# FARMING FOR NATURE

## THE ROLE OF RESULTS-BASED PAYMENTS

EDITED BY

EILEEN O'ROURKE & JOHN A. FINN

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# POLICY ENVIRONMENT ECOSYSTEM SERVICES AND THE ROLE OF RBPS IN INTEGRATED APPROACH TO AGRICULTURAL LAND USE

JAMES MORAN

## INTRODUCTION

Results-based payments schemes (RBPS) in the European Union have evolved over the last 25 years as a method of improving the link between agri-environment scheme payments and achievement of environmental results. The prevailing approach to agri-environment schemes has been management- or action- based payments for which participants are paid for a prescribed list of management actions, which are expected to deliver the desired results. Action-based payment schemes have shown limited results in terms of delivering improvements in farmland biodiversity, apart from some geographically targeted, higher level schemes that have become increasing complex in terms of their design and implementation (Kleijn and Sutherland, 2003; Kleijn et al., 2006; Cullen et al., 2018; Dupraz and Guyomard, 2019). Hence, results-based payment schemes have received increasing attention over the last ten years (Matzdorf and Lorenz, 2010; Burton and Schwarz, 2013; Keenleyside et al., 2014; Herzon et al., 2018; Maher et al., 2018). Results-based payment schemes were first introduced in the early 1990s and early examples in the UK, Netherland and Germany focused on species-rich grassland and birds in grassland and arable areas. In general, they have been applied as higher tiered agri-environment measures targeted at specific geographic areas. A range of approaches have developed that vary from pure results-based to hybrid approaches that combine results-based payments with complementary actions (Herzon et al., 2018). The

main focus of RBPS to date has been on biodiversity targets but there is increasing interest in their application to a range of other ecosystem services including water quality, carbon storage and sequestration (Whittingham, 2011; Reed et al., 2014).

This chapter explores the policy environment where RBPS are emerging as a promising tool to meet societal demands for the delivery of biodiversity protection and associated ecosystem services. The chapter highlights how agriculture is both dependent on, and a supplier of a range of ecosystem services. The management of land and its condition influences ecosystem service provision. The international and national agricultural policy context in which RBPS are being introduced is summarised and the role of RBPS in a modern multifunctional agricultural system is outlined.

## ECOSYSTEM SERVICES TRADE-OFFS AND SYNERGIES, AND NEED FOR INTEGRATED ECOSYSTEM APPROACH

Agriculture is the dominant land use in Ireland. Together with forestry, it is responsible for the management of 75% of the land area of Ireland. Our landscape has been shaped by millennia of agricultural production and today is made up of a diverse range of ecosystems which collectively provide society with a range of services termed ecosystem services. These include provisioning services such as food, fibre, bioenergy and biopharmaceuticals; regulation services such as regulation of climate, water quantity and quality; support services such as pollination and pest control; and cultural and aesthetic services. Agriculture is dependent on the services provided by its constituent ecosystems while also being a significant consumer of services (Power, 2010). For example, agricultural production is dependent on nutrient cycling and water provision within agroecosystems, but is also a significant consumer of nutrients and water.

The type, quantity and quality of ecosystem service provision from any one area is dependent on the ecosystem condition of that area. The balance between provisioning, regulatory and support services in agricultural areas depends on the capacity of the land to supply a particular service or bundle of services (Crouzat et al., 2015). This capacity is dependent on a range of biotic and abiotic factors e.g. geology, soils, hydrology, climate, vegetation composition and management. Ecosystem condition and diversity of agricultural ecosystems has deteriorated in recent decades in Ireland and

> **Considering that a climate and biodiversity crisis was declared by the Irish Government in 2019, then an integrated approach to land management is essential to mitigate climate change while preserving biodiversity and related ecosystem services. Collaboration between a wide range of disciplines: scientists, resource managers, economists, sociologists, policy makers, land owners, industrial and recreational users etc. is needed.**

Europe, mainly as a result of multiple stressors including direct removal of habitats, pollution, inappropriate management relative to the capacity of the land resulting either from intensification or abandonment, and climate change (EPA, 2016; DCHG, 2019).

Agriculture can be responsible for a range of ecosystem disservices, including habitat loss, nutrient and sediment loss to water, soil erosion, flooding, net greenhouse gas emissions (Power, 2010). These disservices occur when the management intensity exceeds the capacity of the land or through mismanagement. Integrated and adaptive management approaches are required to manage the complex structure and interactions within our agricultural landscape in order to meet the needs of society for a range of ecosystem services. Integrated management needs to take into account the trade-offs and synergies between the potential services and disservices from agricultural production in any particular location.

Managing and sustaining ecosystems in a rapidly changing world requires adaptive management approaches that consider these ecosystems as interacting components at landscape scales – rather than focusing on single species or product/service. The integrated ecosystem approach considers the range of goods and services and manages them cognisant of their interactions and trade-offs. It takes into account the characteristics of the ecosystem and its political and social setting, integrating both social and economic information with biophysical information and explicitly considering the provision of human needs (Secretariat of the Convention on Biological Diversity, 2004).

