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Agricultural Pollution and Waterways on the Island of Ireland: Towards Effective Policy Solutions

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Agricultural Pollution and Waterways on the Island of Ireland: Towards Effective Policy Solutions

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Abstract: 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. What has received less focus is how power is distributed within the agriculture sector, i.e., why/how some agricultural industries are more 'successful' or receive more focus than others, and what this means for policy. Researchers typically treat 'farmers' as a monolith, for example, focusing on the power of the 'farming lobby' versus that of other interest groups such as environmentalists. This tells us only part of the picture; power distributions within the agriculture industry itself also have implications for policy. Using empirical qualitative research (interviews, focus groups) conducted on the island of Ireland, this paper shows how some agri-food sectors (e.g., dairy) hold more power than others meaning they can resist important regulation such as water pollution initiatives. This renders 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 environmental degradation and support the resilience of the ecosystems upon which food production depends, agri-food system governance must become more equitable and nuanced, allowing for tangible consideration of the challenges that different agriculture sectors face.

Keywords: water governance; stakeholder engagement; agri-environmental policymaking

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1. Introduction

In Ireland and Northern Ireland (NI), the agriculture industry has historically received considerably more support and attention than many other industries, as per an exceptionalist policy approach [1,2]. In many ways, this is still the case. It continues to benefit from a range of public subsidies, such as Common Agriculture Policy (CAP) direct payments, renewable energy incentives and rural support aimed mainly at agriculture [2,3]. This support often comes at the expense of the island's waterways and wider natural environment [4–7].

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. However, such an approach fails to convey a complete picture, including complex power relations between farmers and processors, input suppliers and farm advisors. This paper argues 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 and are impacted by it, and how other agri-food actors influence it. Empirical data from this research show that the 'agriculture lobby' comprises multiple autonomous actors, not all of whom have the same objectives or agency in realising them.

This paper sheds light on how different actors in the agri-food industry influence and engage with water policies on the island of Ireland and demonstrates how current power distributions compromise the efficacy and sustainability of existing policy instruments. It is ordered as follows: first, theoretical debates in governance and power are considered, then,

an overview of the research and the case study area is provided. The paper then moves on to analyse the empirical data and discuss the implications of power distributions within the agri-food sector for waterway management. For the purposes of this paper, focus is on the island of Ireland's two largest agriculture sub-sectors:

1. Dairy and
2. Drystock-typically refers to both beef cattle and sheep, although in this article, the term refers mainly to beef farming.

Although it does not offer policy solutions, the paper concludes that if more equitable, effective and resilient policies are to be developed, greater consideration of how power is distributed amongst actors in the policymaking sphere, including amongst those within the agri-food network, is required.

1.1. Case Study: Agriculture and Waterways on the Island of Ireland

Agriculture accounts for 67 percent of total land-use area in Ireland [8] and almost 75 percent in NI [9]. While the agriculture sector in many 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 [10,11].

Agriculture production on the island is heavily cattle-focused. Beef (herein the beef industry is referred to mainly as the drystock industry) and dairy products have long been a mainstay of the Irish economy [12], 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 [13,14]. Today, most agricultural output in the region continues to come from beef and dairy production: 68 percent in Ireland [15] and 54 percent in NI [9]. In Ireland, growth in its agriculture sector continues to come mainly from growth in beef and dairy production [15]. In NI, the dairy and beef sectors also remain important, although the region's two fastest growing sectors are poultry and pig production; pig and poultry account for only 18 percent and 8 percent of output, respectively, 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 [9].

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., see NI's 'Going for Growth' strategy [16] and Ireland's 'Food Wise 2025' [17]). 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 [8,18,19].

