

# GLENS OF ANTRIM RESILIENT FARMS PROJECT



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An assessment of the multiple benefits in the landscape achieved by putting the farm business needs first.

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## SUMMARY

Agriculture is the most important industry in the countryside, still forming the economic basis that supports rural communities. Most land is under agricultural production and is privately owned. It is also becoming increasingly recognized that the landscape delivers multiple benefits beyond agriculture which are important locally, regionally, nationally and internationally. These benefits are economic, social, ecological and environmental. Land management over the past centuries has often focused on linear or single benefits from plots of land. This approach to land management has created a siloed mentality where food production and environmental management are often perceived to sit in opposing camps. This approach has led to the farming industry responding to the

environment sector and environmental needs largely within a legislative framework that is driven by risk of prosecution. At the same time the health of both the wider and protected landscape are in decline.

Environmental measures that are created to encourage farmers to improve biodiversity of farmland are often regarded by landowners as a 'non-essential' aspect of the farm business or simply an opportunity to avail of a grant. Many fail to apply to these schemes because agri-environment grants are viewed as high-risk due to fears of non-compliance, especially for something that is a non-essential part of the farm business. In addition, the rates of grant available reflect the income foregone (in order to comply with World Trade Organisation rules on subsidies), so that for a farmer to receive even a modest financial return he has to carry out the work himself, requiring time away from core business, a rare commodity on most livestock farms where 'quiet' periods do not occur.

Government is failing in many of the environmental targets set including management of designated landscapes and woodland (especially native) creation, while farming is also under pressure from global markets, climate change, uncertainty of Brexit etc.

The Glens Resilient Farm Project worked closely with farmers to partner them in trialing a new approach to delivering sustainable, improved and diversified farm businesses. It focused on the use of 'green infrastructure' and management changes as an essential part of farming production. The project concentrated on some key factors that impact all farms, namely climate (mainly wind and water), soil, stock, crop changes /protection and diversification opportunities.

The key thrust of this work was based on the needs of the farm business and not the environment. However, because the tools being used focus on 'nature's benefits', they also deliver significant multiple environmental, economic and social benefits. Indeed, initial results indicate that they could considerably outstrip current agri-environmental and forestry schemes.

Landscape scale benefits are discussed regarding farm / rural sustainability, woodland creation, hedgerow creation and management, flood attenuation, biodiversity, and climate change.

## INTRODUCTION

The economic landscape of farming is changing. The ongoing changes in climate, increases in the costs of inputs, future changes with BREXIT are only some of the uncertainties that are facing farming communities.

Farming is still our largest rural employer, and the mainstay of the rural community and its way of life. Increasing numbers of farmers, especially in upland regions, are having to work away from the farm to subsidize their incomes. With pressures mounting on the sector and indeed on rural communities, innovative approaches to farm and land management are needed so that the viability of farms, and thus rural communities, are maintained.

It has long been recognized that the farmed landscape can provide wider environmental and community benefits, beyond that of food production. Most land in our countryside is owned privately, mainly by farmers, which often not the case in GB. As well as producing food, the farmed and rural landscape has untapped potential that can increase rural sustainability, improve landscape and provide community benefit. Multiple benefits can be delivered at local, national and international levels (Table1).

Agri-environment Schemes have been the main method for incentivizing farmers to deliver some of these benefits. The current 'DAERA-NI Environmental Farming Scheme' is the latest agri-environment scheme designed to achieve some of these objectives through "*a voluntary scheme that will support farmers and land managers to carry out environmentally beneficial farming practices on agricultural land*".... The stated aims of the scheme are to:

1. restore, preserve and enhance biodiversity;
2. improve water management and water quality;
3. reduce soil erosion and improve soil management;
4. foster carbon conservation and sequestration in agriculture; and
5. reduce greenhouse gas and ammonia emissions from agriculture.

Despite many decades of such schemes and, the considerable efforts within the environmental sector, the overall health of the environment, especially in relation to ecology, is in decline. The primary cause of this ongoing decline has been clearly defined as 'policy-driven agricultural change'(State of Nature NI, 2016).

