A Nuffield Farming Scholarships Trust

Report

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Building cross sector bridges and engaging farmers to own the environmental agenda

Kate Mayne

July 2019

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A

Nuffield (UK) Farming Scholarships Trust Report

"Leading positive change in agriculture. Inspiring passion and potential in people."

Date of report: July 2019

Title	Building cross sector bridges and engaging farmers to own the environmental agenda
Scholar	Kate Mayne
Sponsor	The Three Counties Agricultural Society and National Trust
Objectives of Study Tour	• Understand the causes of poor engagement with environmental issues and identify barriers to influencing the agenda • Seek examples of effective farmer engagement • Investigate ways of utilising embedded farmer knowledge to deliver environmental goals • Identify the principles of successful cross sector collaboration
Countries Visited	The Netherlands, Sweden, Romania, New Zealand, Australia, Ireland and the UK
Messages	• Society urgently needs to move on from a polarised and unconstructive debate over the environment • We need positive working relationships between interested parties in order to effect change • Agriculture industry must build credibility in the debate by driving change and delivering farmer led solutions • Policy needs to be positive and evidenced in a practical way. • Tapping into farmers knowledge will ensure policy fits with farm businesses and delivers better results for the natural environment • Accountability is vital to ensure farmer or industry led initiatives drive sufficient change

EXECUTIVE SUMMARY

Not since the two world wars has there been so much pressure on agriculture to deliver for society. The complex set of demands asked from the countryside for food, energy, flood mitigation, carbon capture, biodiversity recovery and recreational provisions is resulting in conflict over how we tackle these issues; where emphasis should be put and what their longer-term impacts might be. Since the 1980s governments have been legislating to mitigate the effects of farming on the natural environment, and success from implementation has been felt. More however needs to be done and maintaining the pace of progress for environmental recovery is proving difficult.

The aim of my study was to investigate ways of improving the delivery of agri-environment outcomes by better farmer engagement, cross sector collaboration and breaking down the barriers to influencing policy. My research led me to countries where environmental targets are a source of conflict and social disruption within the farming sector: Australia, New Zealand, Sweden, the Netherlands, Ireland, Romania and the UK. I talked to farmers, regulators, researchers and environmental organisations to understand all perspectives of the challenge and looked at various initiatives to identify the principles of success.

My research uncovered discontent within all stakeholder groups in the environmental agenda; from farmers frustrated by laws that are ill-fitting and have unintended consequences, to environmental organisations disheartened by lack of progress and concerned about the future. Top-down rules, inadequate ground-truthing and the use of theoretical data sets for regulation were blamed by the agriculture industry for its reticence about the environment. The language of the conversation is also widely considered to be a barrier to progress.

Solutions lie in valuing the knowledge that exists within the farming community and developing outcome-based rules rather than prescription led regulation. Local level data capture can help farmers understand an issue in their setting and identify practical fixes that can fit their farming systems. More autonomy in decision-making encourages farmers to own the outcomes of environmental schemes, so gets better results. And facilitating farmer driven initiatives can increase engagement and encourage less willing individuals to participate in effecting positive environmental change. To value farmers', stakeholders in the environmental agenda need to consider their relationships with other stakeholder groups. Paternalistic, top-down relationships discourage honest and open dialogue. Farmers, policy makers, researchers and environmental organisations need to work as equal partners to meet our environmental aims, and they need to build trust with one another to enable positive communication on which future collaboration can be built.

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DISCLAIMER

The opinions expressed in this report are my own and not necessarily those of the Nuffield Farming Scholarships Trust, or of my sponsor, or of any other sponsoring body.

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1: Introduction

Personal introduction

I am a born and bred Shropshire girl and have possessed a love for farming and the countryside all my life. I studied Agriculture at Newcastle University and then moved to the eastern counties to work as a potato and onion agronomist. Shropshire eventually called me home, where I have worked ever since in various roles including agronomy, quality management, environmental management and on-farm advice. My specialisms include agri-environment and pollution management schemes, river management and permit compliance for the anaerobic digestion sector.

I am a clerk to the Strine Internal Drainage Board; a small drainage authority near Telford. I undertake ad hoc project-based work for organisations such as the Shropshire Wildlife Trust; lending a farming perspective to their work. Currently I sit on the Catchment Based Approach steering group for the Shropshire Middle Severn, as representative for the farming community.

I am a trustee for Shropshire Wildlife Trust and Shropshire Rural Support and I also volunteer at Knockin & Kinnerley Cricket Club as a juniors' coach and coordinator for girls and ladies' cricket. My other loves are netball, tennis, our farm shoot and larking about with my kids in the beautiful British countryside.

Chapter 2: Background to my study

I have lived and worked on farms all my life and I am passionate about progressive farming systems. But it's time I owned up to something: I'm also a greenie. I take enormous pleasure in smelling honeysuckle in the hedgerows and watching clouds of small birds lift off our bird covers. I still remember the first lapwing nest I ever found; and it is no less exciting discovering nature now. I'm also sure that I'm not alone. When we live and work surrounded by the beauty of nature it is hard not to appreciate it, even for the busiest, most hardened farmers. The trouble is it is also our manufacturing hub for food, fuel, building materials and power; a storage facility for carbon and flood water. Wildlife has adapted to much of our interference over centuries, but with the rapid pace of change in farming over the last hundred years, many species have fallen foul of our drive to feed a hungry world.

Figure 1. The pace of change in agriculture has been huge – demonstrated here by tractors used on our family farm now and 60 years ago. *Photo courtesy of Margaret Lycett.*

As society has gained a greater understanding of the impact of the human footprint on our planet, policies have been developed to minimise its damage. Regulation has had some massive wins in tackling big issues like Chloroflurocarbons (CFCs) and Dichlorodiphenyltrichloroethane (DDT), but there is more to be done. Now we look at the finer details to work on less tangible issues like ammonia emissions and diffuse pollution. Justifying regulation can be harder to substantiate because the 'cause and effect' is sometimes not so clear and as a result we have disagreements as to the extent of an issue or how it is best tackled.

The Nuffield Farming Scholarship Trust has presented me with this opportunity to delve deeper into the topic of environmental delivery; to search out ways in which agriculture can meet the multiple demands on it by influencing the agenda and collaborating with non- farming stakeholders. The issue is too big to ignore anyone's contribution so we must improve delivery through better engagement and more positive participation. My study aims to shed light on how this can be done.

Chapter 3: My study tour

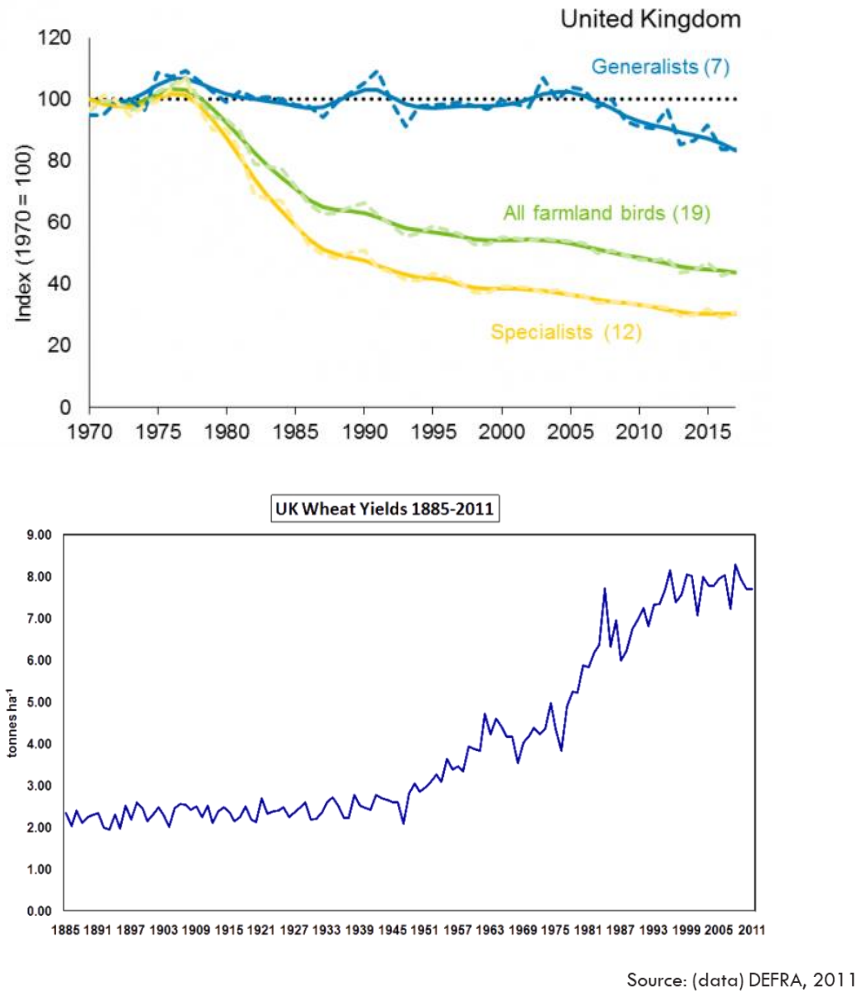
When	Country visited	Why?
2018		
January	UK	Oxford Real Farming Conference
March	The Netherlands	Contemporary scholars conference
	UK	Meeting with Friends Of the Earth
April	UK	Devon investigating beaver release programmes and farming with reintroduced species
May	The Netherlands	Follow up visits to meet Boeren Natuur, wildlife organisations, farmers and farmer union representatives
June	Sweden	Research into wolf conservation, fishing industry perspectives on engagement and cross sector working and valuing tacit knowledge in traditional Swedish farming communities
September	Romania	Visit to Transylvania to learn about the impacts of EU regulation on the semi-subsistence farming systems. Also, Craiova University and looking at intensive farming near the Danube Delta
October to December	UK	Various conferences and meetings including Cluster Farmers Conference, Results Based Agri-environment meeting (North Yorks), meetings with GWCT Scotland and sector organisations. Presentations at Reaseheath College and the Wildlife Trusts regional agriculture meeting.
2019		
January	New Zealand	Farm visits and appointments to discuss water quality issues, native vegetation management and farmer led schemes
February	Australia	Queensland - Investigating the debate over vegetation management laws, cotton farming and water use, sugar cane and farming in the catchment of the Great Barrier Reef
March	UK	Visit to the lake district to meet National Trust staff and tenants to discuss cross sector working
April	Ireland	Researching payment by results scheme delivery & farmer-led initiatives

Chapter 4: Introduction – the environmental challenge

Environmental issues are not a new topic for discussion, but many see lack of progress in addressing them as the major problem now.