Considering that a climate and biodiversity crisis was declared by the Irish Government in 2019, then an integrated approach to land management is essential to mitigate climate change (reduce emission and enhance

sequestration) while preserving biodiversity and related ecosystem services. Collaboration between a wide range of disciplines: scientists, resource managers, economists, sociologists, policy makers, land owners, industrial and recreational users etc. is needed. This collaborative approach brings a range of expertise and practical experience together to find solutions to pressing global challenges.

## GLOBAL SUSTAINABLE DEVELOPMENT GOALS AND THE DEVELOPMENT OF CAP

Global agriculture has made significant gains in agricultural productivity in recent decades, but this has come at significant social and environmental costs that include water stress, soil degradation, biodiversity and increasing climate impacts that undermine our global food production potential (FAO, 2018). The response to these pressing global challenges resulting from ever-increasing pressures on natural resources has been the UN Agenda for Sustainable Development 2030 (United Nations General Assembly, 2015). This includes 17 sustainable development goals (SDGs) to which sustainable agriculture systems can make a significant contribution. Agriculture can be


**Figure 8.1**
Potential of CAP to contribute to meeting Sustainable Development Goals (SDGs). Source: European Commission

viewed as central to achieving the sustainable development goals and in a European context, future proposals on the Common Agricultural Policy recognise the potential of sustainable agriculture to contribute to 13 of the 17 SDGs (Figure 8.1) (EC, 2017).

FAO (2018) highlights that the 2030 vision for sustainable development is an integrated approach (addressed as one) to food and agriculture, people livelihoods and the management of natural resources in an environment where multiple actors (public and private) participate in the co-creation of solutions. The five key principles of sustainable agriculture (FAO, 2018) are:

1 Increase productivity, employment and value addition in the food systems
2 Protect and enhance natural resources
3 Improve livelihoods and foster inclusive economic growth
4 Enhance the resilience of people, communities and ecosystems
5 Adapt governance to new challenges

The challenges associated with managing the trade-offs and synergies between various policy goals is increasingly recognised (Fader et al., 2018; Nilsson et al., 2018) and there is an increasing need for decision makers to better understand and manage these trade-offs and synergies through improved alignment of objectives and incentives (FAO, 2018).

The Common Agricultural Policy (CAP) is the common policy governing the future direction of agriculture, forestry and rural development in the EU. It has its roots in the 1950s in Western Europe, when food supply and affordability were overriding concerns. However, as early as the 1980s, the intensification of agriculture had led to food surpluses and the impacts of CAP on the environment were becoming more evident. From the early 1990s, CAP was evolving towards a more multifunctional policy with the introduction of agri-environment payments to incentivise environmentally friendly farming practices. Successive reforms of the agricultural policy in the last two decades have seen continued decoupling of subsidies from production and increased linkages between incentives and environmental, public, animal and plant health requirements (Dupraz and Guyomard, 2019).

The current development of the post-2020 Common Agricultural Policy has highlighted the need for a new and simpler delivery model, with increased subsidiarity that can take into account the diversity of European

rural landscapes, together with a greater level of environmental ambition. There is a clear move towards a more results-orientated policy, aimed at achieving a range of objectives that meet a range of global challenges and the sustainable development goals (EC, 2018). Increased flexibility in the regulations has the potential to facilitate the development of more locally adapted and targeted policy interventions at regional and local levels, taking into account the heterogeneity in the European farmed landscape.

The potential contribution of the post-2020 CAP to Sustainable Development Goals is envisaged to be achieved through nine broad objectives which guide the formulation of Member States CAP strategic plans. Social, economic and environment themes are evident across the nine specific CAP objectives (Figure 8.2).