EU directives such as the Nitrates Directive (NiD) and the Water Framework Directive (WFD) underpin the primary environmental policies that guide water management and planning in both Ireland and NI, including agri-environmental schemes implemented under the CAP [7,20]. While efforts made under the NiD and WFD have resulted in improvements in many of the island's worst quality waterways, the quality of its highest standard waterbodies continues to decline [7]. In Ireland's most recent (2018) water quality review [7], 53 percent of surface water bodies 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. In NI, an assessment done the same year revealed that only 36.6 percent of waterbodies were classified as good or high, down from 37.4 percent 2015 [21]. While multiple sources of pollution place pressure on the island's waterways, including public wastewater treatment and private septic tanks, diffuse agricultural pollution is the largest source of water pollution in both Ireland and NI and is the primary reason both jurisdictions will fail to meet water quality targets under the current WFD [4,5,7]. Run-off of nutrients such as nitrogen and phosphorous, the majority of which comes from animal manures, poses a particular problem [4,5,18,22,23]. NI's Environment Agency (NIEA) [24] and Ireland's Environmental Protection Agency (EPA) [7] both state that nutrient emissions

from agriculture are the primary reason their respective jurisdictions will fall short of meeting water quality objectives in the current cycle of the EU's WFD (53 percent of Ireland's waterbodies are negatively impacted by agricultural activities [7]. No equivalent figure is available for NI).

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 [18]. 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 it being imported into the ecosystem through animal feed (e.g., soy and corn) containing phosphorous [24]. Less intensive drystock farming also contributes to the problem; because drystock farms tend to be on hilly land with thin soils, they can experience considerable nutrient runoff problems, even at low stocking densities [25].

1.2. Governance in the Agri-Food Sector

The agri-food sectors in Ireland and Northern Ireland remain special, or 'exceptional', in governance terms, like elsewhere in Europe [26–28]. Exceptionalist policy approaches occur where a sector is perceived to contribute significantly to the 'public good', e.g., education or health [1]. In agriculture, it is believed that 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' [1,28,29]. As part of this exceptionalist approach, a relatively closed network of farm ministries and farm groups were traditionally responsible for developing agriculture policies [1,30–32].

Increasingly, there is a shift away from agricultural exceptionalism in policymaking. Although the agri-food sector remains important, agriculture is no longer only about food and fibre production. The role of agriculture as 'multifunctional'—that is, providing non-commodity outputs such as rural environmental services—is a central research and policy focus [1,33]. There is also an expansion of actors who are active within the sector, including suppliers, processors, retailers, NGOs and consumers [34,35]. Power distributions among actors within the sector are changing as a result of this expansion. However, the inclusion of a broader range of actors does not necessarily result in equal power sharing among them. Rather, the expansion typically leads to strategic positioning of individuals or partners [28].

1.3. Power in the Agri-Food Sector

Recently, much of the literature on power in the agri-food system focuses on how, as a transition away from traditional agricultural exceptionalism occurs globally, power is increasingly concentrated in the hands of a few large corporations at the expense of farmers, public health and the environment (e.g., [36–39]). However, in many European countries, including Ireland and much of the UK, a legacy of small 'family farms' remains. If agri-environmental policies are to be effective, the ways in which these smaller actors engage in the policymaking arena still needs to be considered. To date, this has received little attention.

This research employed a framework for power that builds on a model of 'structural power' developed by Smith [30], which is closely aligned with Lukes' [40,41] three-dimensional power concept. In this, power is considered not only directly observable (first dimension), but also 'hidden' (second dimension), exercised by limiting the scope of decision making to relatively 'safe' issues. That is, power can be employed not only by putting issues on the agenda, but also keeping others off it [40,42]. Power can also be 'invisible' (third dimension), exercised through "unseen mechanisms" such as manipulation and authority ([40], p. 21). The latter is often operationalized through control of institutions

(e.g., religious institutions or the media) that shape and create meaning within society and influence the ideologies that underpin it [40,41].

