advance their interests, with adverse outcomes for water pollution on the island of Ireland, in its trans-border waterways in particular.

To re-assert arguments made in this thesis' introduction, although this research set out to consider challenges faced in mitigating diffuse agricultural pollution in the island of Ireland's trans-boundary waterways, research findings revealed much about the challenge of addressing these challenges across the whole island. Further, this research's theoretical framework and empirical findings are applicable beyond the Irish context, both elsewhere in Europe and globally. Although Ireland and NI have unique socio-political and historical characteristics, they have much in common with countries across Europe. First, they have shared an administrative context with other EU countries for nearly 50 years. Many countries across Europe (e.g., France, The Netherlands, Denmark) are also home to strong agricultural lobbies that continue to actively influence agri-environmental policy at both EU and national levels. Further, as in Ireland and NI, the agriculture sectors in many European countries remain characterised by relatively small 'family farms'. Therefore, the contribution of these farms to Europe's persistent water pollution problems cannot be overlooked if the region's declining water quality is to be adequately addressed. Finally, the challenge of agriculture-related water pollution is a global one. In particular, lessons may be learned from this research's findings about how administrative complexity at regional, national and international levels compromises water pollution mitigation, whether or not catchments cross administrative boundaries. Indeed, such lessons may be applied not just to the challenge of water pollution, but other environmental problems as well.

Analysis conducted in this thesis revealed areas for future research. It is evident that the poultry industry's contribution to water pollution is poorly understood in both Ireland and NI. There are particular knowledge gaps around where exactly poultry litter is being transported to, and the degree to which poultry houses themselves contribute to diffuse agricultural pollution. As this research highlights, there are evidently barriers to conducting research on this, but if water quality issues in the Irish border region are to be addressed, these knowledge gaps must be filled. There is also scope for more research on how to improve knowledge and engagement around drystock farming's contribution to water pollution. Given that drystock enterprises are by far the most numerous agricultural enterprises on the island, the need to address their contribution to the problem is clear.

Finally, the theoretical framework developed and used in this research can be applied to agri-environmental policymaking research in similar contexts. It facilitates an in-depth understanding of how different agri-environmental actors influence the policymaking process

and operationalise their power within complex policy environments, something which less-nuanced policy analysis provides an incomplete picture of. By extension, it might assist in the development of better agri-environmental policies by identifying situations where, although it may appear that relevant actors have equitable say in policy creation, they do not. If unequal power distributions are identified, and where necessary, addressed, it is more likely that, in the face of 'wicked' agri-environmental problems, a multi-dimensional social optimum can be achieved.

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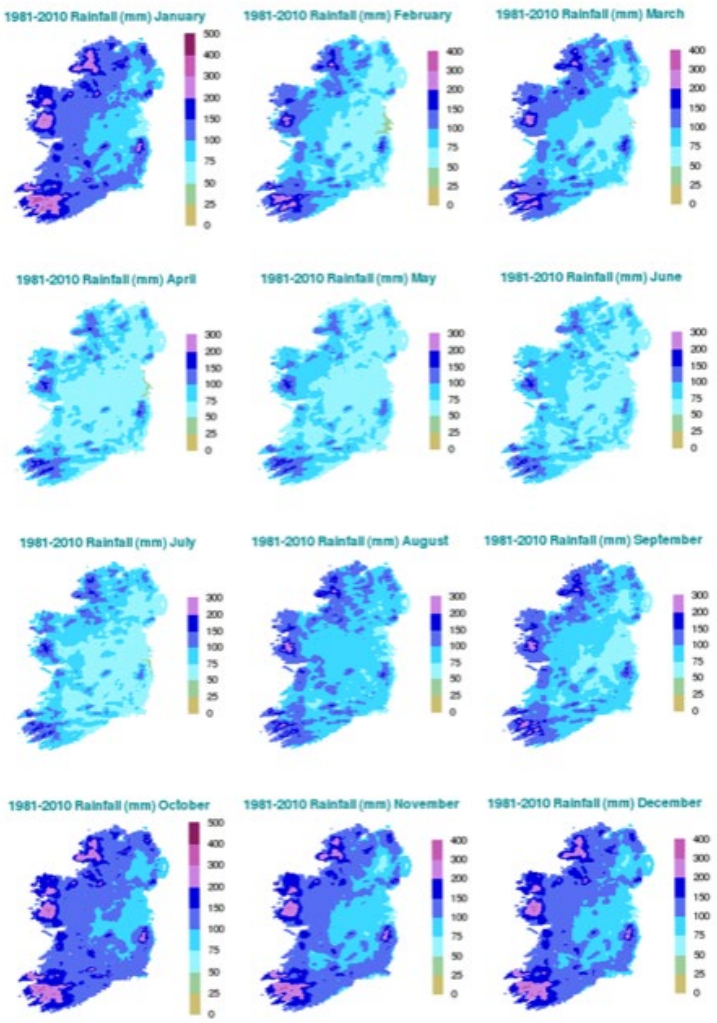
Appendix 1: Additional notes on the dairy industry on the island of Ireland

A1.1 General information

Although the dairy industry is relatively integrated on the island of Ireland, with approximately a third of NI dairy processed in Ireland, there are some key differences in the sector north and south of the border. Mainly, the industry is more intensive in NI than in Ireland, for multiple reasons. First, it is simply more difficult to grow grass in the North's wetter, cooler climate (figure A1-1). Further, while Ireland relies primarily on summer milk production, in NI, milk production is spread more evenly throughout the year[99]. Therefore, NI dairy farms rely more heavily on imported feed than do their southern counterparts: the average NI dairy cow consumes approximately 2,660 kg of feed[100], compared to 1,136 kg in the south (Buckley et al., 2020).

Figure A1.1 Average monthly rainfall on the island of Ireland (Teagasc, 2015).



[99] More feed is required to produce milk during non-summer months due to the lower availability of grass.
[100] This figure was calculated based on the average annual cost of concentrates fed to NI dairy cattle (£693 pa, at £260/ton, based on the average calving pattern (53 percent summer milk). See page 27 of the NI 2020 Farm Business Data report (DAERA, 2020a).

However, distinctions go beyond this, with a fundamentally different historical approach to mechanisation and intensification apparent in NI. O'Rourke (2007a and 2007b) highlights how in the late 19th and early 20th century, Ulster dairy farmers adopted new creamery technology earlier than farmers in the rest of Ireland, facilitating early expansion of the industry. Further, as discussed in chapter four, while the Irish agriculture industry generally remained small and subsistence-focused well into the mid-20th century, the NI industry benefitted from intensification-focused government support much earlier, particularly during and immediately post-World War Two, with the dairy sector being a key benefactor (Foster, 1988). UK accession to the EEC in 1973 furthered intensification and mechanisation (as in Ireland) (Jenkins, 1989), and while expansion and intensification of both the NI and the Irish dairy industries was curtailed in the 1980s by the introduction of EU dairy quotas, the NI industry was able to effectively circumvent these quotas in the late 1990s and early 2000s by purchasing or leasing 'excess' quota from the rest of the UK[101], and therefore begin to expand again – mainly through intensification – much earlier than Irish dairy farmers (e.g., see Belfast Telegraph, 2011. Also confirmed in conversation with a research participant from the Irish dairy industry).

A1.2 Notes on the history of dairy co-operatives on the island of Ireland

As is discussed in chapter eight, dairy co-operatives have a much greater presence in Ireland than in NI, despite the historical strength of the Ulster dairy industry. Although nearly all milk produced in NI is now sold to the region's four main co-operatives, between 1955 and 1994 it was sold directly to the NI Milk Marketing Board (MMB). The Board was set up following the success of similar MMBs in England, Wales and Scotland, and it – rather than individual co-operatives – was responsible for finding a market for milk produced in NI and for distributing profits among farmers (Spencer and Whittaker, 1990). According to research participants involved in Irish (north and south) dairy co-operatives, this is the main reason for the greater influence of Irish dairy co-operatives; while in the South, the economic and socio-political import and influence of dairy co-operatives is well established, the tradition has not developed the same way in the North, because of the interim role of the MMB.

[101] The English dairy industry experienced significant decline and consolidation in the late 1980s and early 1990s, due in part to a 'price war' waged by British supermarkets on English milk co-operatives. From the early 2000s, the UK milk supply consistently failed to fulfil the national quota, meaning that NI dairy farmers were able to able to expand unconstrained, well before quotas began to be phased out in 2009 (and lifted completely in 2015).

Appendix 2: The EU Nitrates Directive: Further information

This appendix outlines details of the EU Nitrates Directive (NiD) regulations and their implementation in Ireland and NI.

A2.1 The European Union Nitrates Directive

EU-level NiD regulations are as follows[102]:

1. **Identification of water polluted, or at risk of pollution**, **such as**:
   - surface freshwaters, in particular those used or intended for the abstraction of drinking water, containing or that could contain (if no action is taken to reverse the trend) a concentration of more than 50 mg/l of nitrates
   - groundwater containing or that could contain (if no action is taken to reverse the trend) more than 50 mg/l of nitrates
   - freshwater bodies, estuaries, coastal waters and marine waters, found to be eutrophic or that could become eutrophic (if no action is taken to reverse the trend)

2. Designation as "Nitrate Vulnerable Zones"(NVZs) of:
   - areas of land which drain into polluted waters or waters at risk of pollution and which contribute to nitrate pollution; or
   - Member States can also choose to apply measures (see below) to the whole territory (instead of designating NVZs).

3. Establishment of Codes of Good Agricultural Practice to be implemented by farmers on a voluntary basis. Codes should include:
   - measures limiting the periods when nitrogen fertilizers can be applied on land in order to target application to periods when crops require nitrogen and prevent nutrient losses to waters;
   - measures limiting the conditions for fertilizer application (on steeply sloping ground, frozen or snow covered ground, near water courses, etc.) to prevent nitrate losses from leaching and run-off;
   - requirement for a minimum storage capacity for livestock manure; and
   - crop rotations, soil winter cover, and catch crops to prevent nitrate leaching and run-off during wet seasons.

4. Establishment of action programmes to be implemented by farmers within NVZs on a compulsory basis. These programmes must include:
   - measures already included in Codes of Good Agricultural Practice, which become mandatory in NVZs; and
   - other measures, such as limitation of fertilizer application (mineral and organic), taking into account crop needs, all nitrogen inputs and soil nitrogen supply, maximum amount of livestock manure to be applied (corresponding to 170 kg nitrogen /hectare/year).

[102] NB – information in this section is taken verbatim from the EU's Nitrates Directive information page (European Commission, 2021)

5. Limits to the application of nitrogen from manure: in areas covered by Action Programmes, the Directive prescribes that the highest amount of nitrogen from manure that can be applied annually is 170 kg/ha. At the request of Member States, and provided that they justify scientifically that this shall not lead to higher pollution, the Commission can adopt implementing Decisions (commonly referred as "derogations") that allow the application of higher maximum limits of nitrogen from manure in specific areas and under particular conditions. Such derogations do not exempt Member States from the water quality objectives of the Directive, nor from any other of its measures. (*See below*)

6. National monitoring and reporting. Every four years Member States are required to report on:

- Nitrates concentrations in groundwaters and surface waters;
- Eutrophication of surface waters;
- Assessment of the impact of action programme(s) on water quality and agricultural practices;
- Revision of NVZs and action programme(s)
- Estimation of future trends in water quality.