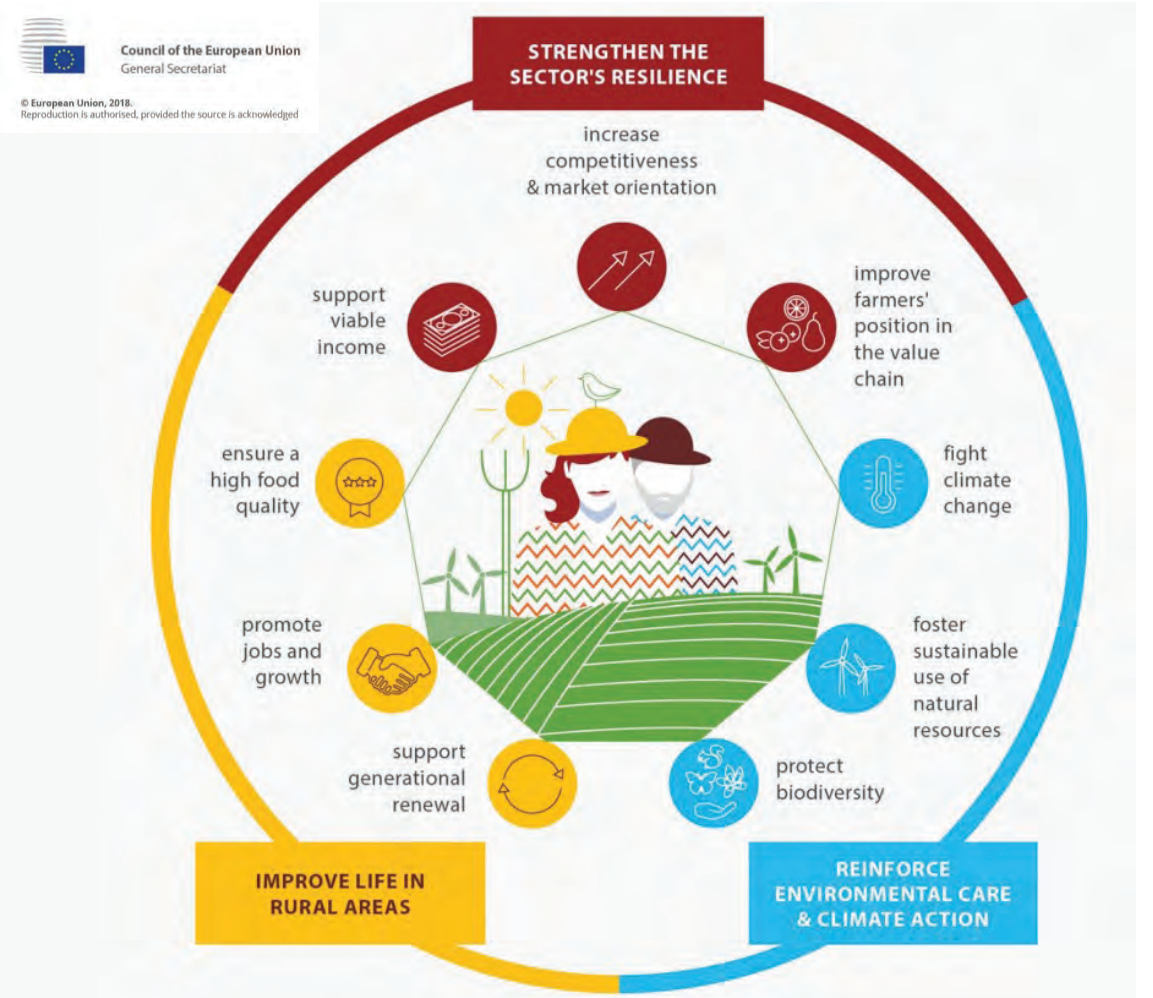


**Figure 8.2**
Specific objectives of the CAP. Source: European Union

There are clear opportunities in the proposed post 2020 CAP framework to realise a vision for agriculture that values people, nature and food in a more integrated approach to policy formulation. Under the proposed new delivery model, Member States have to draw up CAP strategic plans which cover both direct payments (Pillar I) and rural development (Pillar II) to meet quantified targets linked to the above nine objectives (McEldowney and Kelly, 2019). There is a clear need for a more integrated approach across both pillars of CAP. The main proposed changes to the CAP include more specific objectives with increased environmental ambition; introduction of enhanced baseline conditionality (replacing existing greening) related to climate, biodiversity, the wider environment, plant and animal health and eco-schemes in the direct payments architecture (Pillar I); and changes to priorities, budget allocations and a new delivery model focused on performance rather than compliance within the RDP (Pillar II) (Jongeneel, 2018).

A central part of the CAP strategic plans will be the Green architecture where there is a move towards a more results-orientated approach with greater ambition concerning resource efficiency and contribution to achievement of EU environmental and climate objectives (EC, 2017; EC, 2018). The new Green architecture covers both pillars and consists of three main components (Figure 8.3) including enhanced conditionality, eco-schemes and agri-environment climate measures.