This model, developed for this research, can be depicted as follows (Figure 1):

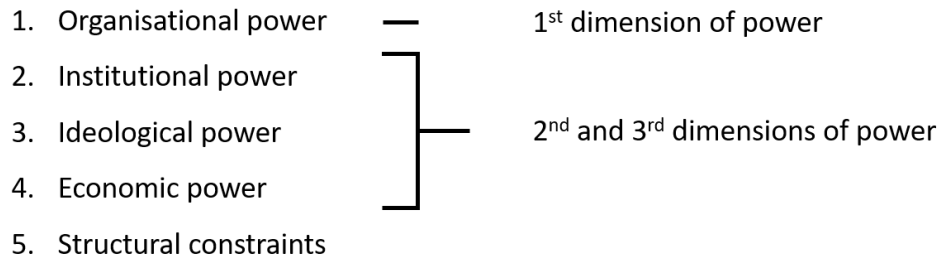

Figure 1. The power framework employed in this research.

Elements of this model include:

- Organisational power: power that "available to all who want it through being a well-organised pressure group or organising a demonstration" ([30], p. 35). It is the visible 'first face' of power.
- Institutional power: "the power that A has over B due to institutional rules and procedures which prevent certain groups or issues having access to the agenda" ([30], p. 36). The fact that agriculture has its own department within government in Ireland, and, until very recently, did in NI 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" ([30], p. 36). For example, in Ireland and NI, as elsewhere in Europe, the idea of farmers as the sole legitimate custodians of the countryside contributes to the agriculture sector's influence, and by extension, shapes policy.
- Economic power: economically privileged groups have a greater influence in policy making.
- 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.

Importantly, each dimension of power serves to reinforce the other dimensions [43], and although one element may be the main determinant at a certain point, this can change over time. Furthermore, one level of power is not superior to another.

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, it is possible to develop a better grasp of the problem, which becomes easier to address as a result. The model of power employed in this research 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 is 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 helps describe how different forms of power interact to reinforce each other [43].

2. Materials and Methods

This research employed qualitative methods within a case study methodology. Contemporary case study research is considered a flexible, pragmatic research approach, particularly useful for exploring context-dependent issues related to human behaviour and social interactions [31,44,45]. Critically, this approach centralises the perspective of participants [45].

Theories of governance and power, outlined above, guided data collection and analysis. It was assumed that although some actors involved in the governance of the island of Ireland's waterways have more power than others, all actors involved have some form of

power, and that this power is derived from different sources and exercised in multiple, not always obvious ways. As is argued below, this has implications for policy outcomes.

Primary qualitative methods used were semi-structured interviews and focus groups. A total of 55 individuals were interviewed across Ireland and Northern Ireland. Interviewees included farmers (2); agri-food industry representatives (6); farmers union representatives (3); central government employees (e.g., representatives of agriculture or environment departments/agencies) (10); other government agency employees (e.g., research institutes, local councils) (16); employees and volunteers at non-governmental environmental organisations (eNGOs) (10); academics (6); and journalists (2). A focus group was also held with 9 farmers. Note that some research participants wore 'two hats', for example, being a government employee but also a part-time farmer, but are listed here in the main capacity in which they were interviewed. Most interviews were recorded and transcribed, but, in some instances where interviewees did not agree to this, detailed notes were taken. Thematic analysis was undertaken by reading and re-reading transcripts and interview notes and coding them according to the key themes that arose. This was done using NVivo 12 software. Data from interviews and the focus group were supplemented by thematic analysis of 34 secondary documents (agri-environmental policies, agri-food strategies, planning strategies) and quantitative data (economic data, land use maps).

3. Results and Discussion

3.1. Power, Governance and Water Pollution on the Island of Ireland

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. However, while environmental actors have been given a 'seat at the table', and language about environmental sustainability has increasingly included relevant policies and strategies, this has not (yet) translated into tangible change. Focus remains on supporting the agri-food sector.

Nearly all research participants acknowledged the strength of the agriculture, or farming lobby both north and south of the border. As an eNGO employee in Ireland summarised: " . . . the farmer lobby is one of the biggest groups in this country . . . we have a really strong farmer lobby here." And while environmental actors may now be included in the policymaking process, research participants from environmental organisations regularly expressed frustration at their limited ability to effect meaningful policy change:

> *"I feel like if our sector was better resourced [we could] offer a counter voice to the I FA's message. [But] theirs is dominant, because they have the powerful political connections [and] the resources."*
>
> (eNGO employee, Ireland)

The agriculture industry's power has roots in the socio-political history of Ireland and Northern Ireland, as beliefs about the importance of farming are deeply rooted in Irish culture [12,46,47]. Language in strategies such as Ireland's Food Harvest 2025 reflects this: "Agri-food is Ireland's oldest and largest indigenous industry, deeply embedded in the landscape, history and personality of the country [Ireland]" ([17], p. 1).