The European Environment Agency's 2018 report *European waters Assessment of status and pressures* points to improvements in water quality since the adoption of the Water Framework Directive in 2000; but still only 40% of surface water bodies meet 'good' ecological status. Similarly, there has been progress made in slowing biodiversity decline in recent years, and reductions in noxious gas emissions, but evidence suggests we have not achieved enough to save many species from extinction or to protect sensitive habitats from further decline.

UK farmland bird indicator 70-11, *source BTO*



Source: (data) DEFRA, 2011

Figure 2: The declines in farmland bird numbers corresponds with a period of rapid increase in production in the UK since 1970 **(***illustrated by tables on bird numbers and wheat yields***)**

Why has there been limited progress in improving ecological status? Ask any farmer and she/he will tell you that lack of legislation is not the problem, rather many businesses are swamped by it. We have comprehensive rule sets, codes of practice and schemes to support compliance; so why are we not getting results? Perhaps stronger enforcement is the solution? This is tough to argue with when action is so urgently needed.

But there is an alternative to stronger enforcement and one which I think is better - engagement.

We are heading into an era of extraordinary change for agriculture. Not only do we need to feed a growing population, but we must do this using less resources, whilst trapping carbon in our soils, reversing biodiversity decline and providing flood mitigation for growing urban areas. People are seeking more recreational opportunities from rural areas and want to see species returned to the UK which have been absent for centuries; beaver, lynx and wolves. Extensive tree planting is suggested as a key climate change measure, and all this needs to be achieved on our existing area of land.

Demands on agriculture are complex and multi-faceted and we need farmers participating positively to achieve success and so positive engagement holds the key.

Viewed from outside the agriculture industry, there is a strong sense that farmers are not engaging sufficiently in environmental issues. But being 'engaged' requires positive participation and this is possibly the hardest stumbling block to overcome. In my own experience, environmental demands; whether legally required or voluntary are often not received in a 'positive' way by the agricultural industry.

4.1 Implementation

How rules are implemented really matters, as it makes **the** difference between buy-in achieving compliance or simply there being more bureaucracy.

In my role as a farm adviser I wrestle with regulation on behalf of farmers which means they are not thinking about the rules but rely on me to do it for them. Their decision making is dictated by meeting requirements, rather than finding the best approach for the environment. Burdensome legislation takes farmers away from the rules, when we need everyone to be thinking "what is the problem" and "how am I best placed to fix this"?

Rules need to be understandable, practical and fit for use, leaving room for farmers to think about how they are applied best in their setting. And, importantly, rules need to be plausible, rational and based on quality evidence which in this age of evidence-driven policy shouldn't be a problem. However, a focus on scientific and theoretical approaches can over-simplify situations and often miss important components, so what evidence is used does not fit with what is known on the ground.

Introducing legislation whilst keeping stakeholders involved and positive is a worldwide problem and the following sections present some perspectives which I have observed during my Nuffield travels.

4.1.1 New Zealand nutrient modelling.

In New Zealand, farmers and farm advisers alike admitted that modelled nutrient data has become a source of considerable frustration. OVERSEER, a nutrient software modelling system, is widely used by regional councils to assess nutrient losses from farms in order to regulate leaching to water. The software generates analyses of nutrients cycling around farms by capturing data on farming activity, topography, soil type etc. It is useful for looking at the long-term impacts of farming activities but over-simplifies processes too much to produce accurate nutrient loss data. Anecdotally, small tweaks to the data inputted can be the difference between a pass or fail for compliance with catchment nutrient limits and this makes farmers very sceptical. Its use as a regulatory tool has had some negative effects on farmers' trust in the regulatory system and the data being used to police them.

News

FARMERS WEEKLY – farmersweekly.co.nz – January 14, 2019 3

Caution urged on Overseer use

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A FLURRY of reports advising caution in the use of Overseer has prompted developers of the technology to convene meetings with local and central government to develop better guidelines on its use.

Three reports released last year, and another commissioned by Overseer Ltd, confirm the technology was a decision support tool for farmers but was increasingly being used by regional councils as a tactical tool used especially for setting and measuring nitrogen leaching limits.

Overseer chief executive Caroline Read said she will work with regulators to get consensus on how to best use Overseer and to move away from it being used to provide an absolute number on the amount of nitrogen leaching.

Reports last year by the Biological Emissions Reference Group, Productivity Commission and the Parliamentary Commissioner for the Environment all raised doubts about the accuracy of Overseer in

SYSTEM FOCUS: Overseer chief executive Caroline Read says Overseer is designed to compare the impact of system changes, rather than providing absolute numbers.

review, by Gerard Willis of Enfocus, described Overseer as a decision support tool for farmers.

"That is, it allows the user to understand the long-term impacts of system wide changes to a farm rather than day-to-day changes in N-loss."

Actual N-loss from a farm can never be known because it cannot be reliably measured for a whole farm and Willis said as with any modelling, Overseer

having "hard numbers" on which farmers are judged to have either passed or failed to one where Overseer was used to determine trends and compare system and management changes.

As technology improves Read said measuring nutrient loss will become more accurate and provide farmers with a comparison of the impacts of different systems and management changes.

Overseer modelled rather than measured nutrient loss, and then only losses below plant root zones.

Councils have used it as a regulatory tool for more than a decade, principally as a compliance measurement tool and to set nutrient loss limits.

Over time its use has extended as regional councils look for technology to measure diffuse discharges and to meet freshwater quality targets.

Willis urged care with its use in planning effects-based water management.

"Overseer should not be considered as a substitute for a broad, multi-pronged approach to water management more generally."

Willis said after N, phosphorous (P) was the other important nutrient for water quality and while regional councils did not set property-specific P-loss limits using Overseer, there have been calls for this happen.

He said Overseer assumed all farmers followed good management practices, but this ignored changes to improve those practices and similarly

treated relative to others, drive creative uses of Overseer and be difficult to justify and enforce if tested legally.

For that reason, he advocated Overseer be used to estimate farm performance against a target range and where failure to meet those standards triggers closer scrutiny of a farm operation.

> *Overseer should not be considered as a substitute for a broad, multi-pronged approach to water management more generally.*

Gerard Willis
Enfocus

This may not necessarily mean refusal or forfeiture of consent, because Willis said Overseer data should not be the only consideration for regulators.

"This approach contrasts with

Figure 3: An article from Farmers Weekly, NZ 14th January 2019

4.1.2 Australian vegetation laws and satellite mapping.

Vegetation Laws are causing considerable conflict in Queensland, Australia, where satellite imagery is being used to enforce the Vegetation Management Act (VMA). The VMA was brought into force in 1999 to regulate the clearance of vegetation in order to protect endangered ecosystems, prevent

loss of biodiversity and protect land from degradation. Since its establishment, the Act has been amended 38 times and has become a political battle ground at state level.

Figure 4: Edengarry Station, Queensland. Removing tree regrowth is required to retain grassland, but vegetation management laws are making this more difficult. *Photo – author's own*

To take as an example of what can go wrong, just one of several conversations I had, Jo, who runs a cattle ranch with her husband Elwyn, spends much of her spare time helping farmers deal with the challenges that implementation of the VMA has created. She tells me that decisions, made remotely using Statewide Landcover And Trees Study (SLATS) satellite maps, are often wrong and farmers can be sent a vegetation restoration notice without ground-truthing.

Native plant species maps, as shown in Figure 5 below, can also be imposed without proof from the ground: the consequences of which are more restrictions on tree clearing and the requirement to fence areas off from livestock grazing. To disprove maps or restoration notices, farmers must bear the cost of challenging them: which Jo tells me can run into thousands of dollars.

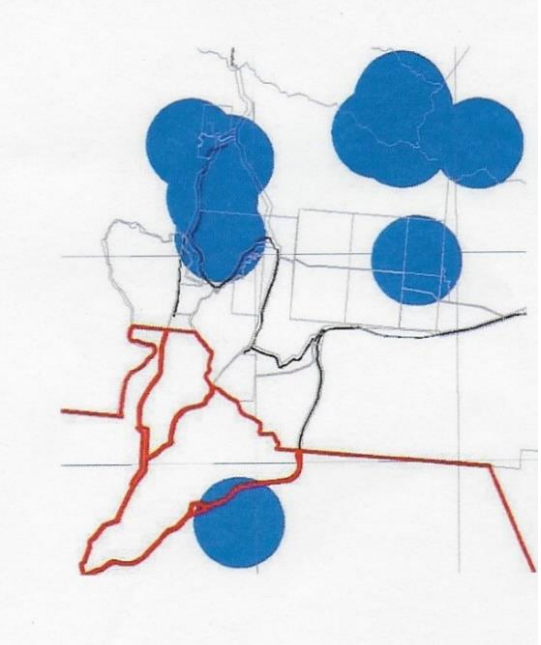


Figure 5: Protected plant trigger maps - 2km buffer zones, shown as blue circles, are placed around the location of recorded rare native plants. These can impact vegetation management and farming practices within these zones. *Source – Agforce, Australia.*

Environmental NGOs are adamant that farmers are felling trees unnecessarily, but, such is the anger amongst farmers in Queensland over VMA implementation that it has prompted the formation of the Green Shirts Movement. Founder Martin Bella explained that the movement now has 10,000 members across Australia, united against green politics which he believes, is having a negative impact on livelihoods and the environment. Amongst its objectives the Green Shirts Movement aims to *'Increase awareness among consumers and stakeholders that land and marine natural resource managers are best placed to be the frontline conservationists'* : it is staking claim to the environmental agenda, with ground level knowledge at its core.

4.1.3 Top-down rules in Transylvania, Romania

The Tarnava Mare High Nature Value grasslands were added to the Natura 2000 network of protected sites in 2008; a year after Romania joined the EU. Natura 2000 aims to protect important European habitats and their associated species from development or practices which could negatively impact on them. The challenge working within the network, however, is the heavy obligation it places on farmers to preserve a local environment which was created by practices from a different era.

Farming here is mainly subsistence or semi-subsistence, each family having only a few dairy cattle which are taken to graze by a community herdsman. Sheep were also traditionally grazed in community flocks, though this is now significantly constrained due to changes in land ownership and infrastructure development. Saxon villages are laid out to enable a community approach to all food production, with vegetable and fruit growing close to homes, arable land beyond and common

grazing in the hilly areas. Most work on the farms in Tarnava Mare requires manual labour, including scything grass and hand milking cows.

Figure 6: Traditional Saxon village farm in Transylvania, Romania. *Photo – author's own*

The farming lifestyle here might appear idyllic, but income is poor, opportunities are limited and as a result people are moving away to seek better prospects for their family. Massive net emigration from Romania* since 1990 has resulted in land abandonment and breakdown of community farming systems on which the landscape is built. Cattle numbers dropped, compounding the problem of lack of grazing management, and farmers opted for easier farming choices, like heavier grazing of dry, flat pasture. So, from this it can be seen that with changing economic circumstances and transformation in rural society, the current scheme arrangements will struggle to deliver the aims.