**Table 1 Some potential positive impacts of farmland resilience work on the environment at local, national and global level**

<b>Local</b>
Farming sustainability
Timber production (hardwood and fuel)
Increased tourism
Improved quality of life (Health costs)
Empowerment (Health and education)
Conservation, inland fisheries.
Improved water quality
Site specific improvement for habitats/species
<b>Nationally</b>
Increased Flood attenuation
Improved water quality
Increased employment
More and better-quality timber
Sustainable agriculture
Thriving communities
Increased GDP
National biodiversity targets
<b>Internationally</b>
Carbon sequestration
Climate change
Conservation

As part of a 3-year long engagement process with farmers in The Glens of Antrim (through information sessions, training events, one-to-one engagement etc.) it became clear that:

1. Environmental benefits are not fully understood and are often seen as ‘a nice to do’. They are not always seen as important in benefitting the core business, especially as farmers are already under time and financial pressure.
2. Many farmers are supportive of environmental measures on their land, but view the environment and environmental schemes largely in legislative and enforcement terms. This creates a fear of penalties, which is an obstacle to uptake.

### **Focus on farming needs to increase landscape resilience in a multiple benefits approach**

It is stating the obvious, but the main aim of farmers is to farm and, like any business the farm is a working environment which has primary functions of stock and crop production. Recognizing this, the current project set about changing the emphasis of the agri-environmental support using an approach that put the farm business at the core of the scheme. This change in emphasis shifted the focus from that stated in the Environmental Farming Scheme:

From:

*“a voluntary scheme that will support farmers and land managers to carry out environmentally beneficial farming practices on agricultural land”*

To:

*“a voluntary scheme that will support farmers and land managers to utilize environmental practices, infrastructure, knowledge and diversification towards maximizing the profitability and sustainability of their farm business”*

In short, the emphasis was not on what the farmer could do for the environment, but what the environment could provide to aid the farm business.

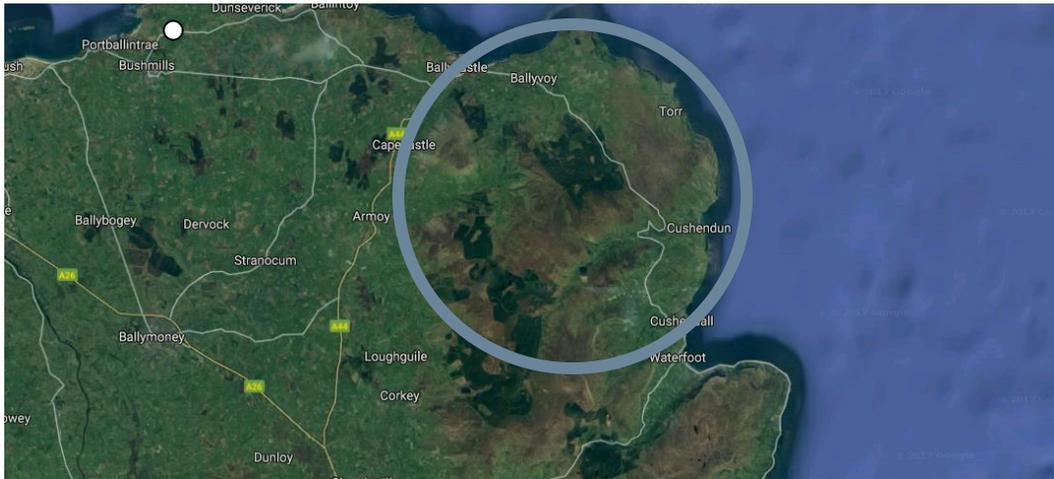
The overall project looked at the needs of 13 farmers / landowners and developed individual farm plans towards supporting these aims. The tools employed primarily focused on the use of ‘green infrastructure’ with stock management changes and diversification opportunities to carry out objectives. The aim of the pilot was to create an innovative environmental approach towards improving the resilience of farm economies, rural communities and landscapes. A landscape that delivers these benefits is one in which the biological and physical factors interact in a way that allows the landscape to be sustainable and renewing, thereby creating what are known as ‘resilient landscapes’.

## **METHODS**

### **Initial consultation and conversation with landowners, prior to farm surveys**

The initial ideas and key principles behind the survey involved public and one to one meetings with the farming community to explain the scope and, equally importantly, the limitations of the survey. At this stage it was vital to state that the key emphasis of the study was to put farmers’ needs first. The second most important aspect was to explain that the tools being used to improve farm businesses were mainly natural ‘green infrastructure’ alongside stock changes (and other diversification opportunities, when relevant).

It was also made clear from the start that results would have much more potential and relevance if the survey work was carried out in partnership with the farmer. Therefore, at all stages of the process the farmer/landowner was viewed as an essential member of the survey team.