Similar beliefs are held across much of Europe, which, coupled with the legacy of a post-World War II drive for food security, have shaped European agri-environmental legislation, and by extension, Irish and UK legislation. These beliefs mean that solutions to agriculture-related environmental issues are limited to those that keep farmers at their centre. This is evidenced by the fact that the EU's (and Ireland and NI's) sustainability agenda remains focused on multifunctionality, with multifunctional agriculture a core tenet of this [48]. This is ideological power: that which "defines reality, problems and acceptable action" and therefore limits what is possible within policymaking ([30], p. 36). This ideological power translates into, and is reinforced by, a strong 'rural vote' which

extends the power of farmers into the political arena, and institutional power in the form of a stand-alone agriculture ministry (in Ireland, but also in NI until very recently):

" . . . in this country, if you want to get elected, that agricultural vote is important."

(Dairy farmer, Ireland)

On top of this, the organisational power of the agriculture lobby is widely recognized, north and south of the border, 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, Ireland)

Both the Irish Farmers' Association (IFA) and the Ulster Farmers' Union are seen as politically powerful because of this ability to organize:

"The main organisation is the IFA . . . they are still the main organisation when it comes to fighting in Europe, which is where most of the real decisions are made . . . "

(Dairy farmer, Ireland)

" . . . farmers in Northern Ireland, through the UFU, like, have a relatively loud political voice . . . [they] are better organized and better integrated into the political parties, influencing them, you know."

(Government employee, NI)

This exemplifies how different forms of power interact and can magnify each other. Because of a potent combination of organisational, ideological and institutional power, the industry is able to strongly lobby against regulations that limit its growth, an issue highlighted by regulators on both side of the border. For example:

"[In Ireland] we 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."

(Government employee, Ireland)

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

(Government employee, NI)

This has implications for what kind of policy solutions are implemented and how effective they are. Meadows [49] and Abson et al. [50] characterise policy interventions on a scale ranging from 'shallow' to 'deep'. Shallow interventions are those that are relatively easy to implement, such as subsidies or taxes, but are unlikely to affect fundamental change in a system. 'Deep' interventions, e.g., those that target a system's rules, power and organisational structures, as well as the values and ideas underpinning these, can shift the 'status quo' of a system, but are much more difficult to implement. Under the NiD, a range of measures are enforced in Ireland and NI to limit agricultural pollution—summarised in Table 1—The first three listed are legal requirements under the NiD Good Agricultural Practice (GAP) regulations, the latter three are examples of measures that government programmes in Ireland and NI are promoting to support farmers to meet these requirements [51,52]. This research argues that all are 'shallow'; none fundamentally challenge the way the industry operates. This argument is based on analysis of secondary data (policy documents), and is also summarized in Table 1.

Table 1. Summary of water pollution mitigation measure implemented under the NiD.

Water Pollution Control Measure	**Intervention Type ('Shallow' or 'Deep')**
Limits on land spreading (of manure) (170 kg nitrogen/hectare NiD; 250 kg nitrogen/hectare under NiD derogation)	Shallow AND Deep *
Closed period (no land spreading during late autumn/winter)	Shallow
Improving farmyard management, e.g.,: • Improving slurry (manure) storage capacity	Shallow
Improving land management, e.g.,: • Riparian margins; vegetative buffer strips along waterways	Shallow
Improving nutrient and fertiliser management, e.g.,: • Soil testing for nutrient loading in soil	Shallow
Improving pesticide application, e.g.,: • Use of appropriate pesticide application equipment	Shallow

Of the measures outlined here, only the limit on land spreading has potential to challenge industry expansion (i.e., a 'deep' intervention), given that it indirectly limits the numbers of livestock a farm may carry. However, in both Ireland and NI, farmers can avail of a NiD derogation, which allows them to apply higher amounts of nitrogen in specific areas and under certain conditions [51,52]. Thus, while this intervention is not strictly 'shallow', it is not truly 'deep'. None of the measures in Table 1 address 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. Again, this research argues that many measures remain shallow because of the power of the agriculture industry.