*2.6 million Romanians of working age live abroad. This equates to a fifth of the country's labour force (World Bank figures)

4.1.4 The European fishing industry and the consultation process

In Sweden, I talked to Kari Stange, Senior Marine Sustainability Council Stakeholder Engagement Manager for Scandinavia and Baltic Sea Region. Kari has also worked for the European Commission on collaboration and stakeholder management and in her PhD thesis *'knowledge production at*

boundaries' she draws attention to the weaknesses in the stakeholder consultation process when calculating Total Allowable Catches for different fish species. The system supporting the Common Fisheries Policy at present takes evidence for decision making from fisheries scientists, and stakeholders are invited to comment on it. This approach assumes academic knowledge is the primary source of facts, but this evidence is frequently disputed by the fishing industry.

Figure 7, below from Kari's thesis, questions the transparency and credibility of the classic consultation process against a system of collaborative participation. But there could be another problem here too, that the scientific data collection and assessment is misunderstood and not well communicated to enable the two types of knowledge to be brought together to inform the way forward.

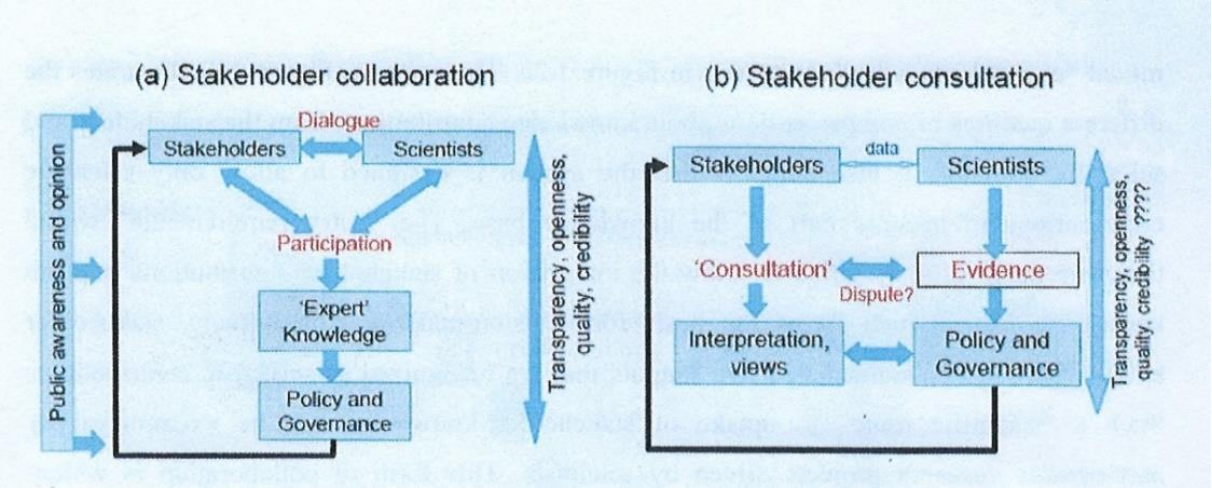


Figure 7: Stakeholder collaboration versus Stakeholder consultation,
from Knowledge Production at Boundaries by Kari Stange

4.1.5 Issue fatigue, the Great Barrier Reef

To keep stakeholders engaged in the environmental agenda it is vital that the targets set and the methods of measuring progress towards them are sound. In Brisbane, I met Michael Quirk of the Cane Growers Association, who described cane farmers in the Great Barrier Reef catchment as '*issue fatigued*'. The negative impacts of cane production next to the world's largest coral reef have been widely reported for some time but, despite a healthy uptake of technology and adoption of new practices aimed at reducing run-off and sediment loss, because of a lack of results showing water quality improvements at farm level and insufficient documented evidence demonstrating practice changes on farms, there appears to have been little progress against current targets.

Design improvements to the multi-stakeholder *Paddock to Reef Programme* for 2018-2022 are now aimed at addressing some of these issues, by capturing more evidence of positive land management practices, collecting more water quality data and improving modelling to better reflect variables. There is concern however that, although the improved cross sector relationships will bring a more

positive reporting system, these could be outweighed by disagreements over proposed amendments to regulations protecting the Great Barrier Reef.

Figure 8: Bare soil in sugar cane crops after harvest makes soil vulnerable to runoff and sediment loss. MacKay, February 2019. *Photo author's own.*

4.2 The language and the approach

Too often it is the language of the environmental conversation that is the obstacle to engagement. In the countries I visited it was commonplace to find farmers tired of the criticisms being levelled at them on water quality, biodiversity loss, soil damage etc. The language of the general media is often so loaded with negative imagery that we find agriculture in a permanently defensive position over its practices.

4.2.1 Use of the word 'Deforestation' in Queensland

In Queensland I met farmers wounded by the accusation that they are 'deforesting' the countryside, an example of which is shown in Figure 9 below.

Felled trees and muddy waters

Queensland is one of the world's worst places for deforestation

1,000 rugby pitches' worth of forest disappear every day

Figure 9: Media language can inflame the debate –
headline from The Economist, February 24th, 2018

I was told that the SLATS report (Statewide Landcover & Trees Study) was 'cherry-picked' for a government report which only highlighted tree clearance but did not include any areas of thickening and regrowth of trees. One farmer I met described how encroachment of vegetation from the neighbouring national park has reduced his farm's carrying capacity from 1200 to 600 head of cattle and this is having a significant impact on his ability to farm profitably. This experience is typical of many farmers in Queensland who feel that data is being misused to support the implementation of strict vegetation management laws.

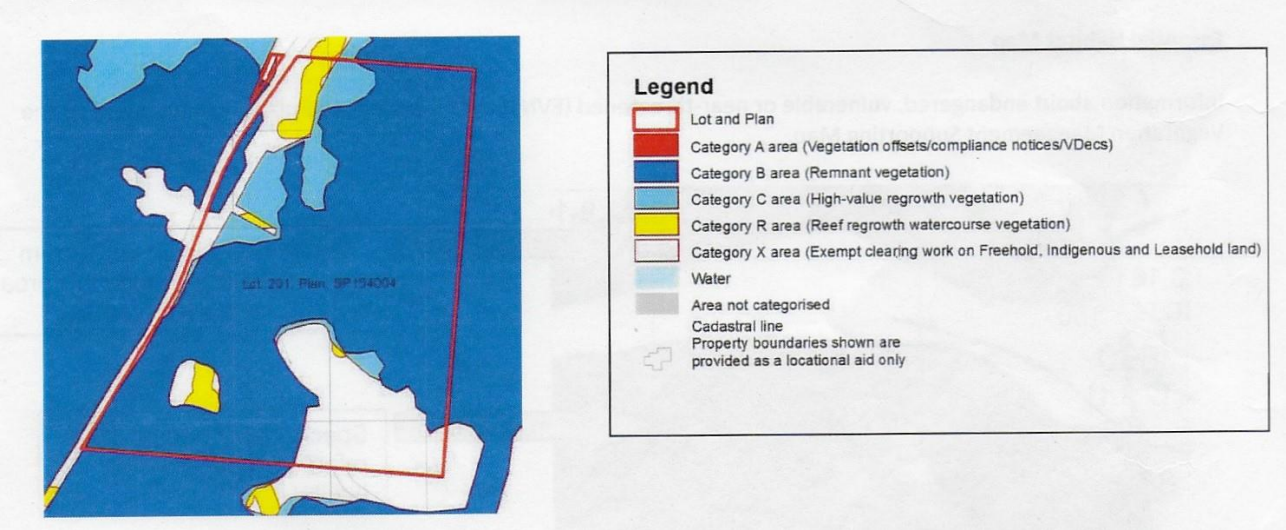


Figure 10: Property Map of Assessable Vegetation showing categories of vegetation to inform management. The extent of 'regrowth' on farms is a source of much conflict with the Vegetation Management Act. *Source - Agforce, Australia.*

Much of the problem lies in what the term 'deforestation' is being used to describe. The *'Supplementary report to the SLATS Report 2012–14'* detailed the type of tree clearance included in the figures and shows that around 85-90% of clearing (between 2012 and 2014) was done as permitted land management practice; commonly the removal self-set trees on pastureland. Further, much of the 'alarming rise in deforestation' that media outlets reported across the world was, according to the SLATS report, as a result of legitimate mulga harvesting to feed stock in drought-stricken areas.

4.2.2 Approach issues

Language and the approach can both influence whether farmers engage 'positively' or 'negatively' with rules and regulation. In Ireland, I met Catherine Seale, a Community Water officer in Galway for the Local Authority Water Programme. Catherine's PhD thesis *'Learning How To Inform Extension Practices Related To Mandatory Agri-environmental Policy'* investigated farmers' experiences of cross-compliance rules and the relationship between these and the sustainability issues that exist in agriculture. In capturing perceptions of cross compliance, the study noted many farmers experienced "emotions of fear, stress and anxiety when engaging with cross compliance". This 'social dimension' of policy is important to consider – **rules which create negative emotions will inhibit constructive engagement.**

Chapter conclusion

Legislation that is heavily reliant on data produced by modelling or remote imagery without ground-truth checks is causing scepticism and disengagement from environmental issues which need to be tackled.

Top-down or negative approaches and the language of the debate are also causing frustration and reluctance to engage in with them.

This problem can be overcome by improving engagement between sectors and making farmers part of the solution.

Chapter 5: Sources of knowledge and how we use them

During my Nuffield studies I met several researchers who have worked on projects aimed at capturing alternative knowledge sources : I was struck by the importance capturing and using a wide range of knowledge has in engaging stakeholders in the environmental agenda.

One of these researchers was Marie Kvarnstrom of the Swedish Biodiversity centre at the Swedish University of Agricultural Sciences SLU. She has worked on several projects connected to the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services and which are inspired by the 'Multiple Evidence Base approach' (MEB). MEB seeks to consider *'indigenous, local and scientific knowledge systems as generating complementary forms of knowledge'* in order to gain more insightful understanding of sustainable agricultural practices. Holders of 'indigenous and local knowledge' in Nordic countries were identified by Marie and her colleagues as Saami and Inuit people, but also importantly included people using various traditional farming techniques. In the UK this list could encompass farmers with many regionally defined farming techniques; such as commoners with hefted sheep flocks or flood plain graziers, whose methodologies have been developed over many years of experience.