Reports and studies

The 4-yearly reports produced by the Member States are used as the basis for a 4-yearly report by the European Commission on the implementation of the Directive.

A2.2 The Nitrates Directive on the Island of Ireland: Implementation and impact

Full details of Ireland's Nitrates Action Programme are included in DAFM's cross compliance handbook: gov.ie - Explanatory Handbook for Cross Compliance Requirements (www.gov.ie)

NI's Nutrients Action Programme 2019-2022 Guidance Booklet is available at: 20.21.177 Nutrients Action Programme 2019-2022 Guidance Booklet Final.PDF (daera-ni.gov.uk) (NIEA, 2019)

The Nitrates Directive Derogation in Ireland

Both Ireland and NI have been granted NiD derogations, which allows farmers there to spread up to 250kg of nitrogen from manure per hectare, per annum. Notably, at the time of writing, only three other member states (Denmark, The Netherlands and Belgium) hold one (European Commission, 2021).

Appendix 3: Local Authority Waters Programme (LAWPRO) and ASSAP

As detailed in chapter 6, Ireland's Environmental Protection Agency (EPA) Water Quality Report for 2013-2018. showed that water quality in Ireland declined in that period. In response, Ireland's second river basin management plan (2018) attempted to adopt a new approach to addressing water pollution, moving away from a regulatory based, 'one size fits all' approach, towards one that is more collaborative and focused on 'the right measure in the right place' (Nolan, 2019). To facilitate this, the Irish government supported the creation of the Local Authority Waters Programme (LAWPRO) and the Agricultural Sustainability, Support and Advisory Programme (ASSAP) (Meehan, 2019), which work together across 190 Priority Areas for Action.

A3.1 Priority areas for action

In 2017, the EPA identified 190 specific catchment areas, called Priority Areas for Action (PAAs) (Meehan, 2019; LAWPRO, 2021b). Catchment areas were classified as PAAs if they included waterbodies that met one or more of the following criteria (LAWPRO, 2021b):

- Waterbodies deemed 'at risk' of not achieving 'good' or 'high' status under the WFD
- High status objective waterbodies, often referred to as 'Blue Dot' waters
- Waterbodies in Protected Areas, e.g., those used for drinking water supply, bathing, shellfish growing or waters that feed into habitats in Natural Heritage Areas or Special Areas of Conservation
- Waterbodies where the water quality has declined or might decline if pollution source(s) is not identified

Additional principles were applied to further narrow the scope of the project:

- Where possible, focus is should be on waterbody headwaters
- A PAA should include water bodies at a sub-catchment scale, where practical
- Multiple pollution sources should be tackled together
- PAAs should link to existing programmes and community group initiatives, where possible
- Where improvements or measures are already planned, PAAs should build on these
- PAAs should ensure an even distribution of actions to address different pollution sources and catchment types across the regions

A3.2 Local Authority Waters Programme

The Local Authority Waters Programme (LAWPRO) is a national service that works on behalf of Ireland's 31 local authorities to coordinate efforts to meet Water Framework Directive targets. Programme stakeholders include local authorities, state agencies, public bodies, private sector stakeholders and local communities. Kilkenny and Tipperary County Council jointly manage LAWPRO across 13 separate local authority centres within a five-region structure (Border, Midlands and East, South East, South West, West) (LAWPRO, 2021a).

LAWPRO catchment scientists working in PAAs undertake 'Local Catchment Assessments' to understand why water quality has deteriorated and determine actions for improvement. Where agriculture is identified as a key pressure, an advisor from the Agricultural Sustainability, Support and Advisory Programme (ASSAP) is brought in to work with the farmer to "improve farm practices and rase awareness of the water quality issues" (LAWPRO, 2021b). Critically, no funding is available to implement measures. Focus is thus on education and cost-free or low-cost solutions.

A3.3 Agricultural Sustainability, Support and Advisory Programme (ASSAP)

The Agricultural Sustainability, Support and Advisory Programme (ASSAP) is a collaboration between Ireland's Department of Agriculture, Food and the Marine (DAFM) and Dairy Sustainability Ireland (DSI). It is funded from 2018 until the end of 2021. The programme employees 30 advisors who work directly with farmers to help identify and address potential on-farm water pollution issues. Of these advisors, 20 work directly for Teagasc and 10 are employed by DSI and work specifically with dairy farmers (Meehan, 2019; Teagasc, 2021).

When agriculture is identified as a pressure within a PAA, farmers in the area can (but are not required to) receive a free farm visit from an ASSAP advisor. The advisor assesses the farm for potential issues that may contribute to water pollution, and then agrees with the farmer what improvements can be made. Key focus areas include:

- Improving nutrient management (e.g., more targeted use of slurry and/or fertiliser)
- Improving land management practices to reduce point-source nutrient pollution (e.g., riparian margins, fencing off waterways, etc.)
- Improving farmyard management and practices

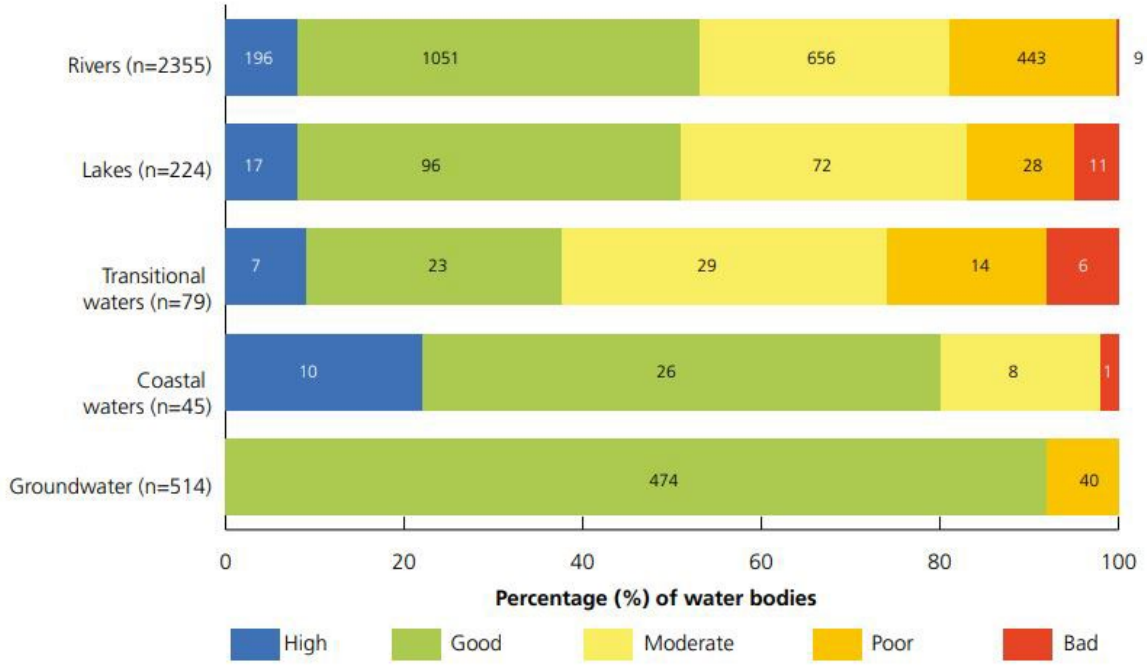
According to an interim report on the programme, relevant farming organisations strongly support the programme and initial response from farmers is positive (Meehan, 2019). However, again, there is no funding available to implement measures suggested by the programme. This is a training and advisory service only.

Appendix 4: Assessment of Ireland and NI's waterways under the Water Framework Directive

A4.1 Waterbodies in Ireland: 2019 assessment

The Ireland EPA report 'Water Quality in Ireland 2013 – 2018' (O'Boyle et al., 2019) outlines the most recent assessment of water quality in Ireland and progress made against Water Framework Directive targets. The following figures, all sourced from the report, provide detail of the report's findings, to supplement figures provided in chapter five.

Figure A4.1 Classification of Ireland water bodies under the WFD, 2015 – 2018



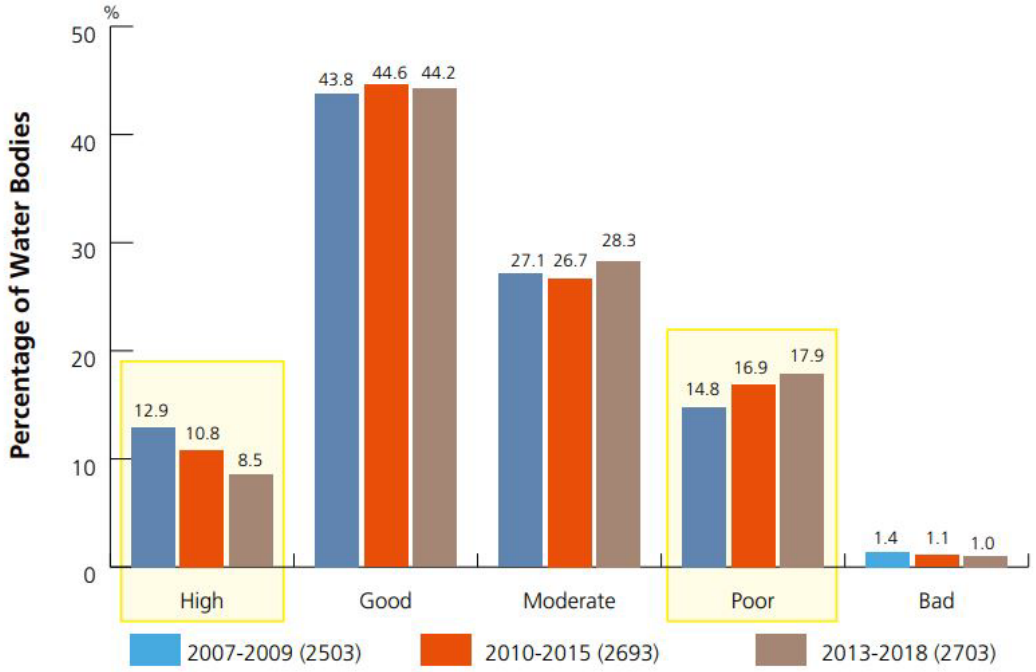
Source: O'Boyle et al., 2019, p. 5

Figure A4.2 Change in surface water ecological status (Ireland) 2015 – 2018

Category	Stable	Declined	Improved	Net Change
Rivers	1,612	429	301	-128
Lakes	150	30	42	12
Transitional	47	13	10	-3
Coastal	22	9	11	2
Total	**1,831**	**481**	**364**	**-117**
Percentage	**68.4%**	**18.0%**	**13.6%**	**-4.4%**

Source: O'Boyle et al., 2019, p. 6

Figure A4.3 Change in percentage of each of five WFD status classes over all WFD assessments (2007 – 2018)