The NiD applies across the EU, and therefore these arguments are not necessarily specific to the island of Ireland. However, it is important to note that, 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 are the others) [53]. The NiD derogation is something the Irish government has actively lobbied for, in support of the Irish agriculture industry [54], further evidence of the agriculture lobby's favoured position in the country. Notably, on both sides of the border, it is mainly dairy farmers who are making avail of the derogation, an issue returned to in the following section.

In a similar vein, the UK's exit from the EU also highlights the strength of the agriculture's industry's power on the island of Ireland. While the UK now has more freedom to regulate the agriculture industry as it wishes, only England and Wales are moving towards a (theoretically) more stringent 'polluter pays' model of regulation [55], NI is not currently following suit. It is clear that in NI and Ireland, the agriculture industry's ideological, institutional and organisational power means there is limited political appetite for constraining its activities. Water quality continues to decline as a result.

However, as this paper argues, this issue extends beyond a simple 'agriculture versus the environment' narrative. To fully understand how the agriculture industry continues to influence policy, and the implications of this influence, this research shows that it is also important to consider the ways in which power is distributed among actors within the industry. Different agriculture actors derive power from different sources and exercise it in multiple ways, which, as will be discussed next, can produce complex policy outcomes.

3.2. Power Distributions within the Agri-Food Industry on the Island of Ireland and Implications for Waterways

In Ireland, the policymaking conversation is focused on two sub-sectors of the agri-food industry: dairy and drystock. Of these, dairy is considered the most successful, with drystock lagging in many respects. Other sub-sectors such as pig, poultry, arable and horticulture are present in the country, but in much smaller numbers than either dairy or drystock, and hardly factor into policy considerations and conversations about the agriculture sector.

The picture is somewhat different in the North. 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. Drystock farmers feature prominently as well but are less powerful in the policymaking arena than either dairy or poultry. Again, although pig, horticulture and arable industries also have a presence in NI, they do not appear to factor into most policy conversations and were rarely mentioned in interviews in this research. However, it should be noted that, although not discussed here, 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 [56] for a comprehensive overview.

In this article, focus is on the dairy and drystock industries as the most prominent sectors both north and south of the Irish border. Of these two sectors, dairy is far more powerful. Participants in both Ireland and NI highlighted this dualism, suggesting that dairy interests are better represented by organisations such as farmers unions and have more influence in the policymaking arena generally:

> *" . . . the main priorities in government are usually [. . .] very aligned with large farmers, [. . .] Usually, smaller farmers are not well represented by the IFA [Irish Farmers' Union], and they just don't have the political clout."*
>
> (eNGO employee, Ireland)

> *" . . . I have heard that the UFU [Ulster Farmers' Union] is more representative of big farmers, of big industry, you know, dairy..."*
>
> (Government employee, NI)

Interviewer: "Do you feel that the Ulster Farmers' Union represents your interests?"

Participant: "It is practically what I said earlier on, it is a wee bit steered towards the better land." (Farmer focus group, NI)

Note that the distinction between 'large' and 'small' farms tend to map onto industry-specific designations, i.e., dairy enterprises are more likely to be considered large/intensive than are drystock enterprises. Although participants refer to "large farmers", most of these 'large' enterprises are still small 'family farms', by European standards. Note also, that here, 'better land' refers to the fact that larger, intensive farmers tend to operate on more productive land. Drystock farmers typically farm on marginal land.

That the dairy and drystock industries dominate policy conversations is a testament to the strength of the ideological power conferred to these sectors by the historical importance of cattle farming on the island of Ireland and to the organisational power dairy and drystock farmers gain through sheer numbers. This is another clear example of how different sources of power interact to reinforce each other. 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 [57,58]. 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 agriculture lobby. This power imbalance impacts the way policy is developed and implemented, as is discussed in the following section.