Figure 12: The author visiting SLU, Uppsala, *Sweden. Photo* *-author's own*

Kari Stange's thesis, 'Knowledge Production at Boundaries' also describes the challenges of valuing stakeholder knowledge in the fishing industry using the watering cans image in Figure 13. It demonstrates visually how the contribution of the fishing industry and other practical knowledge holders is a poor fit with the system that channels information through to EU policy making. Kari demonstrates that the impact this knowledge source can have on decision making is restricted by the 'funnel' – the mechanism of contribution. Quantifying the experience of fishermen for evidence purposes can be difficult, which is perhaps why it is set aside in preference to scientifically captured

trends, but without collaboration across sectors can any of the knowledge acquired be put to best use?

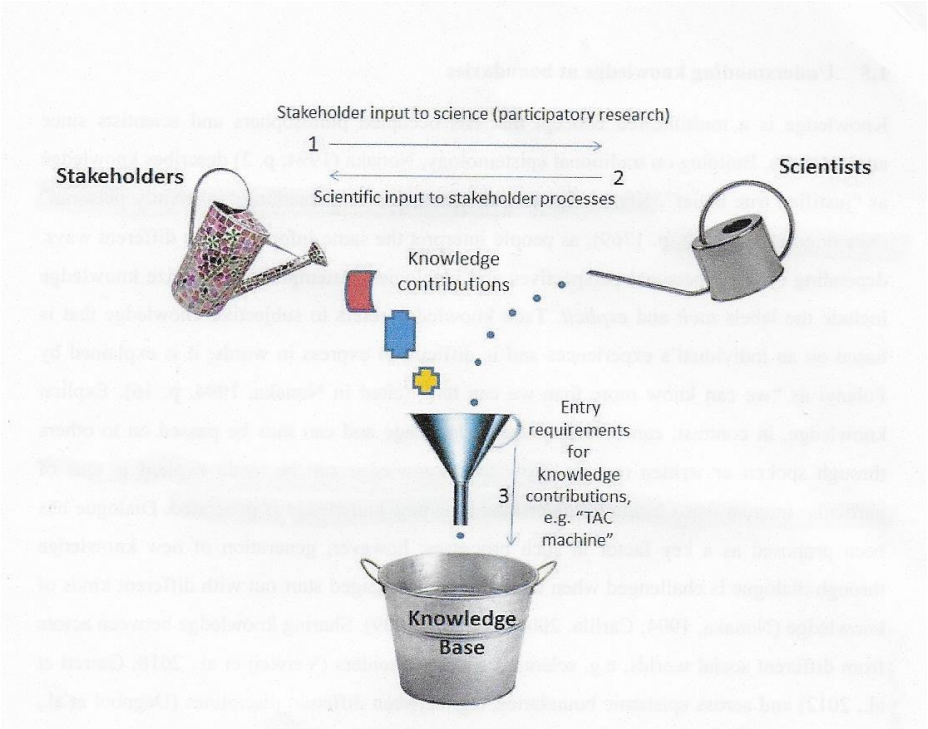


Figure 13: illustration from *Knowledge production at boundaries: An inquiry into collaborations to make management plans for European Fisheries* by Kari Stange

5.1 What are the sources of knowledge in farming?

Beyond scientific sources of understanding there are huge amounts of knowledge within the agricultural industry which can be harnessed in decision making which should be recognised, and I refer to this here as embedded knowledge. The following diagram is my interpretation of what influences activity on the ground in our industry:-

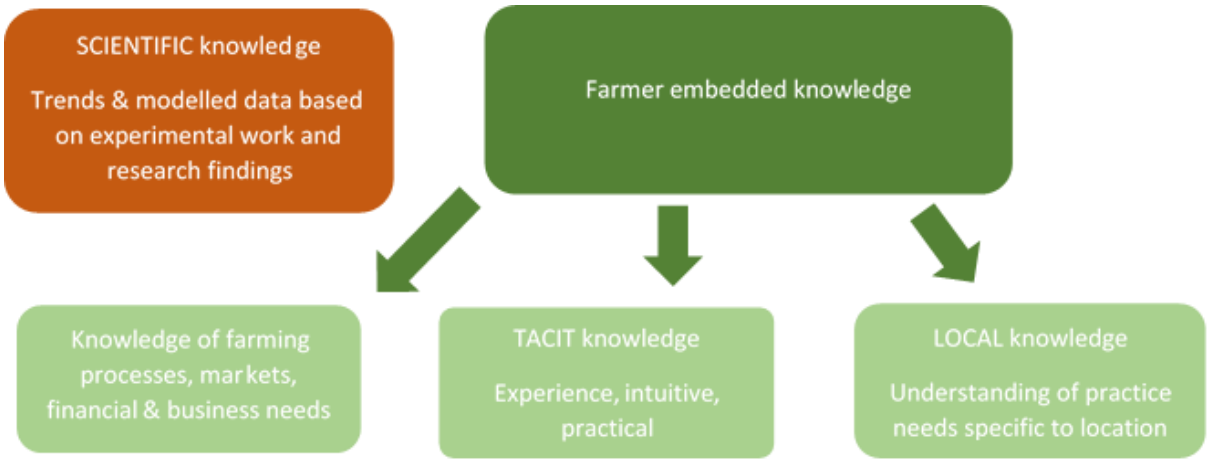


Figure 14: In addition to knowledge of markets, financial and business needs, farmers also use their tacit and local knowledge to make decisions

5.1.1 Tacit knowledge

Agriculture is rich with tacit knowledge. Farmers often act intuitively using their understanding of patterns of behaviour and the experience they accumulate. On-the-ground learning provides farmers with a wealth of knowledge about the land, their stock, their crops and weather patterns and how these elements interconnect. In contrast to explicit knowledge that is easy to record and store, tacit understanding develops from experience and uses people rather than paper for its delivery.

5.1.2 Local knowledge

Similar in nature to tacit knowledge, local knowledge is a product of people's experiences in an area over time and reflects their adapted practices which fit their geographical, social and cultural circumstances. The Food and Agriculture Organisation of the United Nations (FAO) describes local knowledge as dynamic and constantly changing and points out that for development projects, understanding the approaches used in a local area is important before introducing other ways of doing something.

The adaptability of local knowledge is demonstrated in Shropshire in the Melverley flood storage area. Farmers there understand flood water inundation and how it has changed over time; not from Environment Agency alerts or hydrologist studies, but from their own knowledge of the land and how it behaves in a flood. Inaccurate flood maps are a source of considerable frustration locally as they can hold up development where the farmers know it is safe.

Figure 15: Flood water storage up-stream of Shrewsbury. *Photo courtesy of Ian Mansell.*

5.1.3 Knowledge of farming processes, markets, financial & business needs

In commercial, as opposed to subsistence, agriculture there is greater influence from forces beyond the farm gate on the decisions we make. These can be driven by demand, markets (global and domestic), by balance sheets etc. and can override decision making based on farmers' tacit and local knowledge. For environmental policy to be effective, we cannot ignore these external influences but must understand their implications in order make environmental policy function better with the dynamic situation on the ground.

5.2 What is the value of embedded knowledge to the environmental agenda?

The following table sets out the three main areas of knowledge which need to be taken into account not only in farming decisions but those involving the environmental agenda.

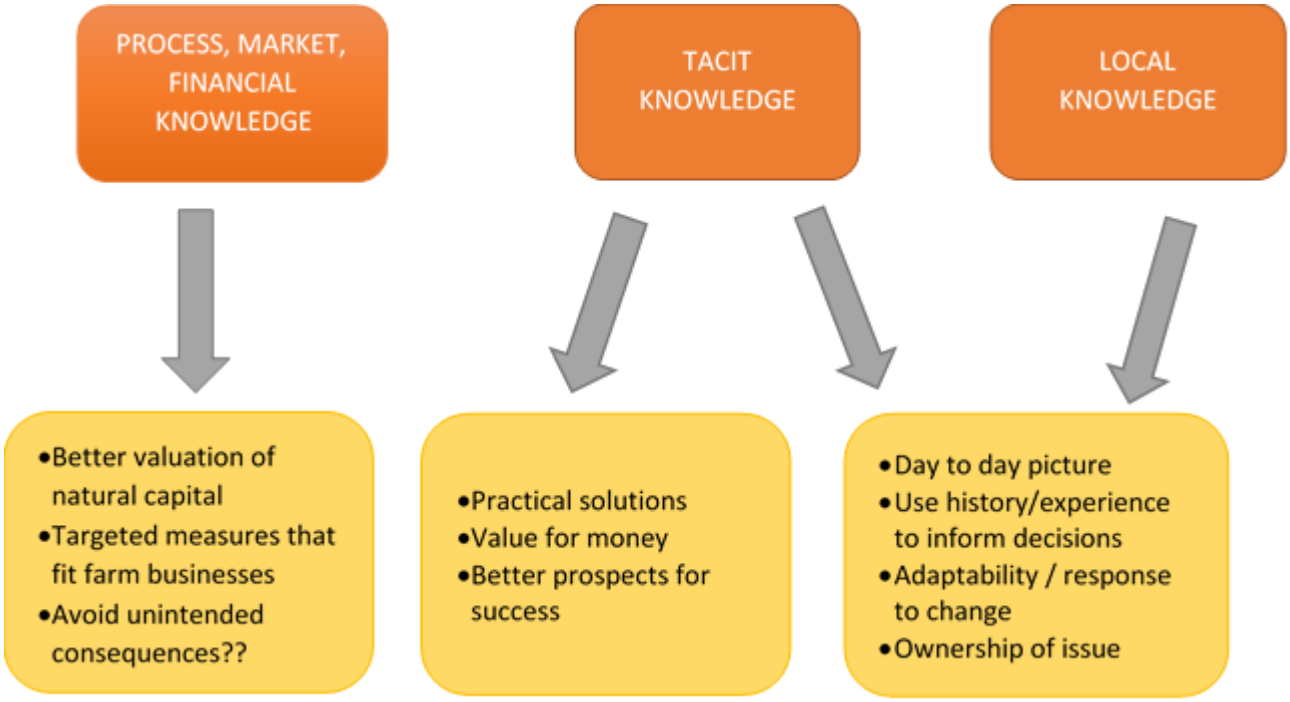


Figure 16: benefits of better valuation of 'embedded farming knowledge'

Farmers have lots of experience and, although not recorded in any traditional sense, this long term 'data capture' is very useful in being able to understand environmental changes. When tacit and local understanding are used in combination with farm business knowledge, it is a powerful tool in finding solutions for environmental impacts that can remedy an issue through easy, farming-savvy wins, that have better long-term prospects.

There are however challenges to integrating knowledge sources in agriculture. Farmers are typically cautious of telling anyone about the biodiversity on their farms; concerned about how the information will be used and what restrictions on practice might result. Equally 'not being heard' has made many farmers reticent and not willing share their knowledge. For success in harnessing their knowledge we need farmers to have a clear ability to influence the end result of its collection, not just be impacted by it.