**Figure 1 Farm survey area for Glens of Antrim Resilient Farm Project 2017 Nos. of farms =13.**

### Explaining the aims of the survey

It was explained that the main purpose of the farm survey was to take the information gained from farmers as well as their specific ideas / experiences and explore them on an individual farm basis: The surveys would lead to:

1. The creation of a plan tailored specifically to each farm and farmer that would use living solutions and green infrastructure to improve farm sustainability and profitability and signpost the farmer to the most appropriate source of further information and support.
2. When relevant provide initial ideas on diversification (e.g. tourism) in order to help sustain the farm business. Once again, the report would also provide a signpost to other bodies who can support this.
3. Identify any other opportunities and issues that may impact on the farm.
4. It was agreed that information on the environmental/ecological significance of significant species and habitats observed would be explained and catered for within the plan.

The focus of the survey was chosen from a range of climatic and management challenges and their implications (Table 2) which were discussed and agreed with the farmer/landowner. The survey was then conducted focusing only on the areas from this list that the farmer felt was important to his/her core business. For example, while all farmers understood the need to reduce water and wind impacts on their lands, some were happy with the swards and current stock they used. In this case their project did not focus on livestock and pasture. However, the final report still gave the farmer some basic information on all issues leaving the opportunity that they may return to these broader targets in the future.

**Table 2: Issues and potential solutions focused upon as part of Glens of Antrim Resilient Farm Project 2017**

<b>Understanding</b>
• Impact of climate and landscape (wind, rain, sun, aspect, relief)
• Livestock
• Swards
• Alternative farm business opportunities / diversification e.g. tourism
• Parasite life cycles and Biosecurity
<b>Management changes</b>
• Profitability - Breed changes
• Profitability - Sward changes
• Access - ease of management - trees and hedges
• Water management - trees and hedges, sward changes
• Wind Shelter - trees and hedges
• Parasites (fluke and worms) – trees and hedges, sward changes
• Biosecurity – trees and hedges
• Diversification- Timber, tourism, countryside access etc.

As part of these initial discussions, environmental data on climate was shown and discussed. For example, the wider catchment mapping using SCIMAP (a free online package developed at Durham University) gave an indication of water movement, flood risk and diffuse pollution. (SCIMAP uses relief as a main indicator of water movement (Figures 2 and 3))

Windrose data was also collected and used from the period 2005 to 2014 from the nearest meteorological station at Ballypatrick Forest, just a few miles from the survey sites. This data was then broken down per season, which gave indications of wind direction in relation to key farm activities (Figure 3).

Important research figures such as the potential benefit of tree planting in the absorption of water were presented. For example, Welsh research indicating that median soil water infiltration rates under trees were 67 times that of grazed pasture (Marshall et al.,1993).

The impact of hedges and tree belts as opposed to solid objects as wind shelters was demonstrated in terms of diagrams and discussions (Figure 4).

Options about the value of hedge width, structure and management were also discussed at this stage to ensure that landowners had the information and empowerment to make decisions during the survey phase. Information provided included a novel style of hedge developed by farmers at Pontbren in Wales (Figure 5).

