FARMING FOR NATURE

THE ROLE OF RESULTS-BASED PAYMENTS

EDITED BY

EILEEN O'ROURKE & JOHN A. FINN

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EILEEN O'ROURKE

INTRODUCTION

One of the greatest challenges facing humanity is the provision of and access to sufficient food to feed an expanding global population, while at the same time maintaining biodiversity and other ecosystem services (Adams, 2012; Benton et al., 2011; Tscharntke et al., 2012). Agricultural habitats constitute over 45% of European Union territorial area, and in words of McIntyre et al. (1992: 606), "The struggle to maintain biodiversity is going to be won or lost in agricultural ecosystems". It is estimated that 50% of all European species are dependent on farmland habitats and agricultural practices (Stoate et al., 2009), and their decline is well documented especially that of farmland bird communities which is commonly regarded as one of the best indicators of overall farmland biodiversity loss (Donald et al., 2001, 2006; Halada et al., 2011). The drivers of farmland biodiversity loss are relatively well understood. As a result of both land use intensification and abandonment, farmland biodiversity has been in decline throughout Europe since the second half of the twentieth century (Strohbach et al., 2015; Foley et al., 2011), resulting in species loss, habitat degradation and fragmentation, as well as excessive nutrient and pesticide loads (Plieninger et al., 2012; CBD, 2010). The decline of low input, high nature value farming systems has had a particularly detrimental impact on farmland biodiversity (Bignal and McCracken, 2000; Opperman et al., 2012; Kleijn et al.,

2008; Fischer et al., 2012). In the 2006 European Strategy for Sustainable Development member states, (MS) agreed to halt biodiversity loss by 2010. That target was not met, indeed the loss of biodiversity continues at an increased rate (Whittingham, 2011). A new declaration was signed in 2010 to halt biodiversity loss by 2020; once more it is highly unlikely that this target will be met.

Agri-environment schemes (AES), implemented under Pillar 2 of the European Common Agricultural Policy (CAP), represent the dominant policy instrument and largest source of funding for the practical conservation of nature and biodiversity in agricultural landscapes. A review of the monitoring evidence to date suggests that most agri-environment schemes provide only moderate or limited gains for biodiversity (Kleijn and Sunderland, 2003; Kleijn et al., 2006; Whittingham, 2007, 2011), and have failed to deliver the EU and Convention on Biological Diversity (CBD, 2010) targets of halting biodiversity loss. The prescriptive nature of AESs, generic rather than context-appropriate measures, poor targeting and monitoring, low priority put on actual results along with inflexible payment conditions have been identified as some of the key reasons for their poor performance (Burton and Schwarz, 2013; Batáry et al., 2015; Herzon et al., 2018). There is increasingly a call for a new approach to delivering biodiversity objectives on European farmland, prominent among which is a call for the integration of an ecosystem service approach (MEA, 2005) into agri-environment measures and a payment structure based on the delivery of results (results-oriented), rather than the existing prescribed management or action-oriented approach (Burton and Schwarz, 2013; Herzon et al., 2018; Keenleyside et al., 2014). As argued by Hanley et al. (2012), the supply of biodiversity and other ecosystem services typically goes unrewarded by market forces, owing to the "missing market" phenomenon. Private landowners usually receive no direct financial reward for enhancing or protecting biodiversity, rather, it typically comes at an opportunity cost to landowners.

The aim of this chapter is to provide a bibliographic review of European agri-environment schemes (AES), with particular emphasis on a result-based approach. It starts by positioning AES within the logic of European CAP policy. It introduces the concept of payment for ecosystems services. It goes on to outlines the advantages and disadvantages of both action and result-based approaches to AES. It also provides examples of a number of existing result-based AES schemes in the EU. This overview forms a

backdrop to the subsequent empirical Irish case-studies, centred on what is still a novel approach to the provision of biodiversity and other ecosystem services within the context of locally-led results-based agri-environment schemes.

EUROPEAN COMMON AGRICULTURAL POLICY (CAP)

The European Common Agricultural Policy (CAP) constitutes the largest agricultural support system worldwide, with a budget of €362.8 billion for the 2014-2020 programme (Pe'er et al., 2014). It also provides the largest source of funding for nature conservation in Europe (Cooper et al., 2009; Keenleyside and Tucker, 2010). When the CAP was first established in the post-World War II era, its main objective was to feed Europe, maintain farm incomes and improve standards of living for farm families. Policy measures of the early CAP comprised mainly direct payments to farmers and commodity price guarantees. By the late 1980s the success of the programme resulted in the over-supply of food products, along with a significant intensification of agriculture, aligned with environmental deterioration and increased conflict with the World Trade Organisation (WTO), because of its distorting effect on world commodity prices.

The CAP represents around 40% of the total European Union (EU) budget and influences land management across 180 million hectares of its 28 (soon to be 27) member states (Reed et al., 2014). It consists of two funds, known as 'Pillars'. The European Agricultural Guaranteed Fund (EAGF), or Pillar I, provides direct payment to farmers (such as the Basic Payment Scheme), and other forms of market support. The smaller Pillar 2 – European Agricultural Fund for Rural Development (EAFRD), which receives about 20% of the CAP budget, is designed to support rural development within its member states. Agri-environment schemes come under Pillar 2, and account for a significant portion of its expenditure – 16.8% in 2019 (Arnott et al., 2019). However, overall less than 6% of the total CAP budget is spent on agri-environment measures. As previously stated CAP still constitutes by far the largest source of funding for practical nature conservation in Europe (Herzon et al., 2018; Batáry et al., 2015). Over the period 2007-2013 EU member states were allocated over €22 billion to cover AES payments (European Court of Auditors, 2011). Pillar 2 funding decreased in absolute terms by 18% from 2013-2020 (from €13.9

billion to €11.4 billion), compared to a 13% reduction in Pillar 1 budget (Pe'er et al., 2014). Funding for both Pillars is set to decrease further in the next CAP round 2021-2027, however, it is expected that environment and climate measures will be even more important, and so will value for money. Member States (MS) have to match Pillar 2 payments with national co-funding.

EVOLUTION OF AGRI-ENVIRONMENT POLICY

Agri-environment schemes (AES) can be traced back to the agricultural structural regulation of 1985 (EU Regulation 797/85), the so called Article 19 targeted scheme, to compensate farmers for loss of income associated with less intensive management of environmental sensitive areas. In 1992 the MacSharry CAP reform (followed by the Agenda 2000 reform), set out to curb the worst excesses of agricultural over-production and environmental degradation, with the introduction of compulsory agri-environment schemes under EU Regulation 2078/92, along with set-aside obligations, price reductions and farm income compensation. The CAP reform of 2003 introduced the 'decoupling' of payments from agricultural production and 'cross-compliance' by linking payments to obligatory minimum environmental and animal welfare standards (Plieninger et al., 2012). The latest CAP round 2014-2020, has gone beyond cross-compliance and other existing EU environmental legislation (e.g. Habitats and Birds Directive, Water Framework, Nitrates, and Sustainable Use of Pesticides Directives), by dedicating 30% of direct payments (Pillar I) to a 'greening component' to be part of everyday farming activities. The 'greening component' incorporates three mandatory principles: 1. Crop diversification; 2. Maintenance of permanent pasture; and 3. Establishment of Ecological Focus Areas (EFA) (Matthews, 2013).

The horizontal Green Direct Payments and its Ecological Focus Areas have been criticised as being too simplistic in their design and for ignoring the science of ecosystem services (Plieninger et al., 2012; Matthews, 2013). Similarly, the broad-brush management or action oriented agri-environment schemes, which currently cover approximately 25% of the EU territory, although positive outcomes have been documented (Primdhal et al., 2003; Hanley et al., 1999), have overall failed to deliver for farmland biodiversity and agro-ecosystems (Ribeiro et al., 2016; Kleijn et al., 2006;

MEA, 2005; Ó hUallacháin et al., 2016; Bellebaum and Koffijerb, 2018). In general biodiversity declines exponentially with increased land use intensity (Kleijn et al., 2008; Bullock et al., 2011; Tscharntke et al., 2005). Research shows that it is extremely difficult to enhance the botanical diversity of intensively farmed agricultural fields (Berendse et al., 1992; Kleijn et al., 2008, 2011). It is also widely accepted that, conserving what is left is more ecologically effective and cost effective than getting back what was lost (Kleijn et al., 2011). These well-established findings feed into the ongoing debate on whether biodiversity conservation is better tackled by 'land sparing' - setting aside strictly protected areas combined with intensive agriculture outside these areas – or 'land sharing', the integration of agricultural production and biodiversity protection on the same land (Phalan et al., 2011; Grau et al., 2013; Fischer et al., 2008, 2014; Green et al., 2005). The latter, 'land sharing', has always been the EU policy and lies at the foundations of agri-environment programmes. European agricultural multifunctionalism rewards farmers for simultaneously providing commodities and fostering farmland biodiversity (Plieninger et al., 2012). Besides, the 'sustainable intensification' associated with 'land-sparing' requires the support of a raft of ecosystem services, from soil fertility and pollination to pest control.

Agri-environment measures decouple payments from agricultural output. They provide income transfer to farmers but, in deference to the Uruguay Round of the General Agreement on Tariffs and Trade (GATT), in a way that does not distort trade and world markets (Cooper et al., 2009; Matthews, 2002, 2013). They are categorised as 'Green Box' payments, to signify that they only support the production of non-commodity public goods. The GATT 1994, agreement stipulates that, "The amount of payment shall be limited to the exact cost or loss of income in complying with the government programme" (GATT, 1994:.63). These two criteria have governed AES since their inception. AES payments are calculated on the basis of the incurred costs and the income foregone, including opportunity costs – to generate alternative income, such as conversion to forestry. Agri-environment-climate measures also allow the EU to continue supporting the farming community at a time when direct agricultural subsidies are under pressure from the WTO.

The CAP has reached a critical point and calls for change in funding priorities have grown louder. There is an increasing imperative to target public money for agriculture directly to the provision of public goods and

ecosystem services. There are essentially two ways to pay for ecosystem services (ES) in agri-environment schemes – there is the currently dominant input-based system (with prescribed management actions), and output-based systems (also known as payment-by-results), which link payments to the delivery of ecosystem services. There are advantages and disadvantages to both approaches. I will briefly summarise issues with the dominant action-based approach before going on to discuss result-oriented AES in more detail.

LIMITATIONS TO ACTION-ORIENTED AGRI-ENVIRONMENT SCHEMES

The overwhelming majority of agri-environment schemes in the EU are management or action-based payment schemes. They relate to defined agricultural management requirements which must be carried out by the farmer or land manager (Keenleyside et al., 2014). They are a collection of schemes that vary markedly between countries and with different objectives, ranging from the conservation of species rich grasslands and hay meadows to reductions in agrochemicals. They generally consist of a set of measures, such as taking field margins out of production, or planting/maintaining hedgerows, erecting bird boxes or stipulating mowing dates. These for the most part horizontal schemes have been in operation for over thirty years and are well embedded within institutional and political structures. Compared to the level of spending, there has been very little scientific evaluation of their effectiveness, with acceptance and uptake used as indicators of effectiveness in EU reviews (Burton and Schwarz, 2013; Primdahl et al., 2010). However, the implementation of AES schemes does not guarantee that the stated objectives of the scheme will actually be meet. Furthermore, a review by Kleijn and Sutherland (2003) found that environmental and biodiversity objectives are rarely clearly defined at the outset, which hampers proper evaluation. Kleijn and Sunderland (2003) carried out a comprehensive evaluation of 62 AES in five EU countries and Switzerland, from studies in the published literature. They found that in the majority of studies the research design was inadequate to assess the effectiveness of the schemes. Ó hUallacháin and Finn (2016) came to a similar conclusion in relation to agri-environment conservation measures for grassland vegetation in Ireland.

Kleijn et al. (2006) measured the level of biodiversity (birds, bees, spiders, grasshoppers and crickets) on a random sample of 202 pairs of similar fields in five EU Countries, one with an agri-environment measure and the other one without. They found that the effects of agri-environment measures on biodiversity in the analysed countries was marginal to moderately positive. Overall they found that in all countries studied, except the Netherlands, some measures of biodiversity were higher on fields with AES compared to conventionally managed fields, but that the positive effects of AES on endangered farmland species was negligible, with the exception of birds in Spain. Not a single species from the IUCN Red Data Book was observed. This confirmed prior observations that contemporary farmland in N-W Europe hosts almost exclusively common wildlife species of both plants and animals (Kleijn and Sutherland, 2003; Kleijn et al., 2001, 2006). They concluded that schemes aiming to promote specific endangered species probably need to be much more tailored to the needs of those species (see also Bellebaum and Koffijerb, 2018). Along with other researchers, Kleijn et al. (2006, 2011) also highlight a major problem with respect to spatial scale, stating that local positive effects do not guarantee that biodiversity decline at the national or even regional level can be stopped (Berendse et al., 1992; Batáry et al., 2015; Tscharnthe et al., 2005). Most AES operate at the field or farm level, resulting in an erratic spatial distribution of fields in an otherwise intensively farmed landscape (Kleijn et al., 2006). Research by Batáry et al. (2015) found that AES schemes implemented after 2007 were not more efficient than schemes implemented before that date, with no sign of learning or improvement of effectiveness over time. Other researchers have also highlighted the fact that a learning process is rarely built into AES design (Finn et al., 2008, 2009; Primdahl et al., 2010). Kleijn et al. (2006) concluded that in order to make AES more effective for biodiversity, there is a need to formulate clear and quantifiable objectives at the start along with baseline data, and the compulsory evaluation of their ecological effects.

Along similar lines Feehan et al. (2005) conducted an evaluation of the Irish agri-environment Rural Environment Protection Scheme (REPS), and found that most species rich and species poor farms were all non-agreement farms, i.e not in REPS. The study concluded that the scheme did not significantly benefit the flora, fauna and beetle biodiversity surveyed. An evaluation of the status of Irish habitats under the Habitats Directive found that all grassland habitats had a 'poor or bad' conservation status in 2007, with no improvement by 2013 (NPWS, 2008, 2013). A study by Ó

hUallacháin et al. (2016) of the botanical composition of selected grassland habitats managed under the Irish Agri-Environment Options Scheme (a follow-on from REPS), found a large variation in results within different conservation measures, and that were not reflected in scheme payments. They called for increased prioritisation of targeting aimed at species and habitats that are of the highest conservation concern and an evidence-based approach linked with differentiated payment rates. Action-oriented AES have typically been seen as a source of income support, designed to facilitate the reliable distribution of funds to farmers' across the board, rather than targeting environmental objectives (Reed et al., 2014).

Potter and Wolf (2014: 402) summarised widespread consensus, when they stated that AES cannot be said to be "strongly anchored in scientific research". The scientific consensus since Kleijn and Sutherland's (2003) landmark paper, is that agri-environment measures have provided only marginal biodiversity gains. Despite major investments in action-oriented schemes across Europe, farmland biodiversity has continued to decline (Whittingham, 2011; Donald et al., 2006; Herzon et al., 2018; Davey et al., 2010).

Another major criticism of action-oriented AES, where farmers essentially select options from a menu-type template, is that they fail to influence farmer's attitudes to the environment or change their behaviour and are thus ineffective in the long term (Burton and Paragahawewa, 2011; Burton et al., 2008; de Snoo et al., 2013; Arnott et al., 2019). The actions are not embedded within farming culture as part of what Burton and Paragahawewa (2011) refer to as conventional 'good farming practice', central to the creation of cultural and social capital within farming communities. The voluntary five year contracts, that one can opt-out of at any time, do not necessarily require a deep personal involvement or a change in farm management strategy. The prescriptive nature of action-oriented AES does not even require farmers to learn anything about good conservation practices, neither does it encourage farmers to innovate (Burton and Schwarz, 2013)[1]. After the 5-year contract is up, there is no guarantee that the conservation measures will be continued, cancelling the ecological benefits accrued during the contract period. Furthermore, what Hanley et al. (1999) refer to as a 'halo effect' may develop where small parts of the farm operate under agri-environment schemes, while the majority of the farm remains intensive, restricting wildlife corridors or catchment performance. Farmers often select to participate in scheme prescriptions

that fit their farm situation, with low costs of compliance or minimum change to current farm practices (Morris and Potter 1995; Arnott et al., 2019). This bias in option uptake has been identified as a primary reason why AES may fail to deliver for biodiversity (Davey et al., 2010). There is also concern that the existing AES are not providing value for money (Armsworth et al., 2012; Hanley et al., 2012; Ansell et al., 2016; Matzdorf and Lorenze, 2010; Whittingham, 2011; ECA, 2011).

On a positive side, action-oriented agri-environment measures have shown good uptake and a willingness of the farming community to participate, as they generally involve little actual change to farming practice. Other advantages are the ease of management and monitoring – selection of options from a standardised menu, relatively low transaction costs, payments are predictable and can be incorporated within the farm planning budget. As previously stated they are politically embedded and do not contradict WTO trade and tariff agreements.

However, the rhetoric is changing, under budgetary constraints, WTO disquiet and the growing public scrutiny of agricultural subsidies, the EU is looking for more cost-effective and clearer outcome-based results, reflecting what Potter and Tilzey (2005) refer to as an increasing neoliberal ideology in EU policy. The European Court of Auditors (ECA, 2011) stated that agri-environment expenditure should be targeted more precisely, and that many current objectives are not specific enough to assess whether they have really been achieved. They also noted the lack of monitoring of the environmental impacts of agri-environment measures (ECA, 2011). We can conclude that both the ecological effectiveness and cost effectiveness of AES must be improved. The possibility of integrating the ecosystem services approach into AES is increasingly proposed, along with emphasis on measurable result outcomes (Herzon et al., 2018; Schroeder et al., 2013).

PAYMENT FOR ECOSYSTEM SERVICES (PES)

Before discussing the particularities of result-based agri-environment schemes, it is first necessary to position that debate within the broader framework of payment for ecosystem services (PES), which is ultimately the foundation on which result-based AES rests.

Ecosystem services (ES) are essentially the benefits people obtain from ecosystems. Although challenging, the concept has become what Redford

and Adams (2009: 785) referred to as "the central metaphor within which to express humanity's need for the rest of nature". The ecosystem services concept has become widely adopted, notably by the Millennium Ecosystem Assessment (MEA, 2005) which categorises services as: 1. Provisioning (e.g. timber / food), 2. Regulating (e.g. water / climate / carbon), 3. Supporting (e.g. pollinators / pest control) and 4. Cultural (e.g. wellbeing / recreation / landscape aesthetics). Many of these so called public goods and services are provided free of charge by agricultural landscapes, such as biodiversity, pollination, water, carbon capture, cultural heritage and scenery. As stated by Hasund (2013), if the agricultural management disappears or changes so will the public goods that are specific to agriculture. In essence, the ecosystem services approach strives to commodify environmental public goods in an attempt to counteract market failure, which currently classifies them simply as free 'externalities'. It positions conservation not as constraining the economy, but as protecting a source of direct economic value (Adams and Hodge, 2014; Hodge, 2013). It is a pragmatic neoliberal approach (based on the work of such ecological economists as Robert Constanza, 1997, Farley and Constanza, 2010), to put a monetary value on public goods. In 1997, Constanza et al. (1997) estimated ecosystem services worldwide to be worth an average $33 Trillion annually ($44 trillion in today's dollar), but updated estimates are substantially higher than that. Putting a market value on these services is quite complex, because the public goods and services have properties of non-rivalry and non-excludability; meaning there is no clear interaction between demand and supply, because their use by one agent doesn't necessarily reduce their availability for use by others, take for example clean air (Hodge and Reader, 2007; Arnott et al., 2019: Hanley et al., 2012). Consequently, standard market arrangements are ineffective. Given the difficulty associated with creating a working market for ecosystem services, the mediatory role of the State has been fundamental to act as a buyer on behalf of the diffuse public consumer (Wynn-Jones, 2013). In recent years a wide range of techniques have been developed to value ecosystem services, broadly based on the benefits perceived by those consuming them, rather than on the cost of provision (Reed et al., 2014). It marks a shift in policy from a Direct Payment Support System, to a 'Public Money for Public Goods' approach (Arnott et al., 2019). Ultimately, land managers should approach the production of ecosystem services and public goods, like they would any other marketable product.

In order to link ecosystem services with AES, policies must be informed by evidence on how ecosystem services and land management practices relate to each other (Whittingham, 2011). The cost of monitoring and verification of ecosystem services delivery, via payment by result-based agri-environment schemes, is considerably higher than the current prescriptive management schemes, and well outside the European Commission's recommendation of less than 4% of the total programme cost (Reed et al., 2014). It is also difficult to price individual services as they tend to work as a bundle within heterogeneous landscapes (Redford and Adams, 2009). Markets can change rapidly (e.g. carbon market), as do public preferences and 'willingness to pay'. For the PES approach to work, there needs to be a long term commitment to sustain a 'market' for public goods and ecosystem services, otherwise farm managers are not going to risk adapting their farm businesses to enhance ES. Competitive auctions that allocate contracts to those that can provide the highest ecosystem services benefits for the lowest cost, can be associated with result oriented agri-environment schemes (Groth, 2009). This approach is currently used in the US Conservation Research Program.

In terms of the shortcomings of the PES approach, many economists have questioned the ability of market valuation processes to capture the complexities of ecological systems and ensure parity of payments (Hodge and Reader, 2007). The difficulty of connecting disparate producer and consumer groups, along with the prohibitive costs of measuring goods and services supplied, means that most schemes end up as hybrids, i.e. with both a prescriptive management and result components. Others critique a neoliberal attempt to promote conservation through an expansion of capitalism, overlooking the intrinsic value of nature (Büscher et al., 2012). Norgaard (2010), argued that PES sustains rather than challenges the entrenched excesses of production and consumption. Others argue that PES may be a form of 'crisis remediation', and what CAP reform needs is for greater emphasis to be put on agro-ecological methods of production rather than continuing attempts to "remediate and maintain an unsustainable approach to agriculture" (Wynn-Jones, 2013: 84). In short, the market should conform to the logic of ecosystem services, rather than the other way around, which is arguably what PES is attempting to do. Finally, the WTO, GATT 1994 agreement and EU Regulation 1783/03, currently restrict the possibility of more direct CAP payment mechanisms, that explicitly cost the value of ecosystem services, rather than opportunity costs, i.e. the cost

of compliance (Schomers and Matzdorf, 2013; Hasund, 2013). Burton and Schwarz (2013: 638), argue that going forward we will need a more 'flexible interpretation of the WTO requirements', as we cannot logically design schemes to meet specific outcomes, and then set payment rates with reference to the costs of actions rather than the value of the outcomes. Potter and Wolf (2014) conclude that the PES landscape is currently highly fragmented and largely experimental, with PES-like approaches being piloted by a series of disparate case-studies.

RESULT-BASED AGRI-ENVIRONMENT MEASURES

There is no single agreed definition of what constitutes a 'result-based' agri-environment payment scheme (Herzon et al., 2018; Keenleyside et al., 2014). Other terms are used interchangeably, such as, 'payment-by-results', 'result-oriented', 'outcome focused schemes', 'payment for ecosystem services'. I will refer to them as 'result-based' payments to differentiate them from the currently dominant prescriptive management or action-based payment schemes, described above. Result-based agri-environment schemes pay land managers not for performing specific management actions (such as mowing on set dates), but for achieving set environmental outcomes, such as a species rich grassland or the promotion of an endangered species. There is a general belief that result-based approaches will be able to deliver better ecological outcomes than action-based approaches and can better integrate ecosystem services within agri-environment programmes. They are also believed to be more cost effective, as payments are directly linked to outcomes (Matzdorf and Lorenz, 2010). Within result-based payments the farmer or land manager is free to choose the most appropriate management to achieve the prescribed result, and payments should reflect the level of achievement. One of the frequently cited attractions of this approach is that it gives the farmer autonomy and the freedom to innovate. It allows them to use their existing knowledge that is necessarily more context specific than the generic prescribed measures that define action-based approaches. The removal of management restrictions and regulations is also likely to increase the attractiveness of schemes, and research to date indicates that the rate of uptake of result-based AES is very positive, despite the increased risk involved (Matzdorf and Lorenz, 2010; Fleury et al., 2015; Herzon et al., 2018; Maher et al., 2018). Linked with the freedom to innovate is

what Burton and Schwarz (2013) refer to as the critically important long term attitudinal and behavioural change, whereby it is expected farmers will incorporate biodiversity and ecosystem services considerations into their concept of 'good farming practice'. It goes beyond the economic and ecological aspects of participating in AES to embrace the social and cultural co-benefits (de Snoo et al., 2013; Arnott et al., 2019).

The suitability of a result-based approach depends on a number of criteria (see Maher et al., 2018; Keenleyside et al., 2014; Herzon et al., 2018) including:

- The clear definition of the ecological objective (i.e. the outcome), based on strong ecological research and up to date baseline data.
- The biodiversity target should be a conservation priority, and be largely dependent on agricultural practices.
- There needs to be a clear, unambiguous link between the ecological objective and reliable indicators that act as proxy for achieving the ecological objectives, and upon which payments depend.
- The result indicators should not be easily achieved by means other than agricultural management. The indicators should be easily measurable, quantifiable and observable by farmers, and they should not be heavily dependent on factors external to the farm, for example, the weather (Uthes and Matzdorf, 2013).
- The existence of adequate expert knowledge on ecological requirements to inform best practice and knowledge transfer to farmers and farm advisors.
- An appropriate system for results verification, farm advisory service and dispute resolution needs to be in place.
- The objectives of the ecological results should be compatible with farmers production rationales and should not require excessive risk taking.
- Socio-economic factors need to be taken into account, including stakeholders' attitudes to innovation and risk taking, along with the existence of a culture of trust between the various actors – farmers, farm advisory service, evaluators and government institutions.
- Works well with a Locally-Led approach.

A lot of the literature on result-based AES has concentrated on the development of reliable indicators, but it must also be remembered that indicators may not be possible for all biodiversity objectives and in all locations (Uthes and Matzdorf, 2013; Kaiser et al., 2010). Thus, result-based schemes are restricted to cases where causal relationships are well established, and can be represented by indicators. Options for indicators range from the number of a single species to a composite indicator, as in the Burren Programme (see Chapter 3), combining species numbers and habitat attributes. When species are the biodiversity target, the ecological integrity of the supporting habitat needs to be considered. Maher et al. (2018: 21) advise that a habitat-based approach is the most effective to deliver a range of benefits and minimise trade-off between ecosystem services. Multiple indicator thresholds, aligned with corresponding payment levels, incentivises farmers to continually improve their ecosystem services outcomes. Setting an appropriate payment level that reflects the full cost of achieving the desired outcome, including time spent on training and possibly monitoring of results by farmers, while also keeping the scheme simple and cost effective is a challenge (Cooper et al., 2009; Herzon et al., 2018). Case studies, such as those from Germany, demonstrate that result-based payments can be achieved within the existing policy framework (Matzdorf and Lorenz, 2010).

Existing result-based AES mainly target the maintenance of threatened habitats or species of conservation priority rather than common farmland biodiversity. In general, they are better suited to the maintenance of existing habitats (where farmers can draw on their management experience), rather than the restoration or re-creation of habitats. These tend to be semi-natural habitats, which have for a long time been under low-input, often high nature value farming (HNVf) systems, with foremost priority going to Natura 2000 sites (O'Rourke and Kramm, 2009). Parallel research has been done on developing farm typologies that capture these farming systems, which could form a useful basis for targeting result-based AES (O'Sullivan et al., 2017; Ribeiro et al., 2016; O'Rourke et al., 2012). The targeting of

CASE STUDIES, SUCH AS THOSE FROM GERMANY, DEMONSTRATE THAT RESULT-BASED PAYMENTS CAN BE ACHIEVED WITHIN THE EXISTING POLICY FRAMEWORK

HNV farmland which tends to be found in naturally disadvantaged areas, means they would significantly benefit from the redistribution of funding associated with a result-based PES approach.

Keenleyside et al. (2014: 4), provide a good summary of the advantages of result-based agri-environment schemes to both farmers and managing authorities, which are summarised here:

- Much clearer link between payment and biodiversity achievements.
- Contracts with farmers simply specify the results required, rather than defining in detail the farm practices that should be carried out.
- The 'production' of biodiversity becomes an integral part of the farming system and farm business, not just another set of land management 'rules' to be followed.
- Farmers have the opportunity to use their management skills, professional judgement and knowledge of the farm and are rewarded for achieving the results of their entrepreneurial efforts.
- Farmers are encouraged to take responsibility for and own the biodiversity results, and this can lead to greater public recognition of farmers' role in supporting biodiversity objectives.
- Results-based schemes can more easily meet the EU requirements for verification of agri-environment-climate payments under the 2014-20 CAP.
- Results-based schemes are more easily targeted and budgets carry less 'deadweight' because there is a built-in incentive for farmers to select only the land where the biodiversity results are achievable.

Keenleyside et al. (2014: 4), also cite circumstances where a management-based approach may be more appropriate than a result–based AES:

- If it is not possible to design reliable indicators of biodiversity results and methods of measuring them on farms.
- Where the managing authority does not have access to the environmental information and expertise needed to set up and run a result-based scheme.
- If the farming community is unwilling to accept a result-based approach (end of citation, Keenleyside et al., 2014:4).

Result-based approaches also contribute to spreading environmental awareness and increasing the motivation of farmers towards environmental protection. Most result-based measures implemented to date have focussed on species rich grasslands, and aim for the conservation of plant rather than animal species; partly because mobile animals are more difficult to observe and they also depend on conditions in neighbouring fields, or in the case of migratory birds, different countries/continents (Russi et al., 2014).

RESULT-BASED AGRI-ENVIRONMENT SCHEMES: EXAMPLES FROM THE LITERATURE

The first experiments with result-based agri-environment schemes were carried out in the early 1990s, with one of the longest running and best known schemes being the MEKA ('Extensive grassland management') programme, introduced in 2000 and co-funded by CAP, focussing on species rich meadows in Baden-Württemberg and later in Lower Saxony in Germany. Within this scheme, farmers receive payments if they have 4 out of a list of 28 indicator plant species in their meadows (Matzdorf et al., 2008; Wittig et al., 2006; Russi et al., 2016). Farmers' received the result-based payment (of €50/ha., between 2000-2009, and €60/ha. between 2009-2014), in addition to an action-oriented basic payment for extensive grassland management, and it is thus a hybrid scheme. In the 2014-2020 RDP programme period a two level 'stand-alone' payment was introduced and is now €230/ha for four indicator species and €260/ha for six indicator species. But the result-based measure can no longer be combined with other management-based measures (as was the case prior to 2014), the de-facto additional payment in most cases is €80/ha (Russi et al., 2014). The MEKA programme essentially rewards existing practice and does not require any management adaptation except a ban on silage making. The programme initially had over 9,000 participating farmers and covered an area of 66,112 ha. In the 2007-2013 RDP period, participation levels fell to around 5,000 farmers, and the area covered decreased to around 41,539 ha, mainly due to low payment rates and the increased opportunity cost related to extensive grassland management (Russi et al., 2016). The increased payment in the current programme period was to incentivise farmers with higher opportunity costs. The majority (62%) of participants are part-time farmers, who as remarked by Russi et al. (2016:72) "tend to

be less dependent on agricultural income than full-time farmers, and for this reason are ready to accept lower productivity and are thus more likely to maintain species rich grasslands".

Matzdorf and Lorenz (2010) interviewed 90 farmers' who participated in the Baden-Württemberg result-based AES. They found that 52% of interviewees continued to manage the grasslands without any change to their farming practices; 48% had adjusted their practices – the biggest change being ceasing silage production. They found that the maintenance of the species rich grasslands ranked very high in importance among 90% of the interviewees; firstly, because it produced good quality fodder (N=40), it contributed to nature conservation (N=38) and the preservation of the cultural landscape (N=29), and helps raise scenic beauty (N=10) (Matzdorf and Lorenz, 2010). The survey also found that many of the participating farmers already had a positive attitude towards nature conservation prior to joining the scheme, most were part-time farmers and over 70% of the interviewees identified all indicator species each year. All the participants mentioned the importance of well-defined indicators. They also found that risk-averse farmers were less likely to participate in the scheme (Matzdorf and Lorenz, 2010).

A review of the project by Russi et al. (2014) found that payments cover the opportunity costs of some categories of farmers (e.g. part-time farmers, less productive fields, hay producers, farmers with few animals), but not those of intensive cattle raisers and biogas producers. This is partly due to changing market conditions (e.g., the decreasing and fluctuating price of hay), and the increasing economic attractiveness and less labour requirements of more intensive management strategies (i.e. silage and biogas). Russi et al. (2014, 2016) argue that the scheme may not be sufficient in the long run to ensure a wide participation, as it does not fully compensate for the opportunity costs of all potentially involved farmers. Rather it acts as an incentive or reward to compensate management strategies that are dependent mainly on intrinsic (ethical) motivation, and in some cases also partly on extrinsic motivations (i.e payments). The increased payment level and differential thresholds introduced in the 2014-2020 programme period is an attempt to cover the opportunity costs of a larger share of farmers and improve the uptake of the measure (Russi et al., 2016). The authorities and scientists involved in the MEKA project believe it plays an important educational role as well as avoiding the abandonment or intensification of species-rich grasslands.

Other early examples of result-oriented schemes for the conservation of hay meadows and pasture land were implemented in the Peak District National Park in the UK, as part of a results element to the existing Higher Level Stewardship Scheme (Buckingham et al., 1998). Other programmes include a Swedish result-oriented scheme to encourage the reproduction of large carnivores (lynx and wolverines) on reindeer grazing land (Burton and Schwarz, 2013). In the Netherlands result-based payments targeted the improvement of breeding success of meadow bird species, using per clutch payments to preserve nesting Lapwings and Black-Tailed Godwits (Musters et al., 2001).

A flowering meadows result-based scheme was established in France in 2007, in the form of a 5-year contract between farmers and the State, and applies only within Natura 2000 zones (Fleury et al., 2015; de Sainte Marie, 2014). Like the Baden-Württemberg programme, farmers commit to ensuring that at least 4 plant species out of a reference list of 20 are present on their land. These species are chosen as indicators of meadows high ecological quality, and are for the most part easily identifiable plants with coloured flowers. Out of 39 participating farmers surveyed by Fleury et al. (2015), only 4 made technical changes, such as mowing later in the season, not mowing the centre section until last to allow flowers to seed, or diluting liquid manure. In practice farmers who signed up for the measure had already reached the target outcome, before they committed to the programme, so it was more a matter of maintaining these measures rather than achieving them. Overall, Fleury et al. (2015), found that the flowering meadows measure does promote a value change, and modifies how farmers view meadows and biodiversity. As in Baden-Württemberg, the French 'flowering meadows' farmers see biodiversity as a factor in forage quality. Again, the more risk-averse farmers tend not to get involved, or those who fear the scheme is too complicated, involving more work, more paperwork and too time consuming (Schroeder et al., 2013).

In the UK the Welsh Glastir scheme, using a whole farm approach, is a move towards a PES orientated scheme (Wynn-Jones, 2013). However, for the moment it is more a complement to the existing action-oriented AES rather than a 'pure' PES scheme, having hit some practical and political barriers in rolling out the scheme (Wynn-Jones, 2013). The former relate to an inability to link particular management specifications to the delivery of measurable ecosystem outputs (Potter and Wolf, 2014).

In Ireland one of the best developed and longest running result-based AES is the Burren Programme which commenced in 2005 with twenty demonstration farms, farming 2,500 ha of priority habitat, and today has 328 farms covering an area of 23,000 ha of priority habitat. The Burren Programme is outlined in detail in Chapter 3. In 2015, Ireland's Department of Agriculture, Food and the Marine (DAFM) allocated some EU RDP funding towards the expansion of the Locally-Led Result-Based Approach (LLRBA), developed in the Burren Programme, to other areas under the auspices of European Innovation Partnership Pilot Projects (EIPs). All the above case-studies have had an important educational and awareness raising role.

Burton and Schwarz (2013) and Schwarz et al. (2008) provide a comprehensive literature review of result-based agri-environment programmes in Europe.

ISSUES WITH RESULT-BASED AGRI-ENVIRONMENT SCHEMES

Conventional action oriented agri-environment schemes have been criticised for a number of reasons: including poor targeting, lack of payment differentiation, short-termism, inadequate monitoring, moderate to poor ecological effectiveness, poor cost-effectiveness, inability to promote innovation and farmers long-term attitudinal and behavioural change (European Court of Auditors, 2011; Burton and Schwarz, 2013; Matzdorf and Lorenz, 2010; de Snoo et al., 2013; Finn and Ó hUallacháin, 2012). A focus on payment-by-results will address some of these issues, but as observed by Moxet and White (2014), it will not address all of them, and it does come with its own set of challenges.

Firstly, result-based AES are restricted to cases where causal relationships between farming practices and ecological objectives are well established and can be represented by single or composite indicators. Some agro-ecology interactions are very complex, operate within specific spatial and temporal scales, may vary over short distances, and not all biodiversity targets can be measured through indicators. Or as Wynne-Jones (2013: 82), put it, the 'limit of scientific knowledge', in terms of linking particular management specifications to the delivery of measurable ecosystem outputs can be a stumbling block, which may be improved on with further research. Habitat change may be slow to respond to changes in land management practices, due to lag times in ecosystem processes, and may not be picked up by

indicators for a long time. The 'time-lag' issue seems to suggest result-based AES may, as previously stated, be more appropriate for holding on to what one has rather than ecosystem restoration, reinforcing the advantage of targeting HNV farmland and designated areas like Natura 2000. The time-lags between management inputs and ecosystem outcomes can also complicate monitoring and payment regimes, making them less attractive to farmers (Reed et al., 2014).

The effectiveness of all agri-environment schemes are significantly impacted by the spatial scale of delivery. Biodiversity conservation is fundamentally a spatial practice. As argued by Kleijn et al. (2011:480), "it is imperative that biodiversity and ecosystem services are monitored within the context of land use within the wider countryside, and in such a way that effects can be scaled-up to national and continental trends, in order to assess what exactly is the impact on conservation strategy". Kleijn et al. (2011) found that only a few studies have linked local conservation efforts to national biodiversity trends, and it is therefore unknown how the EU agri-environment budget for conservation on farmland contributes to the policy objective to halt biodiversity decline. Currently all agri-environment schemes (management and result oriented), operate predominantly at the field and more rarely the farm scale, generally ignoring the critical landscape level (McKenzie et al., 2013; Tscharntke et al., 2005; Cumming et al., 2006). As remarked by Cumming et al. (2006), there is currently a mismatch between the scale at which ecosystem services are managed and the scale of the ecological processes that give rise to these services, and the scale at which most payments are made. The landscape scale requires linkages between separate land management units and attention to habitat matrixes to prevent species/habitat isolation and fragmentation (Donald and Evans, 2006). For example, to be successful AES measures for farmland birds must be embedded within landscape level habitat management to ensure suitable invertebrate food sources within easy reach and possibly to facilitate migration (Bellebaum and Koffijerb, 2018).

A number of researchers, including Burton and Schwarz (2013), Matzdorf and Lorenz (2010), have put a lot of emphasis on the fact that result-oriented AES create strong incentives for farmers' to innovate, and apply their context specific knowledge towards meeting biodiversity and other ecosystem services objectives, something 'rulebook' management-based AES stifle. They argue that this in turn leads to long term behavioural change and increases the social and cultural capital of farmers within their

communities. However, as observed by Moxet and White (2014), farmers may lack the capacity to independently innovate with respect to the delivery of environmental outcomes. Given that environmental scientists themselves often express uncertainty about the complex ecological, spatial and temporal relationships between land management and ecology and hydrology, it is "unreasonable to expect scheme participants to know how specific environmental results can be achieved at low costs" (Moxet and White, 2014: 398). The ability of land managers to take advantage of the 'freedom to innovate' is strongly influenced by the availability of appropriate advisory support. This in turn raises issues about the role, training and skill-sets of farm advisors within result-based AES. How advisors are trained, technically supported, updated and funded is critically important. The Burren Programme is exemplary in providing local high end scientific support, training, up-dating and performance monitoring of farm advisors, however, it comes at a price. The higher training and transaction costs associated with result-based AES, means that keeping schemes both simple and cost-effective can be challenging (Cooper et al., 2009). Or perhaps the EU and National Governments have to accept that if we want agri-environment programmes that actually deliver for biodiversity and the environment, they have to pay more for them. Paying less for the delivery of management oriented schemes is a false economy and poor value for tax payers' money, if they do not reach their objectives