Chapter conclusion

There is a wealth of knowledge that exists in the farming community which should be better used to deliver results for the environment.

Using embedded knowledge will ensure that policy and rule sets fit with local conditions, ground level experience, market demands and other farm business drivers.

We need mechanisms to value embedded farmer knowledge: 'being heard' will benefit engagement and improve environmental performance.

Chapter 6: How do we use farmer knowledge to meet environmental outcomes

As I learnt from the fishing industry, Figure 13, integrating knowledge held in food production industries into existing working systems for policy is no easy task. But there are many reasons to do it. Here, I describe the routes to including other knowledge streams in environmental delivery and assess their risks

6.1 Autonomy in decision making – freedom to farm

To utilise their skills effectively, farmers need space to find their own solutions to the challenges being presented to them. A common opinion I heard was that farmers need to be given the goal and be left to achieve it. There are risks to this approach. It may take time for upland farmers, for example, to balance livestock numbers with habitat requirements; but in the process of working it out there are learning opportunities which will become part of her/his understanding of how to manage land for production and biodiversity in the future. Working through the problem practically enables farmers to adapt practices at the right pace and avoid the unintended consequences of big changes on the ground.

Figure 17: – Cattle drive across the Burren-*a challenging place to farm requiring very local knowledge and good communication to ensure success for farming and for the environment. Photo from 'Blessing of Cattle' Martin Keily and the Burren Programme*

I heard about the importance of positive delivery from Brendan Dunford, programme manager of the Burren Programme on Ireland's mid-west coast. The underlying premise of this scheme is to allow farmers the freedom to farm through payment by results, without prescribed dates or stocking densities. Farmers are free to work according to their own needs, but their scheme payments reflect

how well their farming practices fit with wider habitat targets. A key element of engaging farmers in this scheme is the importance there is in farming the land. Brendan explained, for example, that the more work undertaken by a farmer to manage poaching, tackle scrub and repair walls, the more money they get paid from the scheme: so, the relationship with earning from the scheme is a positive one.

6.2 Writing the rule book

Nature is complex and the 'one size fits all' approach of some policies fails to acknowledge this. At a local level this can have a negative environmental impact, as I noted in Transylvania. Fundatia Adept has been working with farmers in the high nature value landscape to design conservation measures that suit local requirements. Razvan Popa, the programme's technical director, told me that there can be conflicts between the management needs of different protected species in the region, so building schemes locally avoids this problem.

Further, issues can occur when scheme proposals are rolled out aiming to protect a species, rather than a habitat. For example, in 2015, the Romanian government announced the extension of a support measure to protect the corncrake which rewards farmers for delaying the cutting of hay meadows until after 1st August. Farmers in the Tarnava Mare region mow at varying times from farm to farm and year to year according to the state of the grass and its suitability to hand cutting: it is this mosaic of land management that has created very species-rich swards which support many rare insects, birds and mammals and ensures there are always refuges for nature. Mowing to a single date creates more monoculture in the local landscape, limits wildlife refuges and threatens the long-term sustainability of hand cutting hay, which can only be successfully done when conditions are right.

So, Fundatia Adept are working to establish alternative rule sets for the region to ensure national rules do not undermine its existing farming system which is so in tune with biodiversity.

Figure 18: Hay in transport in Transylvania, Romania, September 2018. *Photo – author's own*

6.3 Farmers as a research platform

A wealth of global research suggests that the top-down approach to science; where scientists and academics develop solutions and transfer them to farmers, poorly serves small semi-subsistence farmers because it ignores tacit knowledge and experience of the land. In 'commercial' farming too. loss of trust in science due to a lack of practical perspective, is disconnecting farmers from environmental issues. With more abstract issues like diffuse pollution, farmers need to understand the problem, preferably at a local level, and believe in the data to respond to it. And with some environmental issues this can be hard to achieve. In New Zealand a quarter of the country's native vegetation cover is found on beef and sheep farms; farmers value this and are well engaged in protecting it. Water quality however is more difficult to relate to visually, so the response to protecting it has been slower.

Figure 19: Protected native vegetation on a dairy farm near Tauranga, New Zealand. January 2019. *Photo- author's own.*

6.3.1 Collecting data

To connect farmers to water quality issues in New Zealand, a Stream Health Monitoring and Assessment Kit has been developed, through a cross sector partnership. The tool enables farmers, landowners or other interested parties to assess streams for water quality indicators and help inform them of what the water quality issues are and where they are coming from. The tool is also being used to challenge regional rules and give farmers a voice in the debate about regulating catchment water quality.

In the Netherlands farmer-led nature collectives are gathering data to gain understanding of how to look after wildlife on their land. The Collectief It Lege Midden in Friesland uses motion sensing cameras to capture information on the predation of ground nesting birds to work out how best to

protect them and what prey species need targeting for control. The data has shown an increasing issue from the Stone Marten; a newcomer to the area and protected by law. The collective has used their evidence to apply for trapping licences to control numbers of this species.

Collectief It Lege Midden has also invested money to research soil health and the impacts of raising water levels. The collective wants to understand how the water levels suggested by ecologists are impacting soil condition and whether they are optimum for the multiple functions which farmland must serve. To this end they have sought their own researchers to answer questions that are relevant to wildlife and their farm businesses.

Figure 20: Understanding the impact of raised water levels. Raised water levels are attracting exceptional numbers of waders on Marten and Linda Dijkstra's farm but the farmer-led collective wants to understand the implications they have on soil health. *Photo – courtesy of Marten Dijkstra*

6.3.2 Farmer-led science

'Scientists can be too reductionist' is an accusation I heard in many guises as I talked to farmers on my travels. Nature often throws up very complex pictures and so, to address this in a practical way farmer-led discussions and knowledge sharing events are becoming more common in our industry. In Queensland I learnt about two such groups: The Regenerative Cane Farming Forum and Central Queensland Soil Health Systems. These initiatives drive innovation in production efficiency to benefit the business whilst reducing diffuse pollution and improving soil health. Conversations are led by farmers and contributed to by researchers; a role reversal in the traditional approach to knowledge transfer. Groups like these can provide a 'safe' place to discuss on farm experiences, with less risk of

negative judgement or regulators taking notes. The involvement of scientists in these settings is in a horizontal knowledge sharing role, where research can be steered by farmers and inform them in ways which are most pertinent to them. (see Figure 21 below)

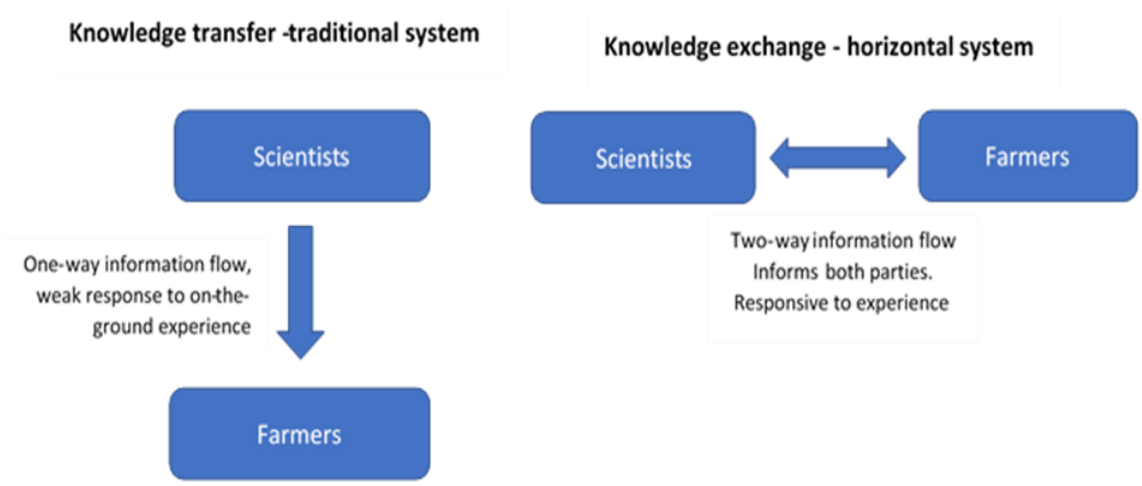


Figure 21: How knowledge can be shared and the implications of the different systems

author's own

Chapter conclusion

Outcome driven schemes and policies provide farmers with space to find their own solutions to the environmental challenges and encourages positive participation.

Through collective engagement farmers can influence the writing of rules, by presenting alternative approaches in a unified voice.

Developing a more horizontal relationship between scientists and farmers can also help advance the environmental cause; data capture helping the industry get to grips with an issue and research being better tailored to meet win-win sustainability goals.

Chapter 7: Approaches to using farmer knowledge in agri-environmental delivery

7.1 Collaborative and collective examples

I have observed various formats for delivery of environment goals where collaborative or collective approaches are being used to localise solutions and to better utilise farmer knowledge. Here I describe some of the models I have observed. **Appendix 1** provides a more in-depth analysis of these approaches in a SWOT format (Strengths, Weaknesses, Opportunities, Threats).

7.1.1 Nature Collectives, The Netherlands.

There are 40 regional farmer collectives represented nationally by the umbrella organisation Boeren Natuur. National targets are set for conservation based on the Birds & Habitats Directives and collectives submit applications to the government for 6-year contracts to deliver the agri-environment targets appropriate in their region. Farmers set up agreements with their local collective and Boeren Natuur take a levy for which they provide the ICT operating system. Boeren Natuur also pilot new scheme options and deal with national level matters of interest, working with cross sector groups. Collective boards are made up of local farmers, with input from regional conservation organisations and nature enthusiasts.