3.3. Intensive Agriculture and Waterways: The Dairy Industry

> *" . . . the dairy industry . . . [wields] a massive amount of influence in rural Ireland."*

(Government employee, Ireland)

The power of Ireland's dairy industry was widely acknowledged by research participants, a consensus summed up by the above quote. In conversation, this was usually contrasted with the drystock industry's relative lack of power, as quotes from the previous section highlight. In NI, although the industry has a lower profile than its southern counterpart, it was also viewed by participants as powerful and better represented than the drystock industry. The dairy industry is more powerful than the drystock industry for two main reasons: its economic power and its organisational power.

The dairy industry it is the most economically dominant sub-sector of both Ireland's and NI's agriculture industries; it accounts for nearly a third of agricultural exports in both jurisdictions and its products are in demand globally [57–60]. Given the export focus of both Ireland's and NI's economies, this gives it considerable economic power, because, when governments are 'picking winners' to boost an export-oriented economy, they are more likely to support those industries that are competitive in the global market. As one Irish policymaker stated:

> *"Bord Bia (the Irish Food Board, responsible for promoting Irish Food globally) 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.

Importantly, 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 typically receive much less subsidy (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 direct payments, may not add the same value to the economy). However, policymakers appear convinced of the sector's economic importance. As Smith [30] and Daugbjerg [61] argue, if an actor can convince policymakers of its economic importance, it can increase its political influence. Furthermore, they suggest that a perception of economic importance is sometimes just as important as actual importance. That dairy is considered so economically important—perhaps more so than its contributions to exports warrants—seems an example of this and may provide evidence that the sector's ideological and organisational power are bolstering its economic power.

Second, the industry has unparalleled organisational power, because, unlike other agricultural industries, it operates on a co-operative basis. Dairy farmers typically have a strong sense of pride in, and loyalty to, their co-operative [62], 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. A handful of large co-operatives process most dairy produced on the island and their power is well recognised:

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

In Ireland, 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.

3.4. Dairy's Power: Implications for Waterways

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. Growth of

the industry has been especially marked in Ireland since the EU lifted quotas on dairy production in 2015, which, according to multiple research participants, is something for which the Irish government actively lobbied. The Irish government also lobbies the EU on behalf of industry to maintain the NiD derogation for the approximately 7000 Irish farmers (most of whom are dairy farmers. Approximately half of Ireland's dairy farmers make avail of the NiD derogation) who rely on it to maintain a profitable (higher) number of cattle on their land. This tight connection between the rules of the wider agriculture industry and the interests of the dairy industry exemplifies dairy's power in action.

Intensive farmers do not always cause more water pollution problems than their less-intensive counterparts [25]. However, 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 the island of Ireland's waterways. One government employee (Ireland) 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 central position within the policymaking sphere—a direct result of its power—does mean it must be seen to making efforts to mitigate its impact on water quality. First, government and industry are acutely aware that an 'environmentally friendly', 'grass fed' image underpins the industry's commercial viability, particularly in international markets. An industry representative was frank about this:

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

Further, the NiD derogation has come under threat recently because neither Ireland nor NI has made enough progress in meeting WFD targets [7,24]. Losing the derogation would be a crisis for the dairy industry, as one government employee (Ireland) 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."*

In response to both these issues, the dairy industry has actively engaged with government 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 Irish government and multiple dairy co-ops that aims to proactively engage dairy farmers in mitigating the industry's water pollution. In addition, in the lead up to the 2021 NiD derogation review, the Irish government conducted a voluntary mid-term performance review, with the view to identifying key areas for improvement [63] (although this again demonstrates a tight connection between policy and industry interests).