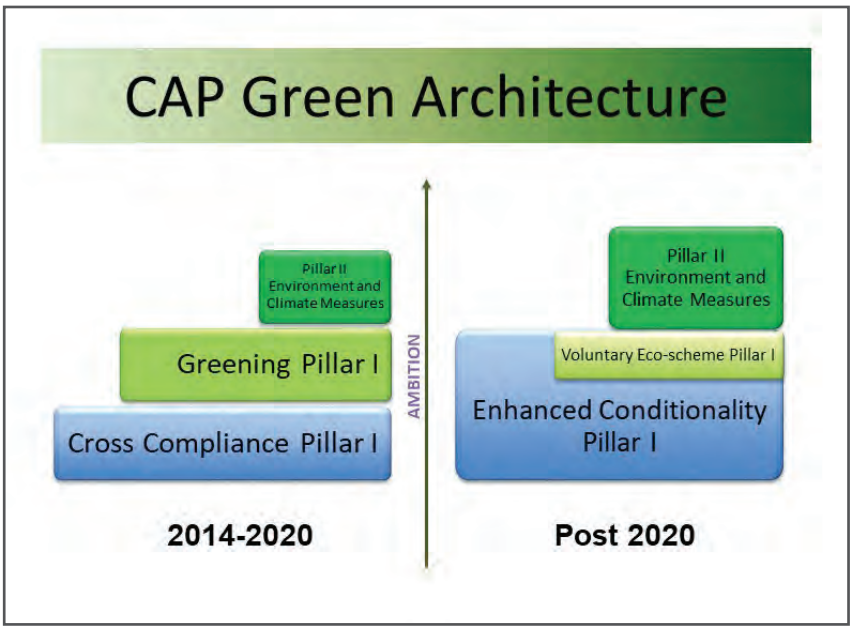


**Figure 8.3**
Comparison of the old and new CAP Green architecture

The enhanced conditionality replaces existing Greening and cross compliance. Under enhanced conditionality Member States must define minimum standards to keep agricultural land (including land no longer used for production) in good agricultural and environmental condition in line with overall objectives, and cognisant of the specific characteristics (e.g. soils and climate, farming systems, land use) of areas at national or regional level. There are 16 statutory management requirements (SMRs) and 10 mandatory standards for good agricultural and environmental condition (GAEC) included in the baseline conditionality. Statutory management requirements relate to legislation on climate and environment together with human, animal and plant health. Good agricultural and environmental condition standards include maintenance of permanent grassland, protection of peatland and wetlands, buffer strip, tools for sustainable management of nutrients, crop rotations, tillage management, retention of landscape features and minimum share of agricultural areas devoted to non-productive areas. The enhanced conditionality establishes a baseline with respect to climate, water, soil and biodiversity and both Pillar I eco-schemes and Pillar II agri-environment climate measures must go beyond this baseline.

Eco-schemes aimed at supporting practices beneficial to the environment and climate are obligatory for Member States but voluntary for farmers. These may be offered as entry level schemes which may be made a condition for entry into more ambitious agri-environment climate measures under pillar II. Eco-schemes can be paid as top-up payments, as a fixed amount per hectare, or linked to part or full compensation for income foregone and cost incurred related to specific agri-environment commitments. Eco-schemes could take the form of light green agri-environment schemes (such as entry level AE schemes in the UK) but also have the potential to be implemented as a results-based payments scheme (such as the proposed public goods bonus in Germany (Jongeneel, 2018; DVL n.d.). The theme of enhanced flexibility to Member States is followed through in relation to agri-environment climate measures where support under payments for management commitments may be granted in the form of locally-led, integrated or cooperative approaches and result-based intervention (recital 37) (EC, 2018). Furthermore commitments can be for an annual or pluri-annual period and can go beyond seven years where duly justified (recital 38) (EC, 2018).

It will be a significant challenge for Member States to realise a truly locally-adapted, results-orientated CAP Green architecture to meet the enhanced environmental ambitions of the post-2020 CAP.

## POLICY OVERVIEW FOR IRELAND: SUSTAINABLE INTENSIFICATION VERSUS ECOLOGICAL INTENSIFICATION

In the Irish context, agriculture is the largest land use in the country with 70% of the land area devoted to agriculture, including approximately 61% grassland or pasture and 9% cropland (https://www.cso.ie/en/releasesandpublications/ep/p-eii/eii2016/lu/). The CAP is the main funding instrument that governs both land use and the implementation of agriculture-related land use policies. This includes food and agri-environment policy including the national agri-food strategy; biodiversity and nature conservation (Biodiversity Strategy and Natura 2000); Water Framework Directive; and agriculture related climate actions. The national strategy for the agri-food sector, set out in Food Wise 2025, is a 10 year vision for growth in the agri-food sector that acknowledges the role of the sector in maintaining the environment (DAFM, 2015). To achieve this, a sustainable intensification approach is advocated, where future food production systems must be equally focused on environmental protection and increasing production. Progress to date highlights the achievements in relation to production targets with growth in agri-food exports of 70% since 2009 (Government of Ireland, 2019). However, progress on environmental protection is less evident with increases in GHG emissions from agriculture over the duration of the strategy, with further increases projected in line with projected increases in production (EPA, 2019). Increases in production also coincide with deterioration in water quality (EPA, 2019) and ongoing deterioration in farmland biodiversity and habitat quality (DCHG, 2019). These results question the feasibility of the sustainable intensification model as currently implemented In Ireland.

Sustainable intensification i.e. achieving food security and protecting the environment is seen as a global challenge (Thomson et al., 2019; White et al., 2019). The current trend of intensification coupled with continued environment degradation is unsustainable. To a large extent sustainable intensification remains poorly defined and there is a need to move towards more explicit definitions (Wezel et al., 2015). Improved clarity in relation to the principles and practices that underpin sustainable intensification is also required. This may include de-intensification of high-input and high environmental impact systems, and improved efficiency of systems where increased production is attainable without adverse environmental impacts (Struik and Kuyper, 2017). There is a pressing need for improved

understanding of the trade-offs in food production and environment quality, which underpins future food security (Struik and Kuyper, 2017; Thomson et al., 2019). There is also an emerging focus on ecological intensification of agricultural systems which is more explicitly defined than sustainable intensification.

Ecological intensification focuses on increased use and understanding of ecological principles to improve the functioning of ecosystems. This is required to meet the range of ecosystem services (food, fibre and energy provision; plus regulatory, support, cultural and aesthetic services) needed by society, while also preserving access to these services for future generations (Tscharntke et al., 2012; Tittonell, 2014; Wezel et al., 2015; Struik and Kuyper, 2017; Kleijn et al., 2019). Application of an ecological intensification approach requires more integrated land use policy with explicit spatial targeting, matching the capacity of land to provide specific ecosystem services. This requires adaptive management to take account of the current knowledge gaps on the trade-offs between different services and to take account of new and emerging challenges.