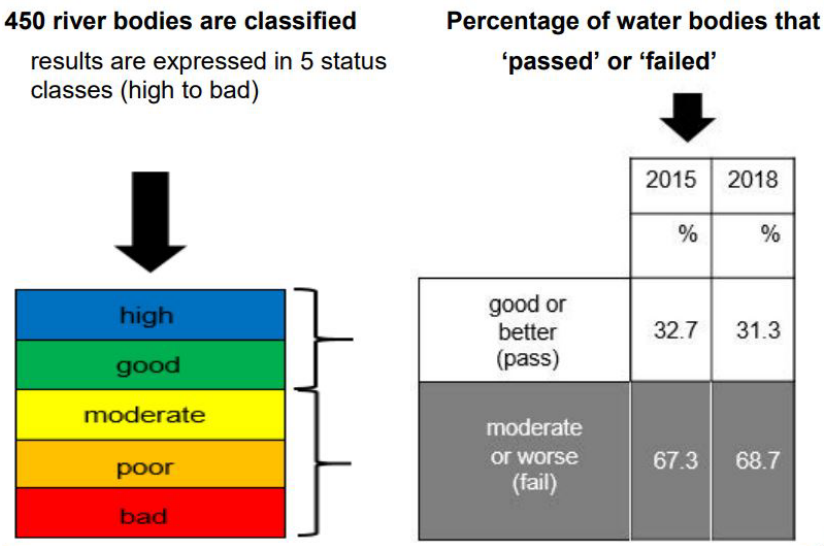


Source: O'Boyle et al., 2019, p. 6

A4.2 Waterbodies in Northern Ireland: 2019 assessment

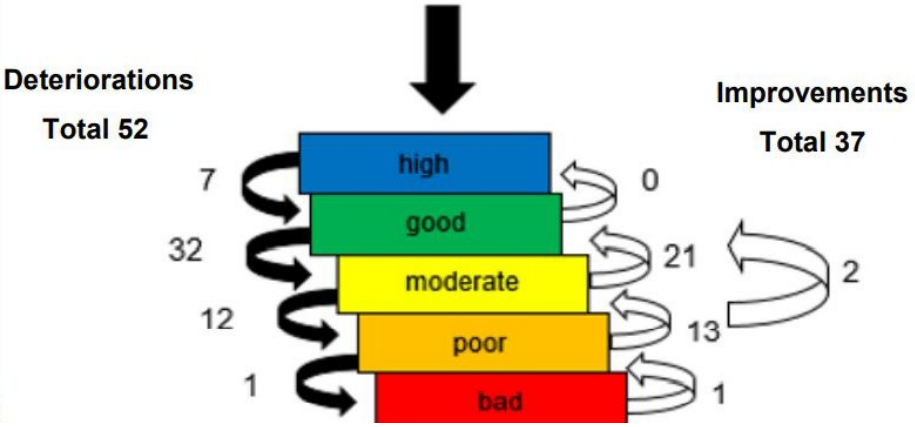
The NI Environment Agency report 'Planning for the third cycle River Basin Plan 2021-2027: Significant water management issues report' (NIEA, 2019), outlines the most recent assessment of water quality in NI and progress made against Water Framework Directive targets. The following figures, all sourced from the report, provide detail of the report's findings, to supplement figures provided in chapter six.

Figure A10.4 Classification of NI river water bodies under the WFD, 2015 and 2018



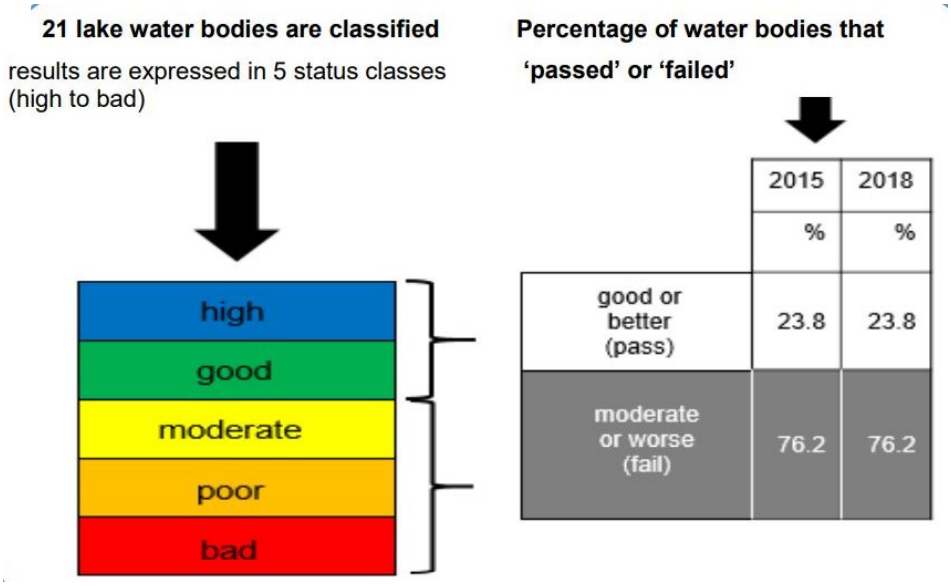
Source: NIEA, 2019, p. 6

Figure A4.5 Total number of river water bodies that deteriorated or improved, 2015 – 2018



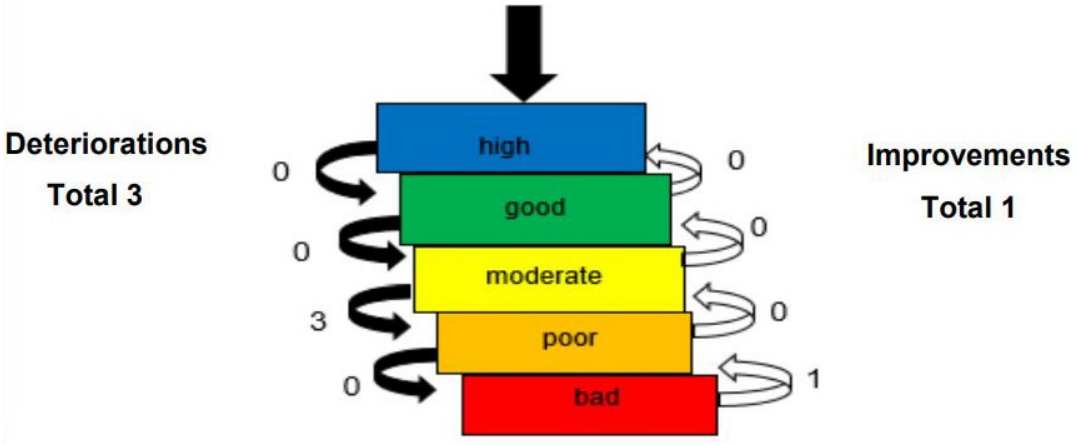
Source: NIEA, 2019, p. 6

Figure A4.6 Classification of NI lake water bodies under the WFD, 2015 and 2018



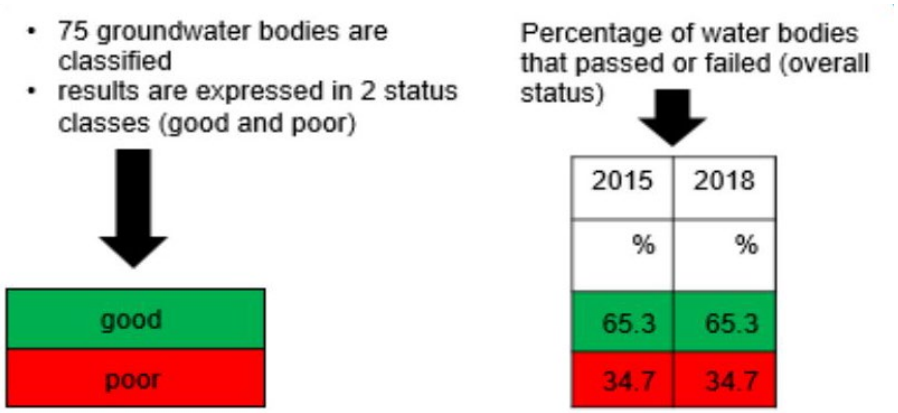
Source: NIEA, 2019, p. 10

Figure A4.7 Total number of lake water bodies that deteriorated or improved, 2015 – 2018



Source: NIEA, 2019, p. 10

Figure A4.8 Summary of NI lake groundwater bodies under the WFD, 2015 and 2018



Source: NIEA, 2019, p. 11

Appendix 5: Notes on soil type and water pollution

A5.1 Soil type, nutrients and waterways

Understanding of soil nutrient pathways has only recently become well understood. For a long time, more focus was placed on an intensity-pollution relationship, that is, the more intensive agriculture is in a region, the more polluted waterways will be (Watson *et al*., 2007). Within extensive systems, issues such as cattle access points to rivers, manure field heaps and field storage of silage were thought to be the main the main sources of phosphorous export to waterways, and there was an expectation that low stocking rates and nutrient inputs would generally not pose a significant water pollution risk (Doody et al., 2012). This is despite the fact that scientific evidence about the potential environmental impact of applying phosphorous to gleyed and peat soils – dominant in most of the island of Ireland's western and border regions – has existed in Ireland since studies conducted by Burke et al. (1974) and Burke (1975) more than 40 years ago (Doody et al., 2012).

In short, their research showed that phosphorus can build up in peat soils and result in significant phosphorous runoff into waterways, something less likely to occur in more freely draining soils. This problem is compounded by climate and topography: periods of heavy rainfall (often experienced on the island of Ireland), combined with hilly landscapes, increase the likelihood of overland nutrient flows. This has knock-on effects for farming practices. For example, farmers may be unable to spread manures on some of their fields due to waterlogging or land grade. This means that they tend to repeatedly spread on the same, dry(er) fields, which further exacerbates nutrient build-up and run-off potential. Doody et al. (2012) offer a comprehensive overview of these issues.

A5.2 Notes on soil type: Key terms

GLEY: The term 'gley' derives from the Russian word 'glei', meaning 'compact bluish-grey'. Gley soils are developed under anaerobic conditions produced by intermittent or permanent waterlogging, either a result of surface water collection or groundwater conditions. They are grey or blue grey in colour, and result when iron compounds change chemically from (brown) ferric to (mobile) ferrous compounds in the absence (or low levels) of oxygen (James Hutton Institute, 2021).

HUMIC GLEY: Humic gley soils are loamy (sandy or silty with some clay) or clayey, with a peaty topsoil (Cranfield University, 2018).

CLAY TILL: In geology, till is unstratified, “unsorted material” that has been directly deposited by glacial ice. (Britannica, 2021).

Appendix 6: Notes on manure, manure spreading and anaerobic digestion

A6.1 Notes on manure spreading

In grazing-based systems, i.e., most drystock farms and a majority of dairy farms in Ireland and NI, animals are outside for much of the year and deposit manure on the land the graze. When those animals are housed, mainly during the winter, their manure is stored and then spread on the land in the spring[103], either directly on the farm they are reared on, or on another farm locally (a drystock farm with a low stocking rate may take manure from a dairy farm with a higher stocking rate, for example). Cattle manure is quite wet and therefore inefficient to transport far.