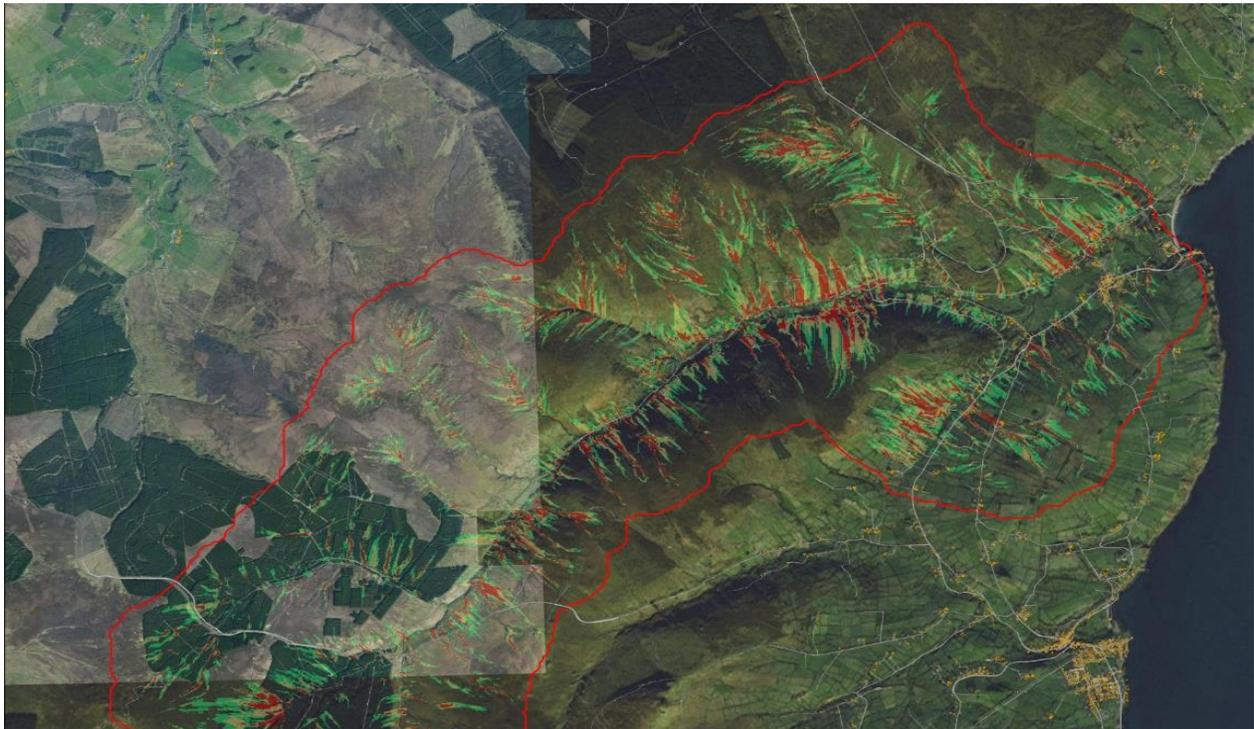


Figure 2 SCIMAP of The Glendun Catchment, this gives an indication of areas of key water and nutrient movements from land

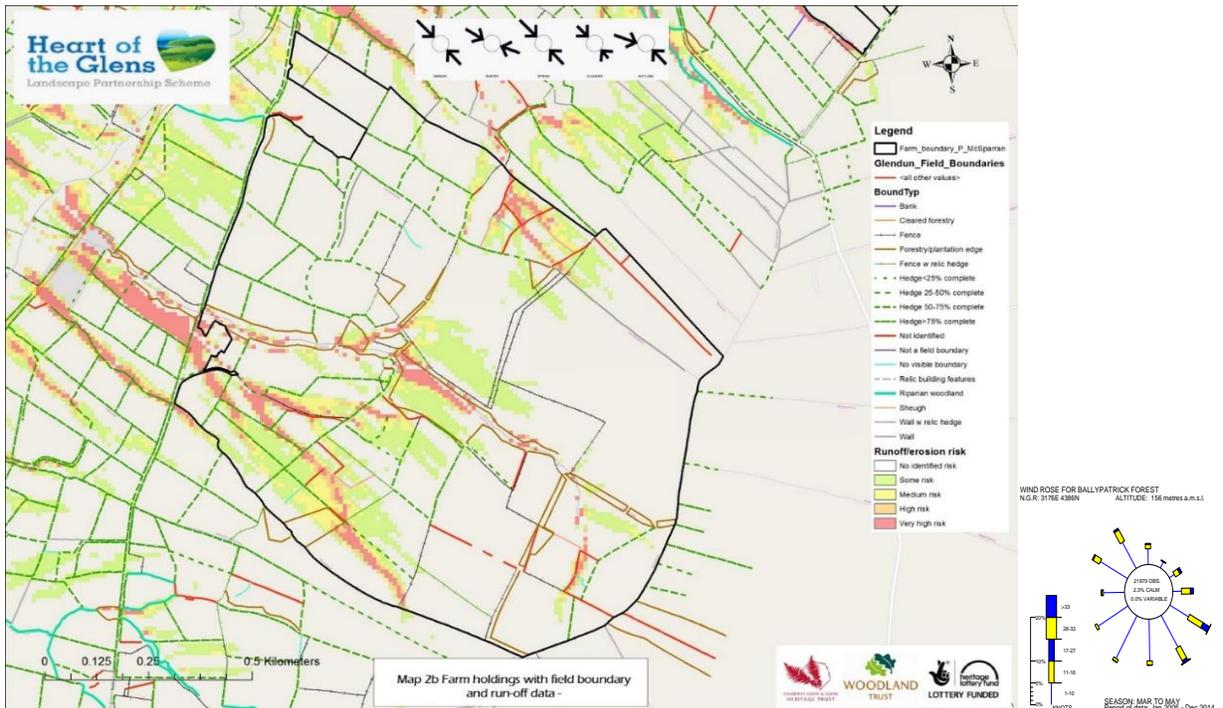
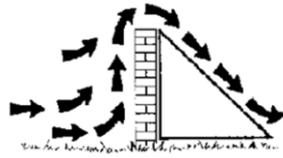
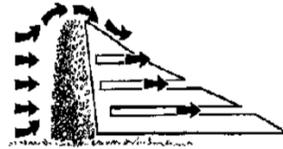