Ireland's land base is made up of a diverse range of broad ecosystem types with potential to provide a range of ecosystem services. These range from ecosystems that are capable of producing high quantities of food (improved grasslands and arable crops) to semi-natural ecosystems dominated by semi-natural vegetation with varying food/fibre production capacities with potential for significant contributions to regulatory, support and cultural ecosystem services (carbon sequestration, water quality, pollination, pest control, flood alleviation, landscape quality etc.). There is an evident broad gradient in intensity of food production from the intensive dairy and arable area in the east and south-east of the country to the extensive food production area in the west and north-west. There are extensive uplands areas dotted around the east and south-east and similarly some intensive lowland areas on more fertile soils in the west and north west. This food production-intensity gradient is mirrored by a similar gradient in the nature value across the country (Matin et al., 2016; Matin et al., 2020).

In general, the areas with the highest proportion of natural/semi-natural vegetation have the highest nature value. This semi natural vegetation plays a major role in providing a range of non-provisioning ecosystem services. The proportion of semi-natural vegetation in Ireland has a good regional balance between semi-natural vegetation and provisioning of

ecosystem services (food/fibre production), representing a multifunctional landscape that is capable of supplying both provisioning and regulatory/support services (García-Feced et al., 2015). However, the overall structure and configuration of the agricultural landscape, together with individual ecosystem structure and condition, determines how the area as a whole functions and its potential to provide ecosystem services to society (Fischer et al., 2006; Mitchell et al., 2013).

## ROLE OF HNVF AND RBPS IN A MODERN MULTIFUNCTIONAL AGRICULTURAL SYSTEM

In an era where our food production systems need to adapt a multifunctional approach to provide a broad range of ecosystem services, there is a clear role for the diversity of land types within Ireland to be managed in a more integrated manner to meet the demand for multiple services.

High Nature Value (HNV) farmland is associated with areas where agriculture is the major land use and where low intensity agricultural systems support or are associated with high levels of semi-natural vegetation that support species and/or habitats of conservation concern (Beaufoy et al., 1994; Beaufoy, 2008). In Ireland, HNV farmland occurs across a broad range of landscape type (Jones et al., 2012), covering one third of the agricultural area (Matin et al., 2020) equating to approximately 1.5 million ha of agricultural land. These areas have natural constraints on food production related to soils, topography, climate and remoteness but are associated with high levels of biodiversity, landscape and socio-cultural values (Paracchini and Oppermann, 2012; Moran and Sullivan, 2017). In recognition of their high nature value, approximately 50% of these areas are part of the Natura 2000 network (Matin et al., 2020). Agriculture systems in Ireland range from intensive production on fertile land with high inputs, to very extensive production on marginal land with low inputs. To meet societal demands for food, fibre, climate and water regulation, and space for nature, we must target the service provision relative to capacity to produce. We essentially need complementary but contrasting approaches to low-input High Nature Value systems versus high-input intensive systems. In the former, we need to maintain ecosystem services and reduce threat of abandonment; in the latter, we need to reduce the impacts of intensification on the environment and promote ecological intensification where high

inputs are replaced by ecological enhancements and realise the benefits of same within the production system.

If we are to promote multifunctional models of agricultural production there must be a mechanism whereby farmers can realise value from the production of various goods and services. This value could be realised where there is market-driven adoption by rewarding production of a range of ecosystem services through enhanced market prices, or via policymakers supporting the implementation of measures such as agri-environment schemes that promote biodiversity and wider ecosystem services provision (Kleijn et al., 2019).

To date, agri-environment schemes have mainly focused on action-based approaches to agri-environment scheme design and their effectiveness has been questioned particularly in the absence of targeting, careful design, training and advice (Batáry et al., 2015). Results-based payments schemes (RBPS) have been advocated in recent decades as a means of improving the effectiveness of agri-environment schemes, in particular for biodiversity conservation. RBPS pay directly for the achievement of results linked to the provision of a biodiversity target or provision of ecosystem services. Results based payments were first introduced in agri-environment scheme design in the early 1990s coinciding with the introduction of mandatory agri-environment measures for Member States in the CAP. RBPS can be of particular interest where management actions are ineffective or the link between specific management actions and environment outcomes are unclear. They have generally been applied as 'higher tier' agri-environment measures that target specific geographic areas with higher environmental ambition than 'lower tier' entry level Management Based Payment Schemes (MBPS). Over the last 25 years, a range of approaches to RBPS design and implementation have emerged from pure results-based to hybrid approaches. In a hybrid approach the results-based payments are combined with payments for complementary management actions or prescriptions.

The relative advantages of the RBPS versus MBPS (Table 8.1) highlights the potential of RBPS as an important tool in well designed, targeted and results-orientated agri-environment measures. The main advantages of RBPS over MBPS include the clear link between payment rates and delivery of results. There has also been much criticism across the EU of the lack of sufficient monitoring of the effectiveness of MBPS when it comes to biodiversity targets (Finn and O'hUallacháin, 2012; Redhead et al., 2018), highlighting that there has been little follow up monitoring to verify if the

desired results have actually been achieved from the prescribed actions. The flexibility in RBPS facilitates participants to innovate and use their skills and expertise to deliver results. RBPS have been highlighted as carrying higher risks for farmer when the results are not delivered despite work being undertaken. However, risks can be reduced with enhanced advisory support, training and knowledge sharing incorporated into scheme delivery as demonstrated in various initiatives in Ireland including the Burren Programme. Good design can also ensure that the measurement of the results takes into account factors outside the control of the farmer (see Chapter 9).