In the case of poultry, the production system matters. For broiler chickens, the main type of chicken reared in NI and Ireland[104], litter (a combination of manure, bedding and often, dead chickens) is removed from the poultry unit at the end of the production cycle (typically seven to nine weeks). This cannot be spread directly on grassland grazed by cattle as the possible presence of dead chickens in the litter makes it a risk to cattle health (UK Environment Agency, 2013; Kyakuwaire et al., 2019). Instead, it is typically either transported off-farm to be ploughed into arable land elsewhere, or to be processed via an anaerobic digester (AD; see below). Note that in both cases, poultry litter produced in NI frequently travels south to Ireland. Either way, nutrients are deposited away from the site of production. Conversely, with laying hens, manure is usually spread locally, because, as with cattle manure, its higher moisture content makes it difficult to transport.

A6.2 Notes on anaerobic digestion

Anaerobic digestion (AD) is a process in which bacteria break down organic matter in the absence of oxygen. By-products of this including biogas (comprising mainly methane, carbon dioxide and hydrogen sulphide) and digestate, which is the nutrient-rich matter left after the digestion process. The biogas produced can be sold into regional national gas distribution systems, compressed and used as fuel for vehicles, or further processed into biochemicals and related products. The digestate has solid and liquid components, which are sometimes separated and processed independently. Solid components are typically turned into

[103] The Nitrates Directive 'closed period' prohibits land spreading during months of the year when runoff is more likely, i.e., late autumn and winter. See appendix 8 for more details.

[104] There are approximately 70 million broiler chickens produced in Ireland annually. Laying stock is approximately 2 million hens (Teagasc, 2021b). In NI, in 2019 there were approximately 128 million broiler chickens reared in NI, compared to between 5 million and 7 million laying hens (DAERA, 2020c, DAERA, 2021d).

commercial products such as animal bedding, horticultural composts and fertilizer. The liquid can also be used as a fertilizer (US EPA, 2021).

AD has been promoted as a 'green energy' solution in Ireland and NI (mainly the latter), and until recently, was supported by the NI Renewables Obligation scheme (for more information on this, refer to chapter 8**,** and Attorp and McAreavey, 2020). It has also been seized on by the NI poultry industry and NI government as a way of addressing the issue of what to do with the high volumes of litter being produced by the broiler industry. According to government employees interviewed for this research, an AD plant in Glenmore, Donegal (LSR, 2021) processes approximately 25 percent of the poultry litter produced in NI. Another 25 percent is processed at a purpose-built facility in County Antrim (the building of which was funded by a significant government loan. Refer to Leroux (2018)). In this research, it was not possible to determine what happens to the remaining 50 percent of the broiler litter produced in NI. It is evident that it is land-spread on arable land, but statistics on what percentage stays in NI and what travels south are seemingly not available.

Importantly, the AD process does not change the amount of nutrients present in poultry litter (or other organic matter), which remain in the digestate even after processing (hence digestate's utility as a fertilizer) (Malamis et al., 2014; Carroll, 2018; Leroux, 2018). In a 2012 report, the NI agriculture and environment department specifically acknowledged that AD "does not address the fundamental issue of excess nutrients in the manure, as it requires land spreading of the digestate. Therefore, it is not an alternative to land spreading" (DAERA, 2012, p. 19, in Leroux, 2018). Despite this, according to some participants in this research, the digestate produced by small-scale ADs is still land spread. The same participants did, however, suggest the AD plant in County Antrim does process the digestate into its solid and liquid components and sell the solids on as horticultural compost. The liquid component, which retains far few nutrients than the solids, continues to be spread on land, but from a nutrient pollution perspective, the impact of this is minimal. It is not clear what happens with the digestate produced in the Donegal AD plant.

Appendix 7: Sample interview guide

Intro: General overview of PhD research; intro to participant's work, etc.

Question 1: To what degree are water management issues 'on the radar' of farmers in Ireland generally? (How important are they?)

Question 2: Why does water pollution remain such a persistent issue in Ireland?

Question 3a: What impact (positive or negative), if any, have current Irish agri-environment strategies (e.g., FoodWise 2025) and had on waterway management in Ireland (in the agricultural context)?

Do you think the policy process is effective?

Question 3b: What impact (positive or negative), if any, have key agri-food policies (EU level, national level) on waterway management in Ireland (in the agricultural context)?

Do you think the policy process is effective?

Question 4: Who are the key players involved in developing agri-environment strategies and policies in Ireland?

Question 5: What factors influence Irish farmers' decision-making processes around land use and waterway management?

How important is family, tradition, grants….etc.?

Question 6 - *If known*: Are there key differences in the agri-environment policymaking processes in Ireland and Northern Ireland? If yes, how do these impact the management of the island's shared waterways?

a. *If yes, why do you think these differences exist?*
b. What impact might north-south divergence in the processes (and outcomes) have on management of shared waterways on the island?

Follow up questions:

7. What do you think are the important issues to consider when thinking about water management issues…or are there other issues that they think are important that we haven't discussed?

8. How do you think things will look in 5 years' time?

Table A7.1 Alignment between research guide and interview questions

Research question	**Interview guide question** (Number – refer to sample guide above)	**Potential interview prompts**
How do the actions, experiences and perspectives of stakeholders involved in Ireland and NI's agri-environmental policymaking networks influence policymaking?	4, 5, 6, 7	"Do you feel your interests are heard/paid attention to by policy makers?" "Who has a 'seat at the table' when agri-food strategies are being developed?" "Do you feel included in the decisions your farmers' union/co-op/other make about policy?"
What, if any, differences exist between agri-environmental policymaking processes north and south of the border, and what impact do these have on shared management of the island of Ireland's shared waterways?	1, 2, 3a, 3b, 6, 7	"Do you communicate with your counterpart in (NI/Irish) government about water issues?" "Are water pollution regulation challenges faced in NI/Ireland causing problems for farmers/practitioners/policymakers in Ireland/NI?"

Appendix 8: Interview participants

Further to comments made in section 6.6, because the network of individuals involved in policymaking and research related to waterway management in Ireland and NI is very small, it is not possible to be too specific about what organisation research participants were associated with.

As discussed, when referring to direct quotes in-text, both in this thesis and in related publications, broad categories were employed when citing individual quotes, distinguishing only between 'government employees', 'eNGO employees', 'academics' and 'farmers', and every effort was made to ensure that it was not possible to infer who the individual being quoted was based on the broader textual context.

This appendix provides slightly more detail about participants, to demonstrate the breadth of organisations and viewpoints represented in this research. However, it is still not possible to be specific about individuals' roles within their organisations. Further, in the case of eNGO staff and academics, it is not acceptable to identify the eNGO or the university, because, again, the network is so small, and the topic so politically charged.

A list of acronyms and abbreviations is available on page *vi* of this thesis, however, for ease, definitions of these are included again here:

AFBINI	Agri-Food and Biosciences Institute, Northern Ireland
DAERA	Department of Agriculture, Environment and Rural Affairs (NI)
DAFM	Department of Agriculture, Food and the Marine (Ireland)
EPA	Environmental Protection Agency (Ireland)
LAWPRO	Local Authorities Waters Programme
ICOS	Irish Co-Operative Organisation Society
NIEA	Northern Ireland Environment Agency

Table A8.1 Breakdown of interviewee by profession and location

Interview category	Number of interviews	Number of supplementary interviews	Geographical location	Number of ministries, institutions or industry sub-sectors represented
Academics	0	1	Ireland	1
	1	4	Northern Ireland	2
Government employees	9	4	Ireland	6
	10	5	Northern Ireland	7
eNGO employees	2	0	Ireland	2
	7	0	Northern Ireland	6
Agriculture industry representatives	2	1	Ireland	2
	1	1	Northern Ireland	1
Farmers' union representatives	1	1	Ireland	1
	1	0	Northern Ireland	1
Farmers, general	2	0	Ireland	1
	0	0	Northern Ireland	N/A
Journalists	0	0	Ireland	N/A
	2	0	Northern Ireland	1
TOTAL	16	7	Ireland	13
	22	10	Northern Ireland	18
	38	**17**	**TOTAL = 55**	

A8.1 List of interview participants by date

Full Interviews

NB – Interviews were conducted in person, unless indicated otherwise.

NI, November 2018

1. Government employee, NI: NI Planning
2. Government employee, NI: NI Assembly
3. Government employee, NI: DAERA
4. Academic, NI
5. eNGO volunteer, NI

NI, February 2019

6. eNGO employee, NI
7. Government employee, NI: DAERA
8. eNGO employee, NI
9. Government employee, NI: AFBINI

Ireland, November 2019 (Dublin, Wexford, Wicklow, Cork, Athenry)

10. Journalists x 2, NI (*telephone*)
11. Government employee, Ireland: DAFM
12. Government employee, Ireland: EPA
13. Government employee, Ireland: LAWPRO (*telephone*)
14. Dairy farmer, Ireland
15. Dairy farmer, Ireland
16. Government employee, Ireland: Teagasc
17. Industry representative, Ireland: ICOS
18. Government employee, Ireland: Department of Housing, Local Government and Heritage
19. Government employee, Ireland: Teagasc (*telephone*)
20. eNGO employee, Ireland
21. eNGO employee, Ireland
22. Industry representative, Ireland: IBEC Ireland
23. Irish Farmers' Association representative, Ireland (*telephone*)

NI, January 2020

24. Drystock industry representative, NI
25. Ulster Farmers' Union representative, NI
26. eNGO employee, Ireland
27. eNGO employees x 2, NI

NI, March 2020

28. Government employee, NI: NIEA
29. Government employee, NI: DAERA
30. Government employee, NI: ABFINI

Other Phone/Skype Interviews

31. Government employee, Ireland: Teagasc, *April 2020 (Zoom)*
32. Government employee, NI: AFBINI, *April 2020 (Zoom)*
33. eNGO employee, NI, *April 2020 (Zoom)*
34. Government employees x 2, Ireland: LAWPRO, *June 2020 (Zoom)*
35. Government employee, NI: AFBINI, *July 2020 (Zoom)*

Supplementary Interviews

1. Academic, NI, *December 2017*
2. Academic, NI, *December 2017*
3. Academic, NI, *December 2017*
4. Academic, Ireland, *November 2019 (telephone)*
5. Government employee, Ireland: Local government (catchment science), *February 2020 (telephone)*
6. Government employee, NI: AFBINI, *March 2020*
7. Government employee, NI: AFBINI, *March 2020 (telephone)*
8. Poultry industry employee, NI, *March 2020 (telephone)*
9. Government employee, NI: NIEA, *March 2020 (telephone)*
10. Academic, NI, *March 2020 (telephone)*
11. Government employee, Ireland: DAFM, *May 2020 (telephone)*
12. Government employee, Ireland: DAFM, *May 2020 (telephone)*
13. Irish Farmers' Association representative, Ireland, *July 2020 (telephone)*
14. Government employee, Ireland: Teagasc, *November 2020 (Zoom)*
15. Industry representative, Ireland: ICOS, *December 2020 (Zoom)*
16. Dairy Industry representative, NI, *December 2020 (telephone)*
17. Government employee, NI: local government (planning), *January 2021 (telephone)*