Figure 3 SCIMAP and Windrose data (also broken down per season) overlaid on a farm map in Glendun Co Antrim.

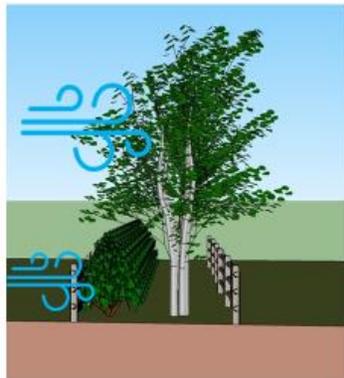


- Solid Object (wall or building)
- Blocks wind but this causes wind to accelerate back to ground level.
- Small shelter zone on the downwind side followed by an area of increased wind and downdraughts (dirty wind).



- Permeable object (hedge or tree line)
- Slows and serrates the wind.
- The wind shadow can be 40 x the height of the hedge. The wind remains more stable (clean) with fewer down drafts

**Figure 4 Basic information of the impact of a nonpermeable (solid wall, building) and permeable object (hedge, trees) on wind flow presented to farmers**



**Figure 5 A Pontbren hedge, which contains a low hedge with a separate row(s) of trees to this, creating shelter from wind further into the field than conventional hedges. The separation of trees and hedges facilitates easy and more cost-effective flailing of hedges.**

This hedge type was designed to give both elevated-level and low-level shelter to stock, crops and pasture, while being thick enough to provide better wind serration than traditional hedges. The hedge's

pragmatic design was also explained in relation to flailing management and future fuel timber potential (Figure 5).

### **Dealing with perceptions and concerns on hedges and eligibility**

One of the major concerns for farmers was the fear of non-compliance. A main area of misinformation was the lack of certainty around what is allowed on hedgerow width. It was a common misunderstanding amongst farmers that the maximum width of a hedge could only be 2 metres. However, scrutiny of DAERA guidelines from 2012 and 2016 indicated they could be 4 metres i.e. opening the opportunity for Pontbren style hedges in relevant locations

*“Hedges, banks, fenced off hedges, and stone walls are eligible provided their width does not exceed two metres from the centre (measured at the base). (Guide to Land Eligibility, 2012).*

*“The hedge, bank or wall is also eligible if it is two metres wide or less from the centre of the boundary measured at the base” (Guide to Land Eligibility 2016)*

### **Soil and pasture types.**

Discussions with farmers also took place about pasture and soil management with general information presented to them on the mineral decline of many foods highlighted in a GB study (McCance and Widdowson 2002) and the potential impacts of podzolisation on soil productivity and water infiltration. Where relevant, ‘green’ solutions were discussed with various options of multi-species swards, including herbal leys that have deep root systems which break ‘soil pans’ and thus significantly improve water percolation, retrieve minerals from the deep soil and increase length of grazing season. The species rich leys also increase soil humus content, fertility and, in some cases, improve anthelmintic properties. Information was also given on the value of species diversity in the sward also has significant potential to enhance biodiversity.

### **On the ground farm survey**

The on-ground survey involved walking the land with the landowner. Each field was surveyed in relation to shelter and water by referring to Windrose and SCIMAP data. The farmer was able to provide extra information on physical drainage works, which was not captured on the SCIMAP models. Each field was then discussed in relation to seasonal usage of the field, (e.g. lambing, flushing ewes, silage, out-wintering etc.), how wet or dry it was, ease of access, wind and other factors. Existing hedgerows and woodland were examined in relation to their potential benefits with regard to wind and water.