RBPS are often targeted at areas best placed, in terms of their land and farm system characteristics, to deliver specified results. Improved targeting

Table 8.1

**RELATIVE ADVANTAGES/DISADVANTAGES OF RBPS AND MBPS APPROACHES**

| RBPS | MBPS |
|---|---|
| Clear link between payments and delivery of results | Payments linked to actions expected to deliver results |
| Flexibility for participant to innovate and use skills and expertise to deliver result | Participants must follow prescribed actions |
| Simple farm contracts specifying results and payments levels | Depending on design requires contracts with detailed definition of management actions required for various targets |
| Facilitate easy targeting where participants are incentivised to select land where results are achievable | Degree of targeting depends on design of measure i.e. lower tier broad scale approach or higher tier targeted approach |
| Builds improved knowledge of environmental targets and capacity among participants | Level of knowledge and capacity building depends on design i.e. higher versus lower tier |
| Easier to meet requirements for enhanced verification by EU due to inbuilt monitoring of results | Additional monitoring required to verify results have been achieved from prescribed actions |
| Higher administrative cost than lower tier AECM but similar to higher tier management based approach | Administrative support depends on design, lower tier versus higher tier i.e. level of targeting, number of actions available to farmer |
| Managing authorities generally unfamiliar with approach and requires adaption of administrative system | Management authorities familiar with approach and administrative system already set up |
| Requires specialist advisory support and training to ensure effectiveness | Requirements for specialist advisory support and training dependant on design i.e. higher versus lower tier |
| Higher level of risk for participant where results are not achieved | Where prescribed actions, terms and conditions are adhered to there is no risk of loss of payment to participant |

where land use targets, including ecosystem service provision, matched to the capacity of a specific land/habitat type is one way of reducing the risk to the participant farmers. In the case of biodiversity, most current RBPS have been targeted at high nature value farmland areas (including Natura 2000 sites) and high nature value landscape features or field margins on intensive farmland.

To date, most RBPS have been implemented at a relatively small scale and focused on biodiversity, with limited experience of implementing these schemes at wider scale (Burton and Schwarz, 2013; Herzon et al., 2018). However, in recent years there has been increasing attention across the EU placed on understanding RBPS design and implementation, enabling expansion of the approach at a much wider scale in the next CAP programming period (Keenleyside et al., 2014; Herzon et al., 2018; Maher et al., 2018). There is increasing interest in their use beyond biodiversity targets, particularly where there is a relationship between higher biodiversity and other environmental targets e.g. water, landscape quality and carbon storage/sequestration. Recent studies have shown that there is high potential for biodiversity action to have multifunctional benefits, often contributing to soil and water quality objectives as well (Galler et al., 2015; Moran and Sullivan, 2017).

Extensively piloting of RBPS in Member States over the last 10 years (including EU Commission funded pilot projects in Ireland, Spain, The UK and Romania) have demonstrated that the RBPS approach can be successfully applied across diverse agricultural settings. These landscapes ranged from floodplain meadows in Ireland, arable crops in the UK, permanent crops in Spain to extensive grasslands in Romania (Maher et al., 2018; Chaplin et al., 2019). The RBPS pilots demonstrated that implementation and control can be simpler but that capacity and resources are needed for effective design. Guidance and training through a farm advisory system is crucial during the implementation phase. This helps build capacity and co-create solutions to deliver the results. RBPS essentially creates a market for environmental services/pubic goods and integrates environmental results into the farm production system. They could be viewed as a quality assurance element when implemented as part of a tool-box of measures to combat environmental challenges within the overall CAP green architecture.

Ireland has played a leading role in relation to innovative design of results-based agri-environment schemes through the Burren Programme (Chapter 3 in this issue), EU-funded pilot programme and more recently through

various European Innovation Partnership Operational Groups. RBPS initiatives in Ireland including the Burren Programme, Hen Harrier and Pearl Mussel EIPs have all been designed to deliver bundles of ecosystem services. The score cards are designed with results indicators aimed at improving biodiversity, soil and water quality in the one results-based scoring system. The indicators selected and used as the basis for payment reflect the overall ecosystem structure and condition and are related to the biodiversity and provision of a bundle of ecosystem services which have limited trade-offs with biodiversity e.g. soil quality, water quality and flow. They have adapted a common design approach that is locally-adapted, practical and results-focused. They seek to balance incentivising higher quality output, overall scheme complexity and aim to account for factors outside the farmer's control. A key to their success has been the hybrid approach where traditional action based payments are combined with results-based payments. The hybrid approach is often used where substantial initial investment and restorative actions (non-productive investments) are required to bring the target area to a minimum state where the result is achievable. The use of these complementary actions within the hybrid approach is very targeted and has been focused on areas where initial scores/results are low and where substantial restorative actions are required. These actions are essentially an investment to ensure that the green infrastructure essential to deliver the desired results is present on the farm. They are not included in the annual results-based payment as they are not required on an annual basis.

In the EU RBAPS pilots, farmers liked the principle that those producing higher quality environment products are rewarded with higher payments. They also highlighted how the approach made them more conscious of and positive towards environmental management. Above all, they felt that well-designed RBPS that are locally adapted to their farm context allowed them the flexibility to adjust their farming practices to the newly created environmental market. A key element for farmers is the opportunity for peer-to-peer learning where farmers can share knowledge on how best to achieve the results combined with locally targeted advice (Maher et al., 2018; Chaplin et al., 2019). The delivery of the results by the participant is facilitated by an advisory and administrative support infrastructure. This local advisory and knowledge information system helps to build trust and capacity enabling the co-creation of innovative solutions to deliver results.