Appendix 9: List of documents analysed and document analysis results

Table A9.1 List of documents analysed

Classification	Document
Water general	
Ireland	Water quality in Ireland 2013-2018
	Water quality in Ireland 2010-2015
NI	NI WFD regulations 2017
	NI WFD regulations 2015
	NI Significant water issues report 2021-27
River Basin Management Plans	
	NWIRBD water plan 2009
	NBIRBD water plan 2009
	NWIRBD RBMP 2009 - 2015
	NBIRBD RBMP 2009 - 2015
	NWIRBD RBMP 2015 -2021
	NBIRBD RBMP 2015 -2021
	Ireland RBMP 2018 - 2021
	Managing shared waters report 2003
Agri-food strategies	
Ireland	AgriVision 2015
	Food Harvest 2020
	Food Wise 2025
	2030 Strategy - public consultation
NI	Going for Growth (2013)
	Sustainable Land Management Strategy (2016)
Rural/regional development strategies	
Ireland	Ireland Rural Development Programme 2014 - 2020
	Ireland Rural Development Programme 2007-2013
	Ireland Rural Development Programme Review 2007-2013
NI	NI Regional Development Strategy 2035
	NI Rural Development Policy 2014 - 2020
Programme for Government	
Ireland	Ireland Programme for Government 2020
	Ireland Programme for Government 2016
NI	NI Programme for Government 2016-2021
	NI Programme for Government 2011-2015
	NI Programme for Government 2011-2015_Sustainabilty scan

Table A9.1 continued

Classification	Document
Environment - general	
Ireland	Ireland's Environment assess_2016_EPA
NI	Environmental Strategy for NI 2019_Public discussion
Other - general	
Ireland	N/A
NI	DAERA Innovation strategy 2020-2025 DAERA Science Strategy Framework 2019 DAERA Science Strategy Framework 2019_RNIA

(Appendix 4 continues next page)

Table A9.2 Number of times agri-food industries cited across all documents analysed (word frequency)

	Poultry[1]	Dairy[2]	Drystock[3]	Pig[4]	Arable[5]	Horticulture[6]	Agriculture[7]	TOTAL
Ireland	164	401	516	143	83	109	6800	8216
NI	140	71	193	28	102	33	3539	4106
Shared	2	4	7	4	3	2	433	455
							TOTAL	12777

NOTE: Terms analysed included (word and related stemmed words):

1. Poultry, broilers, layers, hens, chicken, eggs
2. Dairy, heifer
3. Drystock, beef, suckler, sheep, lamb
4. Pig, pork
5. Arable
6. Horticulture, vegetables, fruit
7. Agriculture, agri-food, farm(ing)

Table A9.3: Agri-food industry word frequency ratio across all documents analysed

All documents	Number of documents	Ratio[105]						
		Poultry	Dairy	Drystock	Pig	Arable	Horticulture	Agriculture
Ireland	14	11.71	28.64	36.86	10.21	5.93	7.79	485.71
NI	14	10.00	5.07	13.79	2.00	7.29	2.36	252.79
Shared	7	0.29	0.57	0.41	0.57	0.43	0.29	61.86

[105] Total times mentioned across all documents analysed, divided by the number of documents.

Appendix 10: Ethical approval

Figure A10.1 Ethics approval application

University Ethics Form Version 2.1.1

Date submitted
22/10/2019 12:45:09

Applicant Details

Is this approval for a:
Student Project [A2]

What type of degree programme is being studied?
Postgraduate Research (e.g. PhD) [A3]

Name of Principal Researcher:
Adrienne Attorp

Please enter your email address
a.a.attorp2@newcastle.ac.uk

Please select your school / academic unit
Geography, Politics and Sociology [A16]

Please enter the module code

Please enter your supervisors email:
ruth.mcareavey@newcastle.ac.uk

Please select your supervisor's school/unit:
Geography, Politics and Sociology [A16]

Project Details

Project Title
Control of diffuse agricultural pollution and management of trans-boundary waterways: A comparative analysis of the policymaking process in Northern Ireland and the Republic of Ireland

Project Synopsis
Brexit is likely to trigger significant changes in the agri-food sector between Ireland, Northern Ireland and Great Britain, including shifts in market conditions, industrial organisation, and policy. Many of the island's ecosystems are transboundary in nature, including numerous waterways. New regulatory regimes may result in different standards across a single water catchment area. This project considers the potential impact of diverging agri-environmental policy on agricultural land use and trans-boundary waterway management on the island of Ireland. Using a range of qualitative methods (interviews, focus groups and case studies), I will investigate factors affecting farmers' land use and waterway management practices in specific trans-boundary water catchment areas in the region, and to what degree these factors are considered in the policymaking process. In the 2018/19 academic year I undertook 11 "scoping" interviews with policy makers and academics whose work in this field (ethical approval was gained for this). Between November 2019 and the end of my project I will collect further data for my research using interviews, focus groups and a case study. Fieldwork will take me to both Ireland and Northern Ireland on multiple occasions. According to the terms defined in this ethics process, my work will not require the use of gatekeepers, nor will I collect any material that raises any sort of ethical challenges.

Project start date
25/09/2017

Project end date
20/09/2021

Is the project externally funded?
Yes - I have a NUProjects/MyProjects reference number [A1]

NUProjects/MyProjects reference
BH170756

Does your project involve collaborators outside of the University?
Yes [Y]

Please provide a list of the collaborating organisations?
1. Teagasc (Ireland) 2. Agricultural and Food Economics, Agri-Food and Biosciences Institute (AFBI; Northern Ireland)

Existing Ethics, Sponsorship & Responsibility

Has ethical approval to cover this proposal already been obtained?
No [N]

Will anyone be acting as sponsor under the NHS Research Governance Framework for Health and Social Care?
No [N]

Do you have a Newcastle upon Tyne Hospitals (NUTH) reference?
No [N]

Will someone other than you (the principal investigator) or your supervisor (for student projects) be responsible for the conduct, management and design of the research?
No [N]

The Animals (Scientific Procedures) Act defines protected animals as: 'any living vertebrate other than man…in its foetal, larval or embryonic form……from the stage of its development when— (a)in the case of a mammal, bird or reptile, half the gestation or incubation period for the relevant species has elapsed; and (b)in any other case, it becomes capable of independent feeding'. In practice 'Protected' animals are all living vertebrates (other than man), including some immature forms, and cephalopods (e.g. octopus, squid, cuttlefish). Using this definition, does your research involve the observation, capture or manipulation of animals or their tissues?
No [N]

Will the study involve participants recruited by virtue of being NHS patients or service users, their dependents, their carers or human tissues or the use of NHS & Health/Social Care Facilities or otherwise require REC approval?
No [N]

Does the research involve human participants e.g. use of questionnaires, focus groups, observation, surveys or lab-based studies involving human participants?
Yes [Y]

Does the study involve any of the following? [a. The study involves children or other vulnerable groups including those who are relatively or absolutely incapable of protecting their own interests, or those in unequal relationships e.g. participants who are subordinate to the researcher(s) in a context outside the research.]

Does the study involve any of the following? [b. The study requires the co-operation of a gatekeeper (defined as someone who can exert undue influence) for initial access to the groups or individuals to be recruited e.g. students at school, members of a self-help group, or residents of a nursing home? NB The Left & School of Psychology volunteer pools are not considered gatekeepers in this case.]

Does the study involve any of the following? [c. It is necessary for participants to take part in the study without their knowledge and consent e.g. covert observation of people in non-public places?]

Does the study involve any of the following? [d. Deliberately misleading participants in any way?]

Does the study involve any of the following? [e. Discussion of sensitive topics e.g. sexual activity or drug use?]

Does the study involve any of the following? [f. The administration of drugs, placebos or other substances (e.g. food supplements, vitamins) to the study participants.]

Does the study involve any of the following? [e.g. Invasive, intrusive or potentially harmful procedures of any kind?]

Does the study involve any of the following? [e.g. Obtaining blood or tissue samples?]

Does the study involve any of the following? [e.g. Pain or more than mild discomfort?]

Does the study involve any of the following? [e.g. Psychological stress, anxiety, harm or negative consequences beyond that encountered in normal life?]

Does the study involve any of the following? [e.g. Prolonged or repetitive testing, or more than 1 hour's commitment or attendance on more than two occasions?]

Does the study involve any of the following? [e.g. Financial inducements (other than reasonable expenses and compensation for time)?]

Does the research involve the viewing, usage or transfer of sensitive data or personal data as defined by the General Data Protection Regulation (GDPR) or data governed by statute such as the Official Secrets Act 1989 / Terrorism Act 2006, commercial contract or by convention e.g. client confidentiality? (If you are unsure please tick YES and complete the sub-questions).
No [N]

Will the study cause direct or indirect damage to the environment or emissions outside permissible levels or be conducted in an Area of Special Scientific Interest or which is of cultural significance?
No [N]

Will the research be conducted outside of the European Economic Area (EEA) or will it involve international collaborators outside the EEA?
No [N]

Next Steps

Based on your responses your project has been categorised as (ethically) low risk and no further review is required before you start work. You will receive a formal approval email on submission of this form. Should your project change you may need to apply for new ethical approval.

Supporting Documentation

Please upload any documents (not uploaded elsewhere in the application) which you think are relevant to the consideration of your application.

filecount - Please upload any documents (not uploaded elsewhere in the application) which you think are relevant to the consideration of your application.
0

Thank you for completing the University's Ethical Review Form. Based on your answers the University is satisfied that your project has met its ethical expectations and grants its ethical approval. Please be aware that if you make any significant changes to your project then you should complete this form again as further review may be required. Confirmation of this decision will be emailed to you. Please complete the declaration to submit your application. Declaration I certify that: [the information contained within this application is accurate.]
Yes [Y]

Figure A10.2 Ethics approval confirmation

From: Policy & Information Team, Newcastle University
To: Adrienne Attorp (PGR)
Subject: Ethics Form Completed for Project: Control of diffuse agricultural pollution and management of trans-boundary waterways: A comparative analysis of the policymaking process in Northern Ireland and the Republic of Ireland BH170756
Date: 22 October 2019 11:45:18

Ref: 15912/2018

Thank you for submitting the ethical approval form for the project 'Control of diffuse agricultural pollution and management of trans-boundary waterways: A comparative analysis of the policymaking process in Northern Ireland and the Republic of Ireland ' (Lead Investigator:Adrienne Attorp). Expected to run from 25/09/2017 to 20/09/2021.

Based on your answers the University Ethics Committee grants its approval for your project to progress. Please be aware that if you make any significant changes to your project then you should complete this form again as further review may be required. If you have any queries please contact res.policy@ncl.ac.uk

Best wishes

Policy & Information Team, Newcastle University Research Office

res.policy@ncl.ac.uk

Appendix 11: Written project overview

I am currently a Teagasc Walsh Scholar, undertaking a PhD at Newcastle University in the UK. My research is supervised by Dr Ruth McAreavey (Reader, Sociology, Newcastle University), Dr Erin Sherry (Principal Economist, AFBINI), Trevor Donnellan (Research Officer, Teagasc) and Professor Sally Shortall (Centre for Rural Economy, Newcastle University).

The title of my PhD is 'Control of diffuse agricultural pollution and management of trans-boundary waterways: A comparative analysis of the policymaking process in Ireland and Northern Ireland'. I attach a brief overview of the project here[106], but in short, I am researching the potential impact of diverging agri-environmental policy on agricultural land use and trans-boundary waterway management on the island of Ireland. I am particularly interested in the factors that affect farmers' land use and waterway management practices, and to what degree these factors are considered in the policymaking process.