Management of the farm in relation to the ergonomics of stock handling and the minimal number of people required for this was also discussed and how carefully designed and sited hedges may also aid with this, improving handling time and reducing risk to farmers.

When relevant, options pertaining to stock types and other production schemes (e.g. the Glenarm Shorthorn Scheme) were also discussed as ways to increase profitability through reducing concentrates, producing higher value produce for niche markets, and reducing soil compaction through the use of lighter breeds, which could also lead to increases in the length of the grazing season.

Pasture type and production type were also discussed again at this stage so the connection between stock and pasture was emphasized, with landowners presented with assorted options of management including - soil testing for pH and resilient pasture leys. The potential multiple benefits discussed again included - increasing soil fertility and humus content, increasing water percolation, improving anthelmintic properties, improving overall productivity of pasture, reducing fertilizer inputs as well as extending the grazing season.

### **Multiple benefits**

While the focus of the farm survey and report was very much on core farm business improvement and profitability, the wider benefits of the works were also discussed with the landowner in relation to other potential long-term benefits to the farm as well as the impact at a landscape, national and global scale (See table 1).

## **RESULTS:**

The area of the 13 farms surveyed covered 965 hectares. Each farmer/landowner was presented with a farm report tailored to their farm and farming activity which was designed to guide them through the main findings, general principles and options that had been agreed during the survey. Of the 13 farms, eleven were owner-managed, with the Ulster Wildlife and the National Trust also owning one each. Twelve of the thirteen landowners actively partnered on-the-ground surveyors.

In an exchange of knowledge, landowners provided information about their business and their needs. Information from landowners demonstrated that productivity of all 13 farms was 100% pastoral production from exclusively sheep and/or cattle and sheep. However, the aims of Ulster Wildlife and the National Trust were broader, with more emphasis placed on the environmental ethos of these bodies.

Breeds of sheep were dominated by Mule crossbreds (Bluefaced Leicester x Scottish Blackface) crossed with Texel or Suffolk terminal sires. Other breeds included Blackface and Lleyn. Cattle production was dominated by crossbred cows put to a Limousin or Charloais terminal sire, with the calves sold as weanlings and/or stores to be finished on lowland farms. All farmers who took part in the surveys identified increasing rainfall, wind, and podzolization 'lack of soak' as increasing issues on their farms. Nine farmers identified increases in internal parasites, mainly liver fluke, which is closely associated with water-logged soils, as an increasing issue.

### **Trees and hedges**

After the initial discussions, all farmers saw benefit from carrying out green infrastructure work, (such as planting traditional hedges and/or Pontbren style hedges and trees) to their farm business. All farmers expressed a wish to plant hedges and trees primarily for shelter from wind and reduction of water in pasture but also for stock protection. Control of parasite infestations, such as fluke, was also a consideration, especially in very wet areas. Ergonomics, including ease of stock handling and pasture management, was also a factor for 6 of the landowners (Figure 6)

**Maximising other benefits:  
Ease of management**



This farm is on a high hill. It drains from west to east  
Planting trees on extremely wet rushy land removed safety threat, reduced fluke habitat and increased shelter.

Hedging the farm with **Pontbren** style hedges reduces impact of wind on this very exposed site. This will facilitate outwintering of cattle and sheep.

Hedging has allowed the division of the farm into manageable fields for rotational grazing and deferred grazing etc.  
The hedging along a lanes means that livestock are easier to manage by only one person.



**Figure 6 An example of the motivations behind the use of hedge and tree planting (green infrastructure) to improve resilience in a Glens of Antrim farm.**

Timber production was of interest to all farmers, with 3 of the participants wanting to remove stands of existing mature conifers (mainly Sitka Spruce) and replace it with mixed woodlands. Planting of new stands of trees was viewed by all as something they would like to do, especially on areas of ground that were too wet, rocky or of lesser value for pasture. Future financial gain from timber, either as a wood fuel or commercial timber crop was an important motivation for considering trees, along with shelter benefits of trees for the primary business. 11 landowners expressed interest of planting blocks for trees between 0.2 and 9 hectares.

Positive impacts from planting hedgerows and trees for ‘birds, insects and mammals’ was of interest to all landowners surveyed. This good-will towards nature had an impact on extra pieces of work on 7 farms especially when it came to connecting areas of existing woodland using hedgerows as wildlife corridors. All landowners were happy that nature and biodiversity would benefit from the works.