## LOCALLY LED AND RBPS

The application of the RBPS in Ireland to date has been highly targeted to specific ecosystems and local areas. The success of the Burren Programme has led to considerable interest in the locally-led approach to design and implementation of the RBPS. The Burren Programme is described as a locally-led approach that is farmer-centred, results-based, involving a local partnership that consists of farmers, advisors, scientists and government departments/agencies (Dunford, 2016). This has led to the development of innovative solutions to ongoing local challenges. At this stage, it is important to define what is meant by locally led in this very specific context and it also must be acknowledged that locally led is not an essential component of RBPS. However, the two approaches are very complementary and when they have been combined they have proven extremely effective in meeting environmental challenges. A factor in the success of combining the two approaches is the inherent flexibility in RBPS for the farmer with respect to land management. RBPS facilitates local adaption of management at the farm and field scale allowing the farmer to adapt their practices to meet specified targets/results.

Locally led is neither a top down nor a bottom up process but a combination of the two, marrying local knowledge and expertise with external specialist support. As highlighted by Dunford (2016), it builds on local knowledge to identify problems, causes and potential solutions. This is combined with research on local farms, trailing and testing solutions which are rolled out in programmes where as much as possible of the administration and support infrastructure are housed locally. This enables and encourages farmers to take ownership of the programme and become actively involved in its planning, monitoring and management. An adaptive approach has proven essential to the implementation of successful locally-led results-based schemes such as the Burren Programme. This ensures continued improvements and ongoing lessons from scheme implementation can be utilised to improve future design and implementation.

Ireland's current Rural Development Programme (DAFM, 2019) outlines how the government seeks to determine the applicability of the locally-led approach to the design, implementation and development of agri-environment schemes through the funding of EIP-Agri operational groups. The set up of EIP operational groups across the EU seeks to bring a diverse range of partners (farmers, advisors, scientists and the wider

community) together to develop innovative solutions to specific problems or challenges (EC, n.d.). Further elaboration of the locally led approach to agri-environment scheme design and implementation can be seen in the EIP Operation group-locally led measure in the Irish RDP. In the case of the priority areas addressed by the Hen Harrier and Pearl Mussel Projects, locally-led refers to the delivery of locally adapted projects which are co-designed and implemented by a range of local and national actors including researchers, advisors, local farmers and other local stakeholders. It is clear from the RDP that the other locally-led environment and climate EIP operational group projects should be primarily driven by innovative ideas coming from the local area. However, there is also specific need to collaborate with a range of stakeholders including farmers, advisors, researchers, ecologists, NGOs, businesses, government departments and agencies. Locally-led can thus be defined as a local partnership approach, combining the experience and knowledge from a range of stakeholders both local and national with a specific geographical focus and with the aim of finding locally-adopted solutions to identified local challenges/needs.

## THE NEED FOR A WHOLE-FARM AND LANDSCAPE- OR CATCHMENT-SCALE APPROACH?

To date the majority of RBPS have been applied at field or parcel-scale in Ireland, and have been specifically targeted at a habitat or ecosystem type. Where the design is driven by the requirements of a target species (e.g. the Hen harrier) whose requirements are only met by managing large contiguous areas across a range of ecosystems, then a wider landscape-scale approach is necessary. This is illustrated in the Hen Harrier RBPS project in Ireland (http://www.henharrierproject.ie/) where the project has targeted results-based payments at the range of semi-natural habitats required by the species during its breeding season. A range of score cards have been developed which include indicators of the provision of other ecosystem services besides habitat quality for hen harrier, including water quality, water storage and carbon storage delivering bundles of ecosystem services at a landscape scale. This is combined with an innovative bonus payment where additional payments are made to farmers conditional on successful fledging of Hen Harrier. In this landscape scale approach there can still be parts of the farm outside the RBPS system. As illustrated by the Pearl Mussel Project (https://

www.pearlmusselproject.ie/) this can be particularly problematic for certain biodiversity targets and for the provision of high status water bodies. The freshwater pearl mussel requires high status water bodies with low nutrient and no sediment loss to water within the catchments, accompanied by natural hydrological conditions. Similar to the Hen Harrier programme, score cards have been developed for all semi-natural habitats within the freshwater pearl mussel catchment that deliver appropriate ecosystem condition together with bundles of associated ecosystem services. However, in a RBPS targeted at individual fields, a farm could earn significant payments on most of the farm but still have substantial risk of nutrient or sediment loss from a field or part of a field. This could pose a significant threat to the receiving water and target species. The Pearl Mussel Project has devised an innovative whole farm assessment to resolve this issue. A simple scoring system is applied to the whole farm. This is used to calculate a weighting factor of poor (0.3 for high risk) to excellent (1.2 for low risk) which is applied to the total results-based payment. This clearly incentivises farmers to deal with any potential nutrient or sediment risks on their farm, and it is accompanied by a programme of complementary measures to assist farmers in addressing these issues. This is essentially a whole-farm, hybrid,