Over the coming year I will be speaking to various stakeholders who have an interest in these issues. I hope to meet with a diverse range of people: farmers, industry stakeholders, academics, policy makers, NGO staff, etc. Given your work as a _____, I would value hearing your perspective on agriculture policy and the challenges and/or opportunities faced in managing agriculture's impact on Ireland's/NI's waterways. An interview will last approximately one hour and can take place at a time and location most convenient for you.

Data from research interviews will be used both within my thesis and in associated publications, including journal articles. All information you share, either verbally or in writing, will be treated confidentially, in accordance with Newcastle University's data management guidelines (Newcastle University, 2020). Note also that you may withdraw from the research at any time. Further, information provided here does not constitute a consent form; as will be explained during the interview, only verbal consent is being sought.

[106] Refer to thesis abstract, a version of which was shared with all research participants.

Appendix 12: Data management plan

0. Project title, author, version and date		
Project: PhD Research: **Control of diffuse agricultural pollution and management of trans-boundary waterways: A comparative analysis of the policy making process in Northern Ireland and the Republic of Ireland**		
Author: Adrienne Attorp	*Version: 1*	*Date: 22.04.21*

1. Description of the data

1.1 Type of study

Qualitative study assessing power and governance structures within the Irish and Northern Irish agri-food system and the impact these have on land and waterway management on the island of Ireland.

1.2 Assessment of existing data

Most data in this research were primary/empirical and collected by the researcher (details below). This is generating new knowledge in the field of agri-food governance.

A small amount of secondary data was used in this research: 23 publicly available agri-environmental policy documents from both Ireland and Northern Ireland were analysed using content analysis methods, to contextualise this study's empirical data.

1.3 Types of data

Qualitative data collected from focus groups (1), personal interviews (52), participant observation. Coded in NVivo 12.

Content analysis of 23 publicly available agri-environmental policy documents. Coded in NVivo 12.

1.3 Format and scale of the data

1 focus group and 52 interviews recorded via portable digital recorder. Anonymised and stored as WAV files.

Anonymised transcripts of focus group and interviews saved as MS Word documents.

Fieldwork notes (anonymised observations) typed up and saved as MS Word documents.

Formats and software enable sharing and long-term validity of data.

2. Data collection / generation

2.1 Methodologies for data collection / generation

Personal interviews and focus groups recorded via portable digital recorder. Anonymised audio recordings saved as WAV files and transcribed into individual (anonymised) MS word documents.

Excel database of interviews conducted saved separately.

2.2 Data quality and standards

All interviews/focus group recorded and transcribed in same fashion. Anonymised data reviewed by PhD supervisor.

Data collection methods approved via University ethics procedure (22.10.2019)

3. Data management, documentation and curation

3.1 Managing, storing and curating data.

All digital data, including master copies, will be securely stored and backed up on Newcastle University's OneDrive. Data is accessible only to the principal researcher and primary PhD supervisor. All non-digital documents are stored in a locked cabinet in secure offices.

3.2 Metadata standards and data documentation

All methods used to generate data in this research are documented in detail in PhD thesis methodology chapter.

All data collected is clearly labelled to ensure that file content cannot be identified. All digital data is stored in a secured project folder as described above. Names used for files reflect the data contained within the files. Data will be included in files to allow cross-referencing with written research records. Records of all file names are maintained by the principal researcher.

Data and metadata storage will follow the requirements and data protection of Newcastle University.

4. Data security and confidentiality of potentially disclosive information

No sensitive personal data relating to human participants was collected during this research.

4.1 Main risks to data security

N/A

5. Data sharing and access

Data will not be stored in any repository.

5.1 Suitability for sharing

Data is not suitable for sharing. Although it is not classified as 'sensitive personal data', participants agreed to take part on a condition of anonymity. It would therefore not be possible to share this data without significant redaction, which would render the data unusable.

5.2 Discovery by potential users of the research data

N/A

5.3 Data preservation strategy and standards

Data will be stored for the requisite 10-year period, as detailed above. Once this period has passed, the need for storage will be reviewed.

5.4 Restrictions or delays to sharing, with planned actions to limit such restrictions

As above – participant confidentiality and (absence of) consent restrict the possibility of sharing this data.

6. Responsibilities and Resources

The above plan requires access to Newcastle University's OneDrive cloud storage.

7. Relevant institutional, departmental or study policies on data sharing and data security

Policy	**URL or Reference**
Data Management Policy & Procedures	https://www.ncl.ac.uk/media/wwwnclacuk/research/files/ResearchDataManagementPolicy.pdf
Information Security	*https://services.ncl.ac.uk/itservice/policies/InformationSecurityPolicy-v2_1.pdf*
Other	

Appendix 13: Ireland's agri-food strategies: Further details

Table A13.1 Summary of Irish agri-food strategies and key targets

Year	Strategy	Key objectives/targets
2021	**Food Vision 2030**	**Four 'missions'** (with multiple *sub-goals*)**:** ➢ 1. A climate smart, environmentally sustainable agri-food sector o *E.g., reduce nutrient losses from agriculture to water by 50% by 2030* ➢ 2. Viable and resilient primary producers with enhanced wellbeing o *E.g., Competitive, productive primary producers with improved economic and social sustainability* ➢ 3. Food which is safe, nutritious and appealing, trusted and valued at home and abroad o *E.g., Increased value-addition, and an increase in the value of agri-food exports to €21billion by 2030, built on sustainable steady value growth.* ➢ 4. An innovative, competitive and resilient agri-food sector, driven by technology and talent o *E.g., …a more output-focused collaborative innovation system by 2030; with private R&D to reach 1% of turnover*.
2015	**Food Wise 2025**	➢ Increase exports to €19bn (85%). ➢ Increase primary production value to €10bn (65%). ➢ Increase agri-food sector's value added by €13bn (70%). ➢ Create 23,000 additional direct and indirect jobs along food supply chain.
2010	**Food Harvest 2020**	➢ Increase value of primary production output in the agriculture, fisheries and forestry sector by €1.5 billion (33% increase on 2007-2009 average). ➢ Increase value-added in the agri-food, fisheries and food products sector by €2.5 billion (40% increase on 2008 average). ➢ Export target: €12 billion for the sector (42% increase on 2007-2009 average).
2005	**Agrivision 2015**	➢ No specific targets articulated.
2000	**Agri Food 2010**	➢ No specific targets articulated.

Table A3.2 Summary of Irish agri-food strategy steering committee members, by strategy

Strategy	Steering committee members (sector)	Summary, by sector
Food Vision 2030	- Tom Arnold (chairperson; government and NGO sector) - Sharon Buckley, Musgraves (agri-food industry - grocery) - Laura Burke, Environmental Protection Agency (government – environment) - Ailish Byrne, Ulster Bank (banking) - Kieran Calnan, Bord Iscaigh Mhara (government – marine industries) - Philip Carroll, IBEC (meat industry) (agri-food industry) - Karen Ciesielski, Environmental Pillar (eNGO – withdrew 25.02.21) - Frank Convery, EnvEcon (professional services) - Tim Cullinan, Irish Farming Association (agriculture – primary producers) - Thomas Duffy, Macra na Feirme (community – voluntary sector) - Brendan Dunford, Burren Programme (environment/agriculture – primary producers - drystock) - Julie Ennis, Sodexo Ireland (agri-food industry) - Paul Finnerty, Yield Lab Europe (agri-food industry) - Thia Hennessy, University College Cork (academia) - Liam Herlihy, Teagasc (government – agriculture) - Martin Higgins, Food Safety Authority Ireland (government – food) - Caroline Keeling, Keelings (agriculture – primary producers -horticulture) - Jerry Long, ICOS (agri-food industry - dairy) - Oliver Looms, IBEC and Diageo (agri-food industry) - Dan MacSweeney, Bord Bia (government, agri-food) - Pat McCormack, ICMSA (agri-food industry - dairy) - Tom Moran, Department of Agriculture, Food and the Marine (government, agriculture) - Brian Murphy, IBEC (forestry) (agri-food industry) - Pat Murphy, IBEC (dairy industry) and Kerry Ireland (agri-food industry – dairy industry) - Larry Murrin, IBEC and Dawn Farm Foods (agri-food industry - drystock) - Colm O'Donnell, Irish Natura Hill Farmers Association (agriculture – primary producers - drystock) - Sean O'Donoghue, Killybegs Fisherman's Organisation (fishing – primary producers) - Dolores O'Riordan, University College Dublin (academia)	- Government: 6 (19%) - Agri-food industry: 11 (34%) - Agriculture (primary producers): 5 (16%) - Academia: 3 (9%) - Environmental sector: 2 (6%) - Other: 5 (16%) *TOTAL: 32*

	- Terence O'Rourke, Enterprise Ireland (industry – other) - Edmond Phelan, Irish Cattle and Sheep Farmer's Association (agriculture – primary producers - drystock) - Alice Stanton, Royal College of Surgeons (academia) - Siobhan Talbet, Glanbia (agri-food industry - dairy)	
Food Wise 2025	- John Moloney (chairperson; agri-food industry) - Helen Brophy, University College Dublin (academia) - Laura Burke, Environmental Protection Agency (government) - Carmel Cahill, OECD Trade and Agriculture (government) - Kieran Calnan, BIM (government – marine industries) - Michael Carey, Bord Bia (government) - Vincent Carton, Cartons (agri-food industry) - Noel Cawley, Teagasc (government) - Vincent Cleary, Glenisk (agri-food industry) - John Comer, ICMSA (agri-food industry - dairy) - Donal Dennehy, Danone Ireland (agri-food industry) - Michael Dowling, Kerry Group PLC (agri-food industry - dairy) - Eddie Downey, Irish Farmers Association (agriculture – primary producers) - Siobhan Egan, Birdwatch (eNGO sector) - Pat Glennon, Glennon Brothers (agri-food industry) - Jim Hanley, Rosderra (agri-food industry - drystock) - Michael Hoey, Country Cres (agri-food industry) - John Horgan, Kepack (agri-food industry) - Alan Jagoe, dairy farmer (agriculture – primary producers) - Martin Keane, ICOS (agri-food industry - dairy) - Caroline Keeling, Keelings (agriculture – primary producers - horticulture) - Tony Keohane, Tesco Ireland (agri-food industry) - Patrick Kent, Irish Cattle and Sheep Farmer's Association (agriculture – primary producers - drystock) - Kevin Lane, Irish Dairy Board (agri-food industry -dairy) - Anna Malmhake, Irish Distillers Pernod Ricard (agri-food industry) - Tom Moran, Dept of Agriculture, Food and the Marine (government) - Larry Murrin, Dawn Farm Foods (agri-food industry - drystock) - Sean O'Donoghue, Killybegs Fishermen's Organisation (fishing – primary producers) - Kieran O'Dowd, Macra Na Feirme (community – voluntary sector)	- Government: 5 (14%) - Agri-food industry: 18 (50%) - Agriculture (primary producers): 6 (17%) - Academia: 3 (8%) - Environmental sector: 1 (3%) - Other: 3 (8%) *TOTAL: 36*