It is also important to note that most dairy farmers are able to engage with water quality improvement initiatives, unlike many drystock farmers. Because dairy farmers typically farm full-time and their businesses make profit—that is, they have economic power—they can 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, Ireland)

> *"The dairy farmers are generally—I use this very generally OK—but they are more, kind of, businesspeople. They are earning serious money to run their farm. And they are not working off-farm, they are working on-farm constantly."*
>
> (Government employee, NI)

Additionally, farmers who have been granted an NiD derogation know that 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. For example, in NI, 5 percent of derogation dairy farmers receive an inspection visit each year, as compared to 1 percent of non-derogation farmers.

> *"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, Ireland)

Nevertheless, the power of the dairy industry within policymaking means water pollution mitigation measures remain ineffective and water quality continues to decline on the island. Government continues to support the industry's expansion by, for example, lobbying hard for an NiD derogation, and water policy is mainly concerned with allowing expansion to occur with the least impact on waterways, rather than questioning the logic of the expansion. As highlighted above, the central narrative within both the dairy industry and government is about technical solutions for mitigating pollution and increasing industry efficiency, such as improving slurry spreading technology, not about fundamentally re-structuring the sector and the way it is regulated. This means that pressures placed on waterways by dairy on the island are likely to persist.

3.5. Extensive Agriculture and Water Pollution: The Drystock Industry

The drystock industry remains a player in agri-food networks on the island of Ireland because of both its size (and thus, organisational power)—73 percent of Irish farmers are drystock farmers [64] as are 79 percent in NI [57]—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. This is a clear example of ideological power; again, policy solutions are limited to those that maintain these farmers on the land. The historical importance of beef farming on the island of Ireland further contributes to this ideological power, with public support for the sector seemingly even more culturally ingrained there than elsewhere in Europe—evidenced by a strong rural vote that is likely attributable to this combination of ideological power and the drystock sectors' 'strength in numbers' (organisational power). However, the drystock industry has less organisational power than the dairy industry and lacks its economic power, which means that drystock farmers do not have the ability to influence policy in the same way as their dairy counterparts.

Drystock farmers do not operate under a co-operative structure and therefore do not have 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. Their numbers do afford drystock farmers the organisational power to affect action through mass protests, such as those recently staged against low beef prices, which temporarily brought the beef processing industry to a halt [65]. However, such protests have historically affected 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 drystock industry also has low economic power because drystock farming is generally unprofitable, and although beef and sheep meat comprise a significant proportion of agricultural output, their contribution to Ireland and NI's economies is smaller than dairy's, with only half the export value [57,58]. They are also not as competitive in the global market [66], which puts the industry at a disadvantage in an export-focused economy.

This lack of economic power appears to translate into less representation in organisations such as the IFA and the UFU as well, as quotes above highlight, further compromising its ability to advance its interests at the policy level.

3.6. Drystock's Power: Implications for Waterways

The peculiar way in which the drystock industry's different forms of power interact to simultaneously keep drystock farmers on the land but also on the periphery of the agri-food policymaking impacts waterways in ways that are often overlooked. Drystock farming indisputably causes water pollution [25]. However, drystock farmers' lack of influence in the policymaking arena exacerbates, and in turn is exacerbated by, practical challenges (i.e., structural constraints) that make it difficult for many drystock farmers to effectively mitigate their pollution.

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, 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 . . . "*
>
> (CAFRE is NI's College of Agriculture, Food and Rural Enterprise, which is closely linked to, and funded by, NI's Department of Agriculture, Environment and Rural Affairs [67].)

There is also evidence that, particularly in NI, government initiatives to mitigate water pollution do not effectively engage most drystock farmers. For example, NI's department of agriculture runs business development groups (BDGs) for NI farmers, one of the primary fora in which the department engages with farmers on environmental issues [68]. Approximately 3000 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 1000 of really what we would say progressive beef and sheep farmers."*

This lack of power in the policymaking arena is compounded by practical limitations (structural constraints). Most drystock farmers operate on a part-time basis [57,58]. 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:

> *" . . . 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 h 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, Ireland)
>
> *"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, NI)

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 resource 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 (National 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, 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, Ireland)