The potential of strategic tree planting to impact positively on river quality and flooding was of interest to most farmers although generally this was not a core driver for hedge and tree planting.

When the potential impact and ease of management of the The Pontbren hedge type was explained it had significant appeal to over 50% of the farmers, who planned to use it on key locations on their farm.

### **Delivery of Hedgerow and Woodland Creation.**

The amount of new woodland identified in partnership with the 13 farms of some 965 hectares was >80 hectares (this included Pontbren hedges > 3metres in width). This was an increase of existing broadleaf woodland on the participating farms of 413% which would raise farm woodland from 2.2% to 10.6% of land area. On top of this, 10.2 kilometers of traditional 2 metre wide hedgerows was agreed.

A willingness to carry out the work was demonstrated by the initial works carried out in 2016/17 before the EFS scheme was released. Supported by the Woodland Trust, landowners planted significant areas of hedgerow, both traditional and Pontbren, as well as small sections of woodland. The landowners paid for ground preparation, fence installation and for purchase and installation of gates, while the Woodland Trust provided fencing wire, posts and trees. The overall works carried out totaled 5.2 kilometres of hedgerow with the rest to be carried out in following seasons with support from EFS, with the larger woodland schemes to be delivered through the Forestry Expansion Scheme (FES).

More recently, phase two of the scheme delivery has been pursued through the Forestry Expansion Scheme and Environmental Farming Scheme. However, feedback from farmers is that the EFS scheme is less attractive due to funding delays and fear of penalties, with particular problems caused by the cut-off date for planting being the 31<sup>st</sup> December, which has proved extremely difficult to achieve. Regrettably some farmers (3 to date) have already pulled out of the works.

### **Pasture changes**

Five farmers out of the thirteen were interested in trying species-rich pastures. Benefits cited included improving soil fertility, breaking the soil pan, improving soil drainage and improving stock growth and health. Potential in reducing artificial fertilizer inputs, and possible anthelmintic properties were also of interest to most farmers. All 5 farmers welcomed the fact that herbal leys also had beneficial impacts for nature, especially pollinators.

However, the farmers would welcome more information and support in trialing these new sward types.

### **Stock changes**

Of the 6 landowners who kept cattle, all of them expressed interest in stock schemes which might reduce inputs, simplify overall farm management and increase profitability. Four farmers visited the Glenarm Shorthorn Scheme, with one farmer now trialing the breed on his farm. Another farmer is already working towards a bespoke Dexter scheme for the local restaurant market.

Regarding sheep production all farmers were happy with their current systems, although they showed interest in stock changes that may improve overall ease of management and profitability. Farmers were keen to understand opportunities that may improve farm profitability.

## Diversification (Tourism etc.)

One farmer had a significant area of mature Sitka Spruce (>4 hectares) on the farm. The surveyors and Woodland Trust were able to provide advice as to the amount of income that could be made from harvesting and replanting this resource.

Five landowners were very interested in farm diversification, all hoping to develop tourism opportunities on their farm. All five farmers had potential for deriving income from tourism through developing accommodation on farm. Surveyors were able to provide contacts with local tourism support bodies and basic projections of what might be expected to be gained to the farm. One farmer (see paragraph above), who had harvested an area of spruce on his farm, was keen to explore the opportunity to reinvest this income in on-farm tourism accommodation to provide an alternative sustainable source of farm income.

Two farmers opened more than 10 kilometres of public access through their lands. The two farmers had different reasons with the first wanting to direct / control walkers using an established, much-used but unauthorized coastal route to specific areas on his farm. This reduced conflict with agricultural practices, while adding to a potential tourism offer which could be developed on the farm. The second farm opened heretofore unused countryside to support tourism and health opportunities in the area for the benefit of the wider community. This allowed them to avail of a grant that opened access while improving ergonomics of stock and land management on the farm.

# Discussion

The purpose of the Glens of Antrim Resilient Farm Project was to assess if environmental improvements aimed under forestry, agri-environment schemes and other benefits could be delivered by a change in emphasis of such schemes to consider the core aims of the farmer/ landowner. There is an increasing government emphasis being placed on multiple benefits (food production, environmental, public health and other benefits) from farmland. Perhaps the easiest goal to demonstrate involves woodland. Despite the island of Ireland having one of the most suitable climates in temperate Europe for growing trees, the island is still the second least-wooded with approximately 11% forest cover, of which only 1% is native hardwood. Farmland offers the most significant opportunity to increase forest cover yet Northern Ireland Forest Service grants schemes only supported just over 200 hectares of new woodland in 2017, which is approximately 0.014% of the surface area of NI. In comparison, the current project had the potential of delivering over 80 hectares or circa 9.4% cover of the area involved of new, mainly hardwood woodland, bringing the total for those farms to almost 12%.