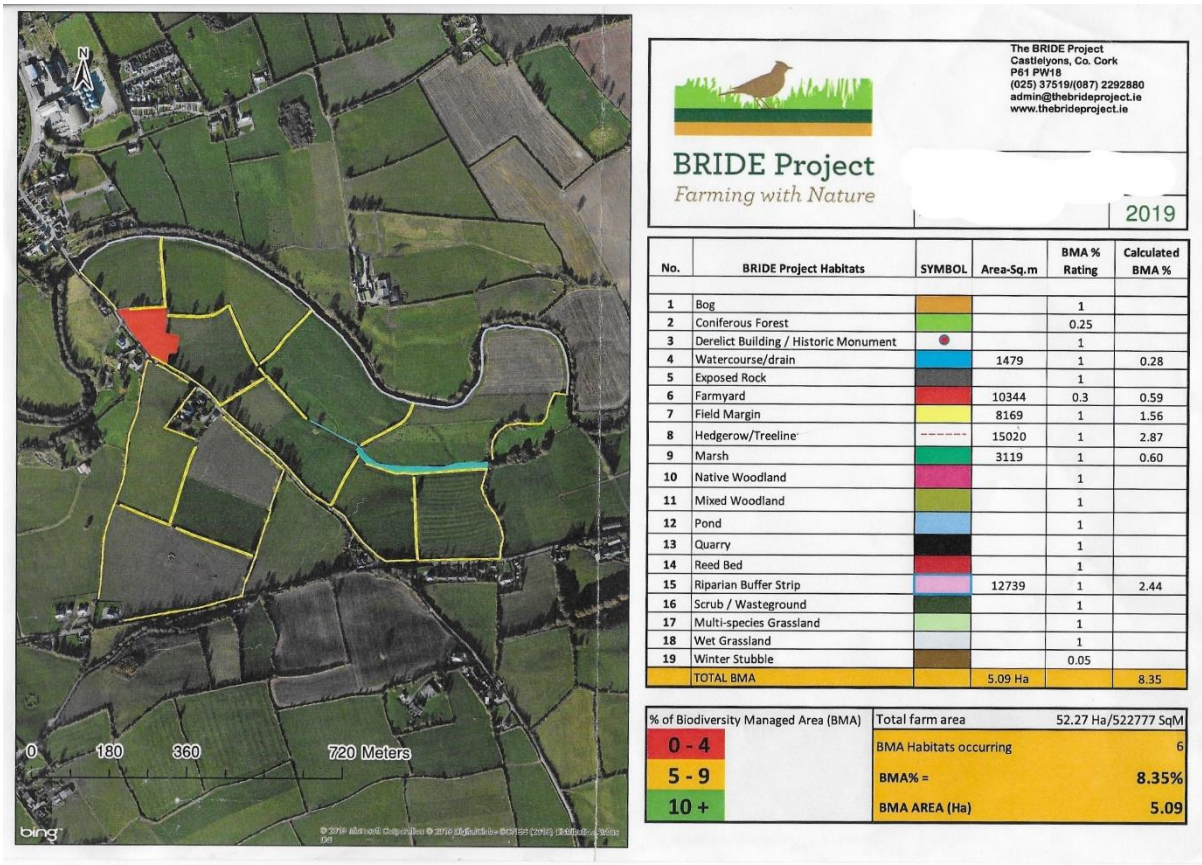
7.1.2 Catchment groups, New Zealand

River catchment groups have sprung up across New Zealand in response to water quality issues and catchment limits on nutrient leaching. Industry representative organisations, such as Beef & Lamb New Zealand, encourage the set-up of farmer-led catchment groups to "establish an authoritative voice with decision makers and shape rules". Catchment groups consider water quality issues in a collaborative way with the aim of improving uptake of pollution reducing measures. Membership fees are typically charged which pay for a catchment coordinator, water testing and consultancy fees.

Figure 22: The success of the New Zealand dairy industry has not been good news for all. River catchment groups are an opportunity to reconnect with the public through positive water quality improvement measures*. The protest sign photographed by the author in January 2019 is part of a campaign against a river damming scheme which pressure groups feel would enable further herd expansion and undermine river health.*

7.1.3 Farmer-led agri-environment initiatives, The BRIDE project – Ireland

Based in the River Bride catchment the project is also called BRIDE as an acronym for 'Biodiversity Regeneration in a Dairying Environment'. Project manager, Donal Sheehan, is a dairy farmer in the Bride valley and manages the initiative which aims to deliver landscape scale agri-environment schemes with an element of payment for habitat quality. The options within the scheme were developed by its farmer led working group and include farmyards as habitat for owls and swifts etc. Farms with priority species are targeted first for inclusion in the scheme.



No.	BRIDE Project Habitats	SYMBOL	Area-Sq.m	BMA % Rating	Calculated BMA %
1	Bog			1	
2	Coniferous Forest			0.25	
3	Derelict Building / Historic Monument			1	
4	Watercourse/drain		1479	1	0.28
5	Exposed Rock			1	
6	Farmyard		10344	0.3	0.59
7	Field Margin		8169	1	1.56
8	Hedgerow/Treeline		15020	1	2.87
9	Marsh		3119	1	0.60
10	Native Woodland			1	
11	Mixed Woodland			1	
12	Pond			1	
13	Quarry			1	
14	Reed Bed			1	
15	Riparian Buffer Strip		12739	1	2.44
16	Scrub / Wasteground			1	
17	Multi-species Grassland			1	
18	Wet Grassland			1	
19	Winter Stubble			0.05	
	TOTAL BMA		5.09 Ha		8.35

Figure 23: A Biodiversity Managed Area (BMA) assessment for a farm in the BRIDE project. The traffic light system is used to highlight current performance level according to quality and area targets for habitat on the farm.

7.1.4 NGO-led payment by results scheme, The Burren Programme, Ireland

A locally led project in the Burren National Park, referred to in Chapter 6.1, is helping prevent land abandonment in this area which is challenging to farm. Dr Brendan Dunford the Programme Manager expresses the importance of long-term projects that build trust with the local farming community and that help cut through some of the barriers to getting things done in a national park. As discussed earlier, the programme uses a hybrid approach to agri-environment which pays farmers for actions on their holdings, such as managing scrub, then assesses fields via a 'habitat health' checklist, to ascertain their payment level for the results-based element. The scoring system for habitat health is based on general indicators which include level of poaching, under-grazing and scrub / invasive species cover.

The local project also helps farmers with permissions for rebuilding work, track construction etc. Local staff provide administration of the programme, advice to farmers and monitoring of progress.

7.1.5 Species targeted scheme – Pearl Mussel Project, Ireland

The Pearl Mussel Programme seeks to create positives to farming in catchments where this protected species, the pearl mussel, is found. The scheme is managed locally and aims to engage farmers in quality habitat management by a payment-by-results approach. Farmers are also rewarded for having functioning flood ground on their holdings. The final payment received is

adjusted according to a whole farm assessment, which looks at farm nutrient balance and a farmyard assessment.

Farmers can also apply for funding to undertake supporting actions which will help them improve their results. These include fencing out waterways and rewetting ground.

Figure 24: The population of freshwater pearl mussels in Europe has declined by 90% in the last century. The species is sensitive to slight changes in environmental conditions.

Photo courtesy of the Pearl Mussel Project, Ireland.

7.1.6 Conservation & rural development NGO, Fundatia Adept, Romania

Fundatia Adept works with semi-subsistence farmers to support the maintenance of appropriate practices which will retain the biodiversity of the area. Natura 2000 status limits opportunities to improve productivity, so Fundatia Adept works to increase the value of products from this high nature value farmed landscape. The NGO also attempts to influence policy and inform the EU on the suitability of rules to the farming systems of Transylvania.

7.2 Knowledge sharing examples

Extensive knowledge sharing is done through collaborations as described above. But farmers also share learning and experiences via other routes, often which may have more business focus and therefore draw a different audience.

7.2.1 Project catalyst, Queensland, Australia

Project Catalyst seeks to drive innovation in sugar cane to improve sustainability and productivity. The initiative has investment from the Australian Government via the Reef Trust; from WWF, Coca Cola, Bayer Crop Science and others. The project works with farmers in the region, to support their research and providing some scientific input. Knowledge is shared through 'Shed Talks'; farmer-led discussion forums, and also communicated through YouTube clips and other media outlets, so non-member farmers can benefit from the learning.

7.2.2 Innovative Farmers (IF), UK

Innovative Farmers works within agriculture to set up networks of farmers wanting to run their own trials. IF sets up 'field labs', facilitates knowledge sharing and finds suitable researchers to work with the farmers involved.

7.3 Key characteristics for group working success

From these examples there are a number of characteristics which stand out as key to project success in engaging farmers and delivering results: -

- Outcome driven not prescription driven - allowing space for farmers to decide upon the right approach for a task embeds ownership and utilises their ground-level knowledge
- Flexibility and local relevance – having an element of flexibility in schemes allows farmers to respond to seasonal and local conditions
- 'Freedom to Farm' – this concept gives room for a variety of levels of engagement in environmental delivery within reasonable limitations and therefore enables participation from a wider range of farmers
- Identity – having a solid 'reason for being' provides a steer to participants on the key targets for delivery and pride in inclusion i.e. being part of a good cause.
- Farm productivity targets –environment-only targets capture some farmers, particularly if there is financial compensation involved, but delivering these targets through business relevant solutions that improve production sustainability will engage a wider range of farmers
- People and relationships – having the right people in place is fundamental to success. I witnessed NGO staff with high levels of acceptance from the local farming community, but this had taken time to develop. If the right farmer-leader can be found the process was quicker. People with a strong agricultural understanding are also more readily acceptable to a farming audience.
- Acknowledging existing contribution – valuing the contribution farmers are already making to the environment is important. Acknowledgement may be monetary; paying farmers for best practice already in place or in respect of the language used i.e. working with farmers to get even better results for their efforts. I believe that schemes like Catchment Sensitive Farming in UK, are giving the wrong message to the industry, by providing funding opportunities only to farmers where water quality is at its worst.

- Whole farm approach –a whole farm approach is logical and avoids unintended consequences. Limiting slurry spreading on land, for example, can have implications on storage capacity and management elsewhere on a holding. Initiatives that take a wider approach to agri-environmental requirements are likely to be more successful longer term for the business and the environment.

7.4 Problem areas

Detailed below are some notes of caution and tripping hazards with the group working approach

- Budget limitations and project boundaries may result in some farms missing out. This can be both frustrating and disengaging for people who are willing to do something but can't, however large or small their contribution might be.

- Making agri-environment options 'fit' with farm businesses can undermine how far we are willing to take them. In the Netherlands I heard accusation from eNGOs that farmer collectives sometimes take the 'easiest' options not the 'best' options for the environment. External input is needed to ensure we address the more challenging areas of conservation.

- Complex calculations for payments e.g. using ecological indicators, may exclude farmers from easily understanding a payment by results system and therefore undermine her/his ownership of results. Simple indicators make practical sense for people on the ground.

- Just as personnel and relationships can be the making of an initiative, so they can also be its downfall. Imbalances in representation of sectors, poor compatibility in aims or the language of the conversation can severely damage engagement.

- Identity can also have negative implications. Where dealt with positively a local target can be an opportunity for farmers. But, being identified as hosting a rare species or habitats can create regulatory challenges for farms in terms of their practices, infrastructure development or new enterprises. Local wildlife targets need to present opportunity, not hurdles, so that farmers are willing to encourage species onto their farms without fear of future limitations because of it.

7.5 Other approaches to utilising farmer knowledge that do not require collaboration

For many people working with others is not desirable. This is often not because of a lack of willingness but purely personal preference. For these farming businesses other routes to engagement should be made available. There are existing routes available and I have detailed some of these below.