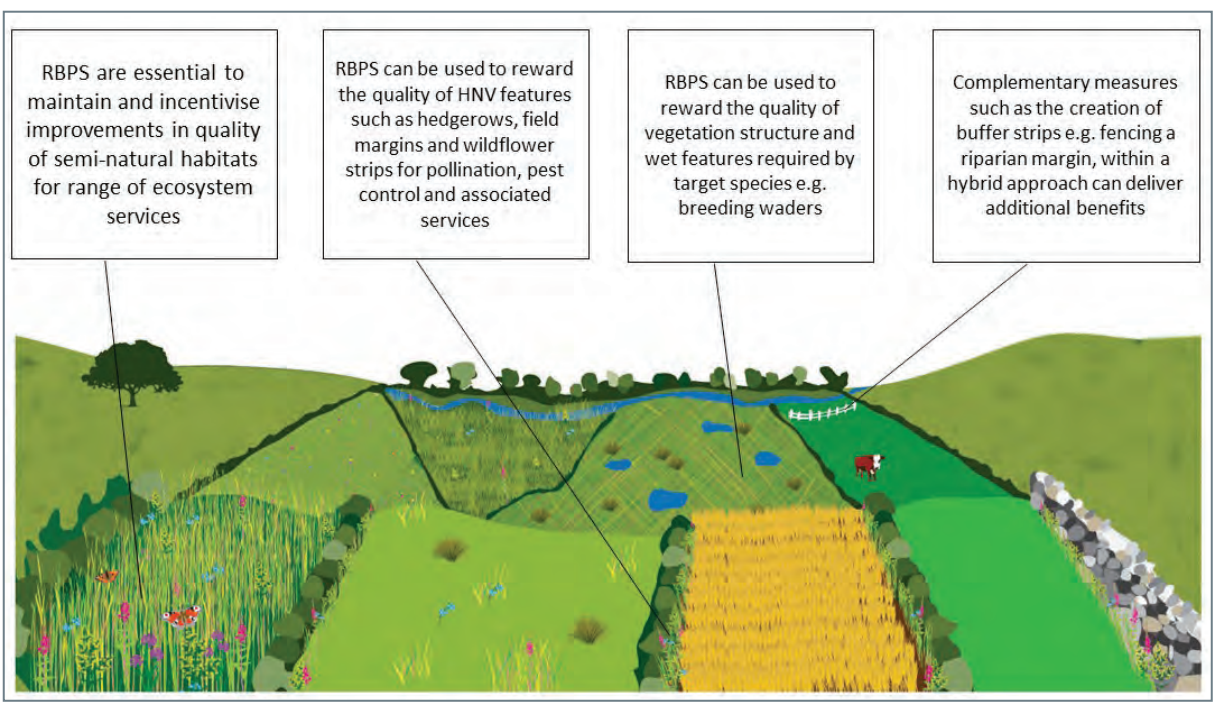


**Figure 8.4**
Illustrative example of an extensive livestock farm where the application of results-based payments is combined with complementary measures in a hybrid agri-environment scheme (Source for background image: Pearl Mussel Project)

results-based approach. Clearly the need for application of a RBPS measure at parcel-, farm- or landscape-/catchment-scale depends on the targets and specific objectives of the scheme.

## CONCLUSIONS

Agriculture is dependent on the maintenance of healthy agro-ecosystems is both a supplier of and dependant on a range of ecosystem services. Ecosystem condition and the diversity of agricultural ecosystems has deteriorated in recent decades and the future of our food system is dependent on reversing this trend. RBPS have a clear role to play where the policy framework focuses on incentivising performance towards meeting environmental objectives as in the legislative proposals for the CAP post 2020. Clear objectives and targets are essential, together with long-term commitments to sustain this newly created market for ecosystem services. Short term or stop-start approaches to agri-environment schemes will increase the risk for participants and may limit their willingness to invest in the green infrastructure required to deliver the desired result. Initial investment in design of RBPS is essential. In Ireland in recent years, there has been considerable investments in pilot initiatives defining and testing indicators, training and capacity building, which can enable the wider roll out of RBPS post-2020. Familiarity with the RBPS approach among policy makers, administration, the farming community and wider advisory support services, still remains a major barrier to its wider implementation. Raising awareness and knowledge of the effectiveness of the approach in meeting environment challenges and the provision of essential ecosystem services is key to wider roll out of RBPS across Ireland and the EU.

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Agricultural habitats cover approximately half the European Union (EU) and an estimated 50% of all species and several habitats of conservation concern in the EU depend on agricultural management. Reversing the loss of European biodiversity is clearly dependent on the conservation of farmland biodiversity.

Results-based approaches are the focus of a growing discussion about improved biodiversity conservation and environmental performance of EU agri-environmental policies. This book outlines lessons learned from a collection of Irish case studies that have implemented results-based approaches and payments for the conservation of farmland habitats and species. The case studies include prominent projects and programmes: the Burren Programme, AranLIFE, KerryLIFE, the NPWS Farm Plan Scheme and Result-Based Agri-environmental Payment Schemes (RBAPS) project.

This work is intended for an international audience of practitioners, policymakers and academics interested in results-based approaches for the conservation of biodiversity and the provision of ecosystem services.

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THE ROLE OF RESULTS-BASED PAYMENTS

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