Because drystock farmers are currently peripheral in policymaking networks, 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, and if stricter regulations are implemented without concurrent consideration of how drystock farmers can be supported to meet these, regulations are likely to fail. Further, as one NI research participant pointed out, maintaining thousands of farmers on the land without adequately addressing their contribution to water pollution is highly 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."*
>
> (Government employee, NI)

This research shows that if future agri-environmental policy is to be effective in addressing diffuse agricultural pollution on the island of Ireland, drystock farmers must be made a more active part of the solution. Acknowledging that they are not as powerful as more central actors, such as the dairy industry, and finding ways to more actively include them in policymaking is important. Equally, they must not be considered powerless and, therefore, out of reach. As empirical data highlighted here show, the drystock industry has significant ideological power, in particular, which, as this research argues, is keeping them on the land. Given that, in, many cases, drystock farming's contribution to water pollution is as significant as that of dairy, it is, imperative to address its contribution to the problem as well.

4. Conclusions

In both Ireland and NI, diffuse agriculture pollution remains a major source of waterway pollution on the island. This research argues that, to understand why policy has failed to effectively address this problem, it is important to understand why policymaking networks on the island of Ireland 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 applied in this research helps address this challenge. It is also important to move beyond meso-level policy analysis, which typically considers 'farmers' or 'the agriculture lobby' to be a monolith. Empirical data reveal that power distributions within Ireland and NI's agri-food industry also determine how water pollution is regulated.

This research makes clear that the agri-food sectors on the island of Ireland are still treated as 'exceptional'. This paper argues that this has limited policy innovation and prevented meaningful progress in addressing agriculture's contribution to water pollution on the island. 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. Thus, policy tends to favour the expansion of intensive industries on the island. This is putting considerable pressure on waterways. 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.

In short, diffuse agricultural pollution from neither intensive nor extensive agriculture is being addressed effectively because of the way power is distributed within agri-environmental policymaking networks in Ireland and NI, and thus, water quality indicators continue to decline on the island of Ireland, despite decades of focus on the issue. If tangible change is to happen, it will likely be necessary to implement policies that challenge the current status quo. Continued focus technical measures for mitigating agricultural pollution (not just of waterways), particularly from intensive industries, is unlikely to significantly alter the current trajectory of declining waterway quality and other environmental degradation. Further, policymakers must recognise the contribution extensive farmers are making to water pollution, and work with them to find effective solutions. This means finding ways of better including them in the policymaking sphere, so they can help shape policy in ways that address the challenges they face in addressing waterway pollution. Other actors, including environmental and other community interests, should also have more tangible 'seats at the table' than they currently do.

Although this research considers only Ireland and NI, many of its findings are applicable to countries throughout Europe, many of which are also home to strong agricultural lobbies. Further, 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, and are likely responsible for more agriculture-related water pollution than smaller farmers, the contribution of the latter to the problem cannot be overlooked if Europe's declining water quality is to be adequately addressed.

The UK's exit from the EU has provided a significant opportunity to re-consider how the agri-food sector is supported and regulated. England and Wales are currently moving towards a 'polluter pays' model of agricultural regulation, which does represent a significant shift in agri-environmental policy. Although this transition is set to be fraught with difficulties, including, in particular, balancing trade obligations with agri-environmental ones, it has prompted new ways of thinking about addressing agriculture's impact on the environment. Currently, it appears that NI, agri-environmental policy is devolved in the UK, meaning that individual nations have the power to make decisions on it, independent of Westminster, is unlikely to follow suit, not least given its continued need to maintain regulatory alignment with the EU. However, according to some policymakers interviewed in this research, the CAP is moving in a similar direction, albeit at a slower pace. It is presently undergoing significant review and is under increasing pressure to address agriculture-related environmental degradation. The need for the current 'status quo' to be challenged is becoming ever more apparent. As this research has shown, what the next phase of agri-environmental policy looks like in NI, Ireland and the rest of Europe will depend on how power is distributed amongst actors in the policymaking sphere, including amongst those within the agri-food network. If more equitable, effective and resilient policy outcomes are to be developed, greater consideration of this is required.

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