7.5.1 Audits & farm assessments

Sometimes seen as burdensome, sector audits are an opportunity to drive change and encourage best practice on individual holdings. Though outside the remit of this study, it is worth commenting that audits and assessments can encourage some useful self-motivation in farmers to improve the environmental footprint of their farms.

For those who are well engaged in the environmental agenda though, farmers are too reliant on audits such as 'Smartcane', to provide environmental results. I heard criticism that the Australian Sugar Cane industry self-audit is not driving change fast enough. More incentives may help to remedy this, as are available in the cotton industry best practice standard.

Case study: myBMP cotton, Australia

myBMP arose in response to pesticide drift and run off issues that would have resulted in a heavy regulatory burden if not dealt with. At its basic level the scheme involves self-assessment for regulation compliance and best industry practice in various areas. Growers can opt to be externally audited to reach full accreditation and work towards an innovative compliance level, by driving further improvements on their holdings. At the time of writing this the scheme had 80% of cotton producers registered but only 15% of these were fully accredited. Alignment with the global accreditation scheme BCI (Better Cotton Initiative) was attracting more growers to become accredited; farmers reaching this standard able to access an extra $2-4 per bale and an additional $1 per bale from a Monsanto incentive.

7.5.2 Other industry initiatives

Industry driven initiatives can also be a good opportunity to drive engagement and change. Schemes such as the Sustainable Dairy Chain in the Netherlands draw many stakeholders together to consider the environmental footprint of food. Information is disseminated through marketing companies or farmer unions; encouraging practice change and presenting options that fit with productivity. The cautionary note I was alluded to however, was that lack of clear targets for achievement can severely undermine the initiative. Without accountability these initiatives are unlikely to drive change to more progressive levels.

7.5.3 Extension and facilitation

Although I haven't specifically investigated extension in this study, it is important to point out some of the essential attributes for delivering environmental advice to farmers, in a way that utilises their knowledge, as demonstrated by the collectives and initiatives I have observed.

- Trust – Farmers need to believe that their interests are at the heart of the advice being given and that science and experience being drawn on is locally and sector appropriate. Trust, as already discussed, can be hard earned and quickly lost, but is really important to get good progress towards environmental goals
- Listening skills – The ability to listen and understand a farmer's situation is important in giving valid and credible advice. Understanding a person's motivations and business circumstances can be the difference between an agri-environment scheme's success or failure. In addition, farmers are often able to offer up cheap and practical fixes that an adviser might not think of; they just need the space and confidence to contribute.
- Agricultural understanding – an element of local context and farming knowledge is vital for advice to be taken seriously and trusted. Options which achieve business and environmental sustainability will be taken up more readily and will have greater potential for long term success.

- Positive messaging – The ‘stick’ approach can get immediate results but is unlikely to motivate farmers further than compliance. The issue fatigue I witnessed in Queensland showed that it is hard to encourage conversation about positive environmental change when farmers feel persecuted. Seeing farmers as the solution not the problem is one way to overcome this.

Chapter conclusion

Initiatives that tackle environmental targets in parallel with farm productivity can engage with a much wider audience.

Industry or farmer led initiatives can be well supported but need auditable targets to ensure satisfactory progress is made.

Facilitation can get farmers involved and keep them engaged but the right people, with the right message and the skills to build trust will achieve more success.

Partnership approaches can help build good working relationships with cross sector groups.

Chapter 8: Building cross sector bridges

8.1 Why?

Many people now harbour strong opinions about countryside issues particularly on agricultural practices such as pesticide use and pollution. This reflects the urgency that society sees in responding to the challenge and makes communicating our actions an industry paramount. Environmental organisations own the agenda at present and connect with people through their passion and clear message. Building better relationships with them will enable farmers to communicate our challenges with them and through them and find courses of action that can meet the combined set of demands.

Environmental organisations make important collaborators as they have valuable ecological and administrative skills that agriculture can benefit from. DEFRA and other private funding sources (e.g. water companies) often use eNGOs to channel money through to farmers and, when managed well, this brokering can be beneficial in cutting through red tape for farmers and facilitating change without the administrative burden. eNGOS also have the potential to provide useful ground level evidencing for biodiversity and natural capital, etc. Trust, however, is key to this relationship. As discussed previously, farmers often fear what might be done with information collected from their farms and need to believe that any organisations they work with have their interests at heart, as well as those of the environment.

8.2 How does agriculture owning the agenda help?

Farmers need to demonstrate their commitment to delivering successful results and gaining credit for what they have achieved. The Pont Bren project in Mid Wales is an excellent example of this. The initiative is highly referenced in environmental circles as a sustainable approach to dealing with multiple themes including business resilience, habitat creation and flood water management. The initiative was led by farmers looking to be less reliant on the “brown envelope” and seeking ways to reduce costs and simplify farming systems. Multiple wins for business and the environment meant that the project had greater potential from the start. eNGO and scientific interest was drawn to its success and the project became an opening for knowledge transfer from agriculture back to science and environmental community. By driving the agenda themselves, the Pont Bren farmers showed what is possible when the industry is given more space to innovate. By driving the agenda we can draw in support and create links with the environmental stakeholders that hold much influence in green politics.

8.3 Credibility

Key to building bridges is credibility on the part of the agricultural industry. Agriculture needs to challenge itself as an industry if we want freedoms of prescription- light rules and choice in approach. To build credibility we must demonstrate our commitment to the environmental agenda by delivering real change. Setting our own targets is one way of achieving this, as it shows a clear intent to drive change but as already discussed external auditing of this is crucial for it to be legitimate. Buy-in from outside our industry and joint ownership of initiatives would help validate the targets and ensure that as an industry we push for betterment rather than basic level compliance.

Part of improving our credibility as an industry is setting our own standards and policing ourselves. We should not tolerate bad practice but highlight it from a knowledgeable position which understands that things can go wrong, but that some actions are inexcusable. In Queensland, Cotton Australia were investigating a possible system of de-registering producers who broke the law, particularly in terms of water use, during the drought conditions.

Some actions, however, may not be illegal but represent the sort of poor practice that can give agriculture a bad name; they "don't pass the pub test" as one farmer described it to me. The Pomahaka Water Care Group in New Zealand is trialling a 'farmer to farmer support group', the intention of which is to have a quiet word with someone for poor practices and avoid regulator involvement. The idea has strength in working on peer to peer relationships and challenging poor practice from a knowledgeable standpoint. It does however rely on people living where they farm and being part of a community; and this is becoming less and less a reality as farm businesses change and expand.

Chapter conclusion

Environmental NGOs are highly influential at government level and are often used as routes for channelling funding into agriculture.

Building better relationships with them will help farming communicate its actions better and influence environmental policy from another direction.

To gain credibility in the environmental debate the agriculture industry should drive best practice delivery, improve self-regulation and demonstrate what we can do on the ground.

Chapter 9: Discussion

9.1 The 'carrot' and the 'stick'

Clear regulatory boundaries are vital in altering offending behaviour and driving change in agriculture, but the types of approach to enforcement are more open to debate. In my view RPA inspections are a blunt tool, leaving no room to consider what the implications of a breach might be. Penalising farmers for an inconsistent 6 metre margin and also for a potentially major pollution breach, undermines the importance of the latter and disengages farmers from the goal. The stick is important, but how it is used is more important still.

Local level facilitation offers opportunities here, where both carrot and stick can be used to encourage behavioural change. Face to face engagement enables a pragmatic approach to be taken to regulating failure and to enforce rules in a constructive manner that will not end in bad feeling.

Thoughtless implementation of rules enforcement can seriously undermine this, as I have discovered from talking to farmers about their personal experiences. We need people from all stakeholder groups to improve their approach, to minimise negative encounters. Valuing farmer knowledge and seeking advice or intervention from within the farming industry can help, especially in tricky, regulatory situations. And for this we must be able to have honest and open dialogue across all sectors.

9.2 Constructive local leadership

Industry bodies such as the NFU have, in my opinion, been slow to realise the importance of environmentally focused local leadership. The environmental agenda has been treated as a minor issue compared to commodity boards, hence we find ourselves on the back foot when having an input in this area. Campaign for the Farmed Environment attempted to fill the void here; but centralised decision making on what and how it is delivered, undermined its ability to be locally relevant.

Local leadership needs to be strong and well supported in order to make a difference in how we are regulated in the future and will help ensure rules assist not hinder farm businesses. With constructive local leadership will come credibility and with credibility our industry will be more trusted to deliver on key environmental goals.

9.3 Facilitation

When I ask farmers how they could do better for the environment, the most common answer is to bring back a free independent advisory service for agriculture, as ADAS used to be. A step towards this could be local level facilitation, via independent people working on behalf of farmers to help them meet environmental outcomes. The role could include signposting to grant support or advisory services, mediating on regulatory matters and promoting up take of agri-environment schemes that meet local targets. The facilitation schemes currently in existence are useful but perhaps lack enough autonomy to make enough difference.

9.4 Losing tacit and local knowledge

One of my concerns, as I witness the contraction of our industry, is how this will affect our tacit and local knowledge resources. As discussed in this paper these forms of knowledge are valuable to

sustainable approaches and their loss could really undermine progress. We need to help small and medium sized businesses survive through the provision of extension services which give business support, grant access and advice on other compatible income streams. We need to consider how tax breaks are applied and to whom and find ways to ensure smaller businesses can keep up with the investment needed to stay compliant.

Chapter 10: Conclusions

- The environmental debate in the countryside is polarised and unconstructive and is holding up progress on environmental recovery. This is a global phenomenon.
- Environmental policy relies too heavily on modelled or remotely captured data and is disconnecting farmers with its lack of real-life perspective.
- Utilising their ground-based knowledge is key to engaging farmers in the environmental agenda. Tapping into farmers embedded knowledge will enable policy to be produced that fits with farm businesses and delivers better results for the natural environment.
- Local level data capture can help farmers understand their impacts, but how this data is used is important. Data should be used as a tool not as a weapon.
- The right people are essential in getting successful engagement.
- An equal and horizontal relationship between scientists, eNGOs and the farming community will better serve the environmental agenda as it will avoid top-down distortion
- Developing healthy relationships with environmental organisations will help our industry gain credibility on green issues and increase our influence on future policy

Chapter 11: Recommendations

To the farming industry

1.• Create strong leadership on environmental issues to increase credibility e.g. through local working groups

2. • Open up opportunities for improving cross sector engagement that will increase understanding of the farming perspective. Talk to local environmental organisations to promote farmer led solutions to their concerns

3. • Consider your farm's environmental footprint and seek solutions for its weaknesses. Lobby your local farming union, government department representative or eNGO with what you need to help you improve.