	- John O'Reilly, Davy's (stockbrokers) - Larry O'Reilly, Cereal farmer (agriculture – primary producers) - Prof Dolores O'Riordan, University College Dublin (academia) - Terence O'Rourke, Enterprise Ireland (industry – other) - Eddie Power, 2 Sisters Food Group (agri-food industry - poultry) - Prof Paul Ross, University College Cork (academia) - Siobhan Talbot, Glanbia (agri-food industry - dairy)	
Food Harvest 2020	- Dr Sean Brady (Chairperson; agri-food industry) - Jim Bergin, Glanbia (agri-food industry - dairy) - Dan Brown, Bord Bia (government) - Gary Browne, RMG Target (industry – marketing) - John Bryan, Irish Farmers' Association (agriculture – primary producers) - Donal Byrne, Cadbury Ireland (agri-food industry) - Jackie Cahill, ICMSA (agri-food industry - dairy) - Noel Cawley, Teagasc (government) - Tom Considine, Department of Finance (government) - John Counsel, Diageo (agri-food industry) - Michael Dowling, Agri-Strategy AIB (banking) - Jim Fennell, Marine Institute (academia) - Gabriel Gilmartin, Irish Cattle and Sheep Farmer's Association (agriculture – primary producers - drystock) - Michael Gowing, Macra na Feirme (community – voluntary sector) - Noel Groome, Foras Orgánach (government – organic agriculture) - Jim Hanley Rosderra Irish Meats (agri-food industry - drystock) - John Horgan, Kepak (agri-food industry) - William Keane 2009 FBD Young Farmer (agriculture – primary producers - dairy) - Mary Kelly, Environmental Protection Agency (government) - Brendan Lacey, Irish Timber Growers Association (agri-food industry) - Alan Lauder, Birdwatch Ireland (eNGO sector) - Eamonn Lennon, Abbott Ireland (agri-food industry) - Mike Magan, Animal Health Ireland (government) - Chris Martin, Musgrave Group (agri-food industry) - Professor Alan Matthews, Trinity College Dublin (academia) - Gerry McCormack, SIPTU (trade union) - Rose McHugh, BIM (government – marine industries) - Pat McLoughlin, ICOS (agri-food industry) - Dan McSweeney, Carbery (agri-food industry)	- Government: 7 (23%) - Agri-food industry: 13 (42%) - Agriculture (primary producers): 4 (13%) - Academia: 2 (6%) - Environmental sector: 1 (3%) - Other: 4 (13%) *TOTAL: 31*

	- Lorcain O'Cinneide, Irish Fish Producers Organisation (primary producers) - Larry Murrin Food and Drink Industry Ireland and Dawn Farm Foods (agri-food industry - drystock)	
Agrivision 2015	- Michael Behan, Irish Meat Association, (agri-food industry - drystock) - Donal Cashman, ICOS (agri-food industry) - Noel Cawley, Ornua/Irish Dairy Board (agri-food industry – dairy) - John Dillon, IFA (agriculture – primary producers) - Michael Duffy, Bord Bia (government, agri-food industry) - Alan Dukes, Chair, former leader of Fine Gael, former Minister for Agriculture, Minister for Finance (government) - Mary Finan, PR consultant (industry, other) - Ciarán Fitzgerald, IBEC/MII (agri-food industry) - Jim Flanagan, Teagasc (government) - Dan Flinter, Enterprise Ireland (industry – other) - Ailish Forde, RGDATA (industry – other) - Mary Kelly, Environmental Protection Agency (Government) - Alan Matthews, Trinity College, Dublin (academia) - Lisa McAllister, Western Development Commission (industry, other) - John Moloney, Glanbia PLC (agri-food industry – dairy) - Pat O'Rourke, ICMSA (agri-food industry – dairy) - Pat Wall, University College Dublin (academia)	- Government: 3 (18%) - Agri-food industry: 7 (41%) - Agriculture (primary producers): 1 (6%) - Academia: 2 (12%) - Environmental sector: 0 (0%) - Other: 4 (24%) *TOTAL: 17*
Agri Food 2010	- Dan Browne, Dawn Meats (agri-food industry) - Noel Cawley, Irish Dairy Board (agri-food industry) - Niall Fitzgerald, Unilever (agri-food industry) - Carmel Foley, Irish Government quango (government) - Joe Healy, farmer (future IFA president) - John Kane, SIPTU (trade union) - Jim O'Grady, IAWS (agri-food industry) - Pat O'Hara, Western Development Commission (academia) - Tom Parlon, Irish Farmers' Association - Seamus Scally, Musgraves (agri-food industry) - Seamus Sheehy, University College Dublin (academia)	- Government: 1 (9%) - Agri-food industry: 5 (45%) - Agriculture (primary producers): 2 (18%) - Academia: 2 (18%) - Environmental sector: 0 (0%) - Other: 1 (9%) *TOTAL: 11*

Appendix 14: Sustainable Agricultural Land Management Strategy for Northern Ireland: Summary of recommendations

The following table summarises recommendations made in 'Delivering our Future, Valuing our Soils: A Sustainable Agricultural Land Management Strategy for Northern Ireland' (Expert Working Group on Sustainable Land Management, 2018). A full list of recommendations can be found starting on page 91 of the report. Here, recommendations are classified as either 'shallow' or 'deep', based on theory outlined in chapter three (Meadows, 1999; Abson et al, 2016). Note that this is a rough classification; the goal is only to show that most recommendations do nothing to challenge intensification of agriculture in NI, and indeed, most are in place to support it. This is discussed in detail in chapter seven.

Table A14.1 Summary of recommendations in NI's Sustainable Agricultural Land Management Strategy and associated intervention 'type'

Recommendation	Intervention type (shallow or deep)
1. Building a baseline	
a. Complete GPS soil sampling and analysis in NI (2Ha intervals)	Shallow
b. Conduct LiDAR scan of NI	Shallow
c. Establish 'enhanced regime of water quality monitoring' in NI	Shallow
d. Create a Sustainable Land Management Decision Support Tool for farmers	Shallow
2. Managing soils more effectively	
a. Use liming to improve soil pH	Shallow
b. Develop system of nutrient analysis for slurries and manures	Shallow
c. Provide mentoring to farmers to encourage farmers to improve nutrient management practices	Shallow
d. Take measures to increase uptake of low-emission slurry spreading techniques	Shallow
e. Improve access to finance for improved slurry spreading technology	Shallow
f. Commission research on improving slurry spreading techniques	Shallow
g. Simplify administrative burden of moving slurries between farms	Shallow

	h. "Investigate potential" for bio-secure re-distribution of slurries	Shallow
	i. Provide capital support for nutrient reprocessing on 'High P' farms	Shallow
3. Producing improved results		
	a. Use variety of grassland management techniques to increase grass utilisation	Shallow
	b. Farmers should grow more diverse swards and consider incorporation of legumes	Shallow
	c. Target water quality interventions on at least 4,000 ha of land	Shallow
	d. "Farmers should incorporate tress appropriately within productive farming systems"	Shallow
	e. Ensure sustainable and flexible management plans in place to achieve stocking levels that "benefit both farmer and the environment simultaneously and receive appropriate financial support"	Shallow
4. Enabling achievement		
	a. Review current environmental governance structures and implement "advocacy first approach" to regulation	Deep
	b. Financially incentivise farmers to move from conacre to long-term leasing	Shallow AND Deep (Incentive is shallow, but a shift away from conacre leasing could be considered a more fundamental change)
	c. Support Land Mobility Scheme for NI	Shallow
	d. Provide mentors on succession planning	Shallow
5. Implementing the vision		
	a. Government and agri-food supply chain should work in partnership to implement strategy	Shallow
	b. "Farmers must not be asked to implement this package on a partial basis"	Shallow
	c. Develop a sustainability brand for NI	Shallow

	d. Develop advisory programme on Sustainable Land Management	Shallow
	e. Identify “sufficient funding streams” to enable implementation of recommendations	Shallow

Appendix 15: Water governance in Ireland: EPA report summary

In 2021, O'Riordan et al. (2021) completed a comprehensive report assessing water governance in Ireland. They used the Water Governance Indicator Framework, a tool developed by the Organisation for Economic Co-operation and Development (OECD) in 2018 to assist countries in assessing their progress towards the WFD goals (OECD, 2018). Full details can be found in the report, but the following table (refer to next page), extracted directly from the report, offers a comprehensive overview of their findings (O'Riordan et al., 2021, pp. ix – xi). Note that, as highlighted in chapter seven of this thesis, 'limited progress' has been made on water finance, regulatory frameworks and monitoring and evaluation. These findings support arguments made in this thesis regarding the limited nature of regulatory capacity in Ireland (chapter seven).

Principle[a]	Performance category	Key findings
1. Clear roles and responsibilities Clearly allocate and distinguish roles and responsibilities for water policymaking, policy implementation, operational management and regulation, and foster coordination across these responsible authorities	Good progress	Roles and responsibilities regarding water governance are clearly identified in the RBMP, but there is a need for all entities to review their terms of reference to ensure that they are effectively meeting their obligations. An overlap between the roles of the WPAC and NCMC was prominent in our research, and it would appear that there is a degree of confusion among both committees on their terms of reference. In particular, it was suggested that project management activities should not fall within the domain of the WPAC and are instead the responsibility of the NCMC There is a lack of clarity on who has overall responsibility for the implementation of the RBMP. As a result, strategic planning and priority setting in the area of implementation of the RBMP is not as rigorous as it might be. Similarly, monitoring progress in relation to the implementation and achievement of outcomes is carried out in an ad hoc manner There is an absence of formal communication mechanisms between the three tiers and various structures. At present, communication is too reliant on personal relationships and is therefore highly vulnerable to inevitable changes of personnel
2. Appropriate scales within basin systems Manage water at the appropriate scale(s) within integrated basin governance systems to reflect local conditions, and to foster co-ordination between the different scales	Strong progress	There is consensus that, following changes made under the second-cycle RBMP, water is managed at the appropriate scale The governance structures are designed to facilitate decision-making at the right level by the right people and organisations
3. Policy coherence Encourage policy coherence through effective cross-sectoral coordination, especially between policies for water and the environment, health, energy, agriculture, industry, spatial planning and land use	Good progress	One of the dominant aims of the second-cycle RBMP and the governance arrangements put in place as part of it is to address issues of policy coherence where there are differing perspectives and priorities among stakeholders To date, considerable effort has been put into building the governance structures and establishing relationships. There is some evidence of the positive outcomes of this approach, but debates on areas of major policy difference have not yet taken place and, more importantly, resolutions have not yet been found
4. Capacity Adapt the level of capacity of responsible authorities to the complexity of water challenges to be met and to the set of competencies required to carry out their duties	Strong progress	There is a culture of cooperation and knowledge-sharing across the governance structures Considerably more capacity and expertise has been added to the governance structures under the second-cycle RBMP, with approximately 100 new public sector posts added The establishment of LAWPRO has had a very positive impact on capacity. LAWPRO research has generated considerable new knowledge on water quality goals. This has been widely shared LAWPRO and local authorities struggle to meet their obligations given current resourcing. LAWPRO faces particular difficulties in retaining staff who are on fixed-term contracts
5. Data and information Produce, update and share timely, consistent, comparable and policy-relevant water and water-related data and information, and use the data to guide, assess and improve water policy	Good progress	There is a general attitude of collaboration and sharing and the catchments.ie website is a positive development The production, updating and sharing of information, as envisaged by the OECD, is a weakness of the current RBMP Producing data that facilitate the monitoring of progress towards the implementation of the RBMP has been a challenge. Some issues in this regard may reflect a time lag, occasioned by the short duration of the second-cycle RBMP and the Covid-19 pandemic Non-governmental stakeholders and members of the public experience particular difficulties accessing data and information

Principle[a]	Performance category	Key findings
6. Water finance Ensure that governance arrangements help mobilise water finance and allocate financial resources in an efficient, transparent and timely manner	Limited progress	Irish Water differs from water utilities in other OECD countries in that it is not allowed to charge domestic water consumers except in the event of excessive consumption. Irish Water is financed through a combination of non-domestic revenue, excess usage charges, government subvention, non-domestic borrowings and capital contributions Water financing is a political decision. However, it is acknowledged that in the past Irish Water was underfunded and that we are still experiencing the impact of this, despite recent increases in funding through the Irish Water Strategic Funding Plan The financial and resourcing challenges faced by local authorities are acknowledged as a significant issue affecting water
7. Regulatory frameworks Ensure that sound water management regulatory frameworks are effectively implemented and enforced in pursuit of the public interest	Limited progress	The absence of Irish primary legislation to implement the WFD represents a major challenge and ensures that regulation is far more complex than it could be The dominant approach within the RBMP is to change behaviours. However, it is generally accepted that there is a greater need for a regulatory mix, including awareness and education, norms and enforcement It was accepted that overall both formal and informal approaches to ensuring compliance need to be improved
8. Innovative water governance practices Promote the adoption and implementation of innovative water governance practices across responsible authorities, levels of government and relevant stakeholders	Strong progress	The governance structures put in place under the second-cycle RBMP represent innovative governance in practice. There is a strong science–policy interface across the structures. This point is highlighted in Boyle *et al.* (2021b) In addition to the governance approach in general, a number of organisations that form part of the structures or are aligned with the structures were set up with a clear mandate to develop innovative ways to cooperate, pooling resources and capacity, building synergies across sectors and searching for efficiency gains There is evidence of good collaboration at a local level and local initiatives emerging that result in better practices. These are supported by LAWPRO LAWPRO's work on the communities side of the organisation has sought to promote community and citizen involvement and social learning and, although it is a work in progress, it has high priority
9. Integrity and transparency Mainstream integrity and transparency practices across water policies, water institutions and water governance frameworks for greater accountability and trust in decision-making	Good progress	Engagement with stakeholders, in particular the environmental NGO sector, led to the establishment of the Water Forum in 2018. Although the organisation is still maturing, this has been a very positive development The level of transparency envisaged by the OECD – a high degree of accountability, supported by legal frameworks, codes of conduct, charters, etc. – is not yet evident Information and data gaps is an area where particular work needs to be done across the governance structures and the public bodies involved in them

Principle[a]	Performance category	Key findings
10. Stakeholder engagement Promote stakeholder engagement for informed and outcome-oriented contributions to water policy design and implementation	Strong progress	A concerted effort was made within the governance structures to map and include all stakeholders The establishment of the Water Forum as an independent and statutory body and its central role as part of the governance structures has been a positive development There is a strong emphasis on capacity-building among all relevant stakeholders In engagements with the general public a joined-up approach to all environmental issues, but in particular to issues of water, climate and biodiversity, is vital, as the public does not distinguish between different implementing bodies
11. Trade-offs Encourage water governance frameworks that help manage trade-offs across water users, rural and urban areas and generations	Good progress	One of the objectives in establishing the governance structures was to facilitate debate on trade-offs. All organisations and committees play a role in this regard Rural issues dominate the second-cycle RBMP. A greater focus on urban issues is called for in the third-cycle RBMP, while recognising the very significant infrastructure expenditure required Trade-offs are also evident in policy debates, with policymakers required to make difficult decisions. It will not be possible in every instance to make a decision that is optimal for water. What is important is that potential trade-offs are identified at an early stage and that efforts are made to minimise any negative impact on water and/or to make a compensatory restitution
12. Monitoring and evaluation Promote regular monitoring and evaluation of water policy and governance where appropriate, share the results with the public and make adjustments where needed	Limited progress	Monitoring and evaluation are acknowledged as a weakness of the second-cycle RBMP. It is not clear whose responsibility it is to report on the implementation of the RBMP The WPAC and NCMC are prescribed roles in monitoring and evaluation. However, to date, neither committee has acted on its role in a formal way Non-governmental stakeholders and the Water Forum, in particular, experience a high level of frustration at the situation The limitations in monitoring and evaluation make it more difficult to achieve the expected outcomes in the second-cycle RBMP It was suggested that over the remainder of the life cycle of the second-cycle RBMP there needs to be rigorous focus on the 726 water bodies identified in the 2018–2021 plan for improvements in water quality. Although it may be the case that improvements in the PAA are offset by deteriorations elsewhere, this is a key test of the governance structures

[a]Descriptions of the principles have been taken directly from OECD (2018).

NCMC, National Coordination and Management Committee; NGO, non-governmental organisation; PAA, Priority Areas for Action; WPAC, Water Policy Advisory Committee.

Appendix 16: Detailed economic data, Ireland and NI agri-food sectors

This appendix details the economic contribution of agricultural sub-sectors to agricultural output in Ireland and NI, as well the contribution of agriculture and the wider agri-food sector to Irish and Northern Irish/British economies. Note that this information is take directly from relevant government sources and has not been adapted in any way. Because methods of recording and reporting data differ in Ireland and Northern Ireland, the data is not presented here in a consistent format. However, the purpose of this appendix is only to help give a more complete picture to data cited in chapters four and eight of this thesis, therefore, inconsistencies can be overlooked.

A16.1 Agri-food economic data, Ireland

Ireland's most recent national farm survey (Donnellan et al., 2019) provides a comprehensive overview of agri-food sector and sub—sector economic performance and is the best source of data. However, the following figures are extracted from a DAFM (2020) factsheet on Irish agriculture and give a basic summary of sectoral performance.

Figure A16.1 Output, input and income and Irish agriculture, 2019

Output, Input and Income in Agriculture 2019				
Main Aggregates	**Value €m**	**Main Commodities**	**Value €m**	**% of G/O**
Goods Output @ Producer Prices[1]	**7,960.9**	**Goods Output (exc. forage)**	**6,896.9**	**100**
+ Contract Work	461.2	of which		
+ Subsidies - Taxes (Products)	99.5	Cattle	2,151.1	31.2%
Agricultural Output @ Basic Prices	**8,521.7**	Milk	2,601.9	37.7%
- Intermediate Consumption	5,647.7	Pigs	543	7.9%
Gross Value Added @ Basic Prices	**2,874.0**	Sheep	260.8	3.8%
- Fixed Capital Consumption	970.1	Crops excel Forage	833.1	12.1%
Net Subsidies	1,737.6	Other Livestock products	507.1	7.4%
- Compensation of Employees	586.2	Forage Plants	1,064.0	
Operating Surplus	**3,055.20**	**Goods Output @ Producer Prices[1]**	**7,960.90**	

Source: DAFM, 2020, p. 7

A16.2 Agri-food economic data, Northern Ireland

The below economic data highlights the dominance of the dairy, drystock and poultry industries in NI. Gross farm output (revenue), as a percentage of NI's total agriculture output, is 8.3 percent for pigs, 5.8 percent[107] for horticulture and 2.2 percent for cereals, versus 30.5 percent for dairy, 23 percent for drystock and 19.4 percent for poultry, and

[107] Note that 'potatoes' are disaggregated from 'horticulture' in the statistical review cited here (DAERA, 2020c); the figure cited in the above text is the gross output for the two (1.1 percent and 4.7 percent, respectively) combined.

these industries account for less than 13 percent of on-farm employment in NI (figure A16.2). Similarly, processing industries associated with these sectors contribute only 6.3 percent (pig) 0.1 percent (horticulture) and 1.3 percent (cereals) of value-added in NI's economy, and account for only 2.2 percent of employees in NI's agri-food sector (figure A16.2).

Figure A16.2 Distribution of farm outputs in NI and share of UK totals, 2019 (DAERA, 2020c)

	% of NI total			NI output as % of UK output
	Gross output	Gross Margin	On farm employment	
Enterprise	%	%	%	%
Dairy	30.5	48.5	20	14.8
Cattle	19.9	16.7	51	15.5
Sheep & wool	3.1	4.2	16	5.2
Pigs	8.3	5.3	4	13.6
Poultry & eggs	19.4	11.0		12.7
Cereals & other crops	2.2	3.6	9	0.9
Potatoes	1.1	1.7		3.0
Horticulture	4.7	8.2		2.7
Others	10.8	1.0		5.5
Total	**100.0**	**100.0**	**100**	**7.9**

Source: Aggregate Agricultural Account. Employment data from June 2019 Agricultural Survey.

Figure A16.3 NI food and drink processing sector: gross turnover, value added, employment by subsector, external and export sales, 2018.

Subsector	Gross turnover	Value added	Employees [1]	External [2] Sales	Export Sales [3]
	£m	£m		£m	£m
Animal by-products	47	10	115	*	*
Bakeries	376	123	4,057	197	108
Beef and sheepmeat	1,436	178	5,048	1,267	232
Drinks	415	117	1,399	221	184
Eggs	182	28	413	120	14
Fish	90	18	633	74	35
Fruit and vegetables	363	92	2,788	243	73
Milk and milk products	1,143	109	2,351	889	478
Pigmeat	365	58	1,652	251	106
Poultrymeat	745	189	5,171	*	*
Total	**5,162**	**921**	**23,625**	**3,988**	**1,369**

1. Full - time equivalents. This is an estimation of the total direct employment in the sector, as some workers are provided by employment agencies and not shown in these figures. The July 2020 edition of the Size and Performance publication presented an estimation of agency employment in 2018 at 2,824 full-time equivalents.

2. Sales outside NI

3. Sales outside UK

Source: Northern Ireland Food and Drinks Processing Report 2018.

These figures exclude those food and drinks processing businesses with a turnover of less than £250,000.

Figure A16.4 Number of farms in NI by size and type, 2019 (DAERA, 2020c)

	Business size (SLR)				
Business type	**Very small**	**Small**	**Medium**	**Large**	**All sizes**
Cereals	198	38	10	7	**253**
General cropping	589	35	15	40	**679**
Horticulture	80	41	26	102	**249**
Pigs	49	20	27	65	**161**
Poultry	169	236	127	115	**647**
Dairy	265	695	609	1,017	**2,586**
Cattle and sheep (LFA)	13,152	1,100	216	148	**14,616**
Cattle and sheep (Lowland)	4,310	458	129	74	**4,971**
Mixed	256	97	49	97	**499**
Others	109	26	16	15	**166**
All types	**19,177**	**2,746**	**1,224**	**1,680**	**24,827**

Source: June 2019 Agricultural Survey