The strategic nature of the survey process, (using meteorological data and Scimap flood and nutrient flow prediction maps) which guided planting hedges and trees to ameliorate for wind, but especially for the reduction of overland flows of water, would also have significant potential benefits if delivered at a landscape level. In terms of flood amelioration research shows that strategically sited trees can reduce flood peaks by up to 20%, while these same actions, along with sward changes, can significantly reduce

overland flows which has a positive impact on water bodies including improvements to fisheries and drinking water supplies due to reduced run-off of nutrients that lead to eutrophication (Bird *et al* 2003, Marshall *et al* 2013, Dixon *et al* 2016).

The increase in trees has many other ecological benefits, providing habitats for a wide range of wild animals and plants. However, the impact of the shelter belts on adjacent meadow and species-rich habitats can also be significant. However, it is important to note that surveyors also considered the creation of other non-woodland habitats and or existing habitat protection, in areas where tree planting would not be suitable.

Potential delivery of for-profit based solutions such as changing to species rich swards and herbal leys along with hedgerow and woodland planting will not only meet farm goals but also improve essential habitats for native pollinators and thus contribute to dealing with the concerns and aims of the government-backed All Ireland Pollinator Plan 2015-2020 and the NI State of Nature Report 2016.

The provision of community and wider public access to a healthy and resilient countryside offers obvious benefits with regard to both sustainable activity-based tourism and government strategies on community health. The obvious economic benefits that prevention brings to health care budgets has been widely published by NHS and Sustrans, supported by a significant and growing body of academic research.

### **Incentivization and interdependency**

While current incentivization through agri-environment and forestry schemes has been fairly successful in terms of uptake, though less effective with regard to outcomes, information from this current work indicates that perceptions of environmental schemes as ‘bolt-ons’ which are extraneous to the core farm business are fundamental in the reduced efficacy of these schemes. Current schemes which are viewed as built around compliance as opposed to commitment have led to the view of environmental gains in a negative legislative framework backed by punitive enforcement, which by its nature prevents rather than encourages action. It is clear from the results of this pilot scheme that a change of emphasis as to how the farming community views the environment to one where it is considered as essential to the profitability of the farm is likely to deliver more benefits. This approach which, by design values and encourages positive partnership with the landowner’s activity, changes the dynamic of the relationship, with farmers becoming actively committed to green infrastructure and other environmental works This has been demonstrated by the considerable actions carried out by the farmers prior to the introduction of the EFS, despite the funding being less in real terms than would have been available under the scheme.

If the target of government policy is towards resilient communities and multiple benefits, then a key ingredient in achieving this is partnership and interdependency. The current schemes do not highlight a key aspect to this interdependency, i.e. presenting green infrastructure and living infrastructure as the key elements they are for the farm business to succeed. This simple act can change the dynamic in the process and tip the scales toward multiple benefits that will meet farmers needs while simultaneously meeting, and indeed surpassing, government targets across many departments and strategies.

## Potential sticking points going forward

The delivery of a scheme that will meet the multiple needs that are required to increase community, landscape and ecological resilience will require a more interdependent and cross-departmental approach to environmental outcomes. It is this 'human element' that will require considerable investment so that all participants can create the positive climate in which a simple scheme can flourish. This project has clearly demonstrated that a farmer-centred, bottom-up approach is significantly more effective in delivering the desired outcomes than a system based on generic prescriptions accompanied by the perceived threat of penalties for non-compliance.

In a resilient landscape, the diversity of life and the elements result in an interconnected system that is resistant to shock, and adaptive to change. Resilient landscapes create diversity and varied ways of life, while nurturing keystone species and wider natural ecosystems that also shape the human cultures and life ways that exist within them. The professional approach to creating such landscapes needs to reflect that interdependence both across departments and within communities. The key to this approach is based on simplicity and on the fact that each landowner/farmer has specific worth and reasonable individual requirements that need to be understood, respected and supported in the partnership. It is this partnership that will deliver the synergies required to create a common goal of improvement from which we all will benefit.

## Acknowledgements

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