To environmental non-government organisations

4. • See farmers as the solution and not the problem. Positive communication is vital to overcome our current sticking point

5. • Listen and learn. Farming is complex and ever changing. One-size never fits all, so utilise farmers' knowledge to understand how your environmental input can help

6. • Seek the input of local farmers to feed in at the inception of an idea. This will help with ground truthing, knowledge transfer and building trust.

To policy makers

7. • Earlier engagement with the farming industry will help develop policy that is more effective and avoids unintended consequences

8. • Create target driven not prescription driven environmental schemes to utilise farmers' knowledge and engage them in delivering results. Targets need to be practical and accessible.

9. • Use regional facilitation networks led by a trusted local contact to promote regionally sensitive targets, mediate on regulatory matters, signpost and support grant access etc.

10. • Provide funding for farmer led science and data capture. This supports understanding of issues, and encourages participation and the development of practical solutions

Chapter 12: After my study

During my study it became apparent that ammonia is going to be the next big challenge for agriculture and one which would really benefit from positive input from the farming industry. Ammonia represents a massive loss of fertilising value from manures and inorganic sources so tackling this is important for farm businesses as well as for the sensitive receptors being impacted on by it.

I have been involved in setting up a working party of local stakeholders in Shropshire to consider what non-regulatory approaches can be developed to: -

- Improve our understanding of the issue through localised data capture
- Harness the nitrogen value of manure (particularly from poultry), and
- Target on-farm measures that make sensitive sites more resilient to aerial ammonia

We hope to draw funding in for facilitation and research to develop the idea of an ammonia knowledge hub and source of practical learning.

I continue to look for opportunities to create networks of knowledge transfer in my local area in order to break down the barriers to working with cross sector stakeholders. I hope to create a farmer-driven focus group to consider carbon capture, landscape connectivity and soil health on typical Shropshire mixed farms.

Acknowledgements and thanks

Undertaking this Nuffield scholarship has been a huge personal journey for me. It has enabled me to immerse myself in a topic which I hold close to my heart and to talk to so many fascinating people that play an important role in it; from global environmental lobby groups to farmers with a handful of cows. The process has helped me overcome personal confidence issues and believe in my own self-worth. I have the Nuffield Farming Scholarship Trust to thank for this, and of course my generous Sponsors: The Three Counties Agricultural Society and National Trust.

I am immensely grateful to all the people who spared me time to talk, welcomed me into their homes and show me around their farms and businesses. There are many people who helped steer my understanding of this topic but are not mentioned in this report. Your input was equally valuable to me and I only wish I had the space to share more stories and opinions here.

I must also extend my heartfelt thanks to all those who have supported me through this process. To my Nuffield mentors, official and unofficial, and to the many people who have helped me and propped me up when I was feeling the pressure.

Kate Mayne

Appendix 1. SWOT analysis of collaborative approaches (appendix to chapter 7)

Nature Collectives, The Netherlands. (para 7.1.1)

Strengths

- Local landscape scale approach means better option targeting
- Flexibility to fine tune schemes for regional variabilities
- More dynamic approach and real-time delivery e.g. farms with wader nests get best payments
- Local 'identity' for nature conservation helps steer option choices on farms

Weaknesses

- Poor engagement in some regions where production potential is highest and options take up too much land
- Limited budget means some farmers may miss out
- Risk of farmer led groups promoting 'easy' options not best options

Opportunities

- Collectives can adapt some options for regional variances
- New scheme ideas can be presented to the commission, providing a more horizontal knowledge transfer approach
- Links with local wildlife enthusiasts, such as bird watchers, enables improved data capture and connects local people to on farm environmental delivery
- The collective can invest in ground-based research to improve understanding in particular areas of interest

Threats

- Disengaging farmers who have the right mindset but cannot deliver key local targets e.g. Don't have breeding waders on their land
- Good quality collaboration with eNGOs is essential for credibility. Local disagreements could undermine relationships and lose trust in collectives to deliver

Catchment groups, New Zealand (para 7.1.2)

Strengths

- Encourage engagement with water quality issues
- Provide a platform for knowledge sharing
- Give farmers a stronger collective voice with regional regulators
- Undertaking water quality analysis helps better inform farmers of the local issue

Weaknesses

- The right farmer leadership is essential for success
- A negative start point for creation of the catchment group (i.e. failing water quality) could influence how positively farmers engage in the process?

Opportunities

- Collecting water quality data can inform regulators and enable the group to challenge rules
- Farmers can share experience of different mitigation options and design solutions to fit their local needs

Threats

- The enforcement of base level N leaching figures for holdings has created some tension between sectors, due to the limitations on holdings to change practices e.g. Convert to dairy or grow more fodder crops
- In failing catchments N leaching reductions may be enforced across the board, punishing all farmers, irrespective of individual impact. This could cause animosity and disengagement.

Farmer-led agri-environment initiatives, The BRIDE project – Ireland (para 7.1.3)

Strengths

- Acknowledges farmers' existing contribution to biodiversity through BMA assessment
- Being dairy farmer-led has given the project credibility in the farming community and therefore exceptional levels of buy-in
- Options are practical and user friendly, helping recognise that this is not main activity on the farm
- Project values habitat often overlooked by agri-environment schemes e.g. farmyards and ponds.
- Buy-in from external parties (e.g. Glanbia, Teagasc Advisory, Birdwatch Ireland and Cork County Council) ensures credibility beyond an agricultural audience and gives external assessment of performance
- Ground level understanding evident in options giving them clear logic to farmers e.g. To have a barn owl box, the farm must be rodenticide free; small areas of bird cover are allowed to create better mosaic

Weaknesses

- Targeting farms with priority species may leave out willing land managers with lack of biodiversity presently
- Competitive scheme with budget constraints and area boundary means some farmers who want to be involved cannot get in
- GIS mapping and BMA assessment expensive
- Aimed at active dairy type businesses, therefore possibly not the right fit for a holding wanting to make significant changes to approach e.g. Knepp Estate rewilding.
- Challenges some traditional approaches to land management such as cutting hedges to be stock proof. Side cutting only and fencing hedges out is a significant change for some farmers

Opportunities

- Further training provided on identifying certain species increases participant skill level
- Bride catchment will be well surveyed for biodiversity contribution if natural capital approach is considered in future

- Farmers will have more credible voice for discussion around environmental delivery going forward

Threats

- Could be assessed as weak against species targets if habitat approach fails to draw in or extend area of targets
- Maintaining balance of external influencers could be challenging. Non-farming partners such as environmental NGOs could push for more biodiversity gain, risking a situation where farmers no longer wish to participate. Equally industry organisations could lobby to dilute options too much, so undermine credibility.

NGO led payment by results scheme, The Burren Programme, Ireland (para 7.1.4)

Strengths

- Local office provides face to face delivery and a ready source of advice and support to farmers
- Excellent working relationship with farming community by having the right people and continuity in message and staff
- Scheme flexibility allows farmers to use their own knowledge of their land to deliver the required results
- Allows for a range of management types from more intense farms receiving smaller payments to those with a high focus on environmental delivery who will receive greater scheme payments
- Local staff are responsible for ensuring project is value for money and it is environmentally effective
- Staff better at communicating in the language of government departments when bidding for funds?
- Provides administrative support to farmers, lack of which can be a significant blocker in some schemes

Weaknesses

- Contractors are better suited to undertake some work e.g. scrub control, therefore money doesn't stay with farmer? (potential benefit to local employment prospects?)
- Out-wintering cattle to manage swards is labour intensive but better for habitat management, creating some incompatibility with trend towards part time farming
- Balance between abandonment and highly managed environment could be hard to communicate
- Still a lot of high labour intensive 'traditional' farming practices required, which can be off-putting for the younger generation of farmers

Opportunities

- Ground-based decision making will help secure farmers' role in the landscape and give the local community a valid voice in the conversation
- Farmers have a live relationship with schemes therefore are more likely to challenge it or make suggestions or how to improve it
- Successful working relationships and environmental delivery make the project more likely to attract continuation or new funding.

Threats

- Change or loss in staff could alter the dynamic or relationships on the ground
- Funding shortages could mean questioning of the value of some landscape measures such as repairing all walls

Species targeted scheme – Fresh Water Pearl Mussel Project, Ireland (para 7.1.5)

Strengths

- Positive 'pride of place' for farming in a pearl mussel catchment and on protected peat bogs
- Message is one of farmers providing environmental services rather than "don't do that"
- Values past and present positive management in land assessment
- Whole-farm approach is more logical for a farming audience and infrastructure improvements can prove beneficial financially (not just for meeting rules) through improved payment scores
- Avoids blanket rules for peat bog management which do not suit all areas
- Measures will have benefits to general habitat quality beyond pearl mussel

Weaknesses

- Compulsory training for farmers. This is paid for, however some farmers less keen on attending meetings may find this a blocker to involvement?
- Limited funding could restrict participation
- Flood plain objectives are agriculturally challenging as they could take up a lot of ground
- Better suited to extensive farming systems therefore engagement from dairy sector (highest risk) could be more limited
- Calculation of payments is quite complex

Opportunities

- Strong identity could be created around the pearl mussel, creating future marketing and funding opportunities?
- Local delivery will help the programme be more adaptable to challenges if they arise
- Data capture of improved farm practices through the duration of the scheme

Threats

- Very challenging species to protect so demonstrating to funders success for the pearl mussel population could be difficult
- Species targeted initiatives can sometimes result in adverse effects on non-target habitats or species – is there risk of this here?

Biodiversity conservation & rural development NGO, Fundatia Adept, Romania
(para 7.1.6)

Strengths

- Accessed support from worldwide governments, organisations and notable people
- Developed a strong relationship with local farmers based on trust
- Understanding the cultural and social implications of nature conservation has led the project to look beyond restricting practices and find innovative solutions e.g. marketing, tourism opportunities, mechanisation
- As an eNGO makes they are more credible when challenging environmental rules that don't fit

Weaknesses

- Top down approach suits political / social situation in this part of Romania but possibly not in Western Europe
- Many targets still require very traditional, labour intensive practices which are not appealing to younger generations
- Elsewhere in Romania farming is becoming more intensive and productive, creating huge divergence within the agricultural sector and therefore pressure on retaining people

Opportunities

- Strong branding possible around the High Nature Value farming practices
- Staff have the skills to communicate with governments, ecologists, policy makers etc making it highly influential
- Global recognition could bring innovations in from further afield to help keep people in the landscape

Threats

- Tourism aspirations undermining habitats?
- Conflict between marketable tourism characteristics of area (e.g. large carnivores and wilderness) and farming
- High value products developed by Adept could be sensitive to economic changes?
- Are semi-subsistence farmers viable in Europe under same laws as western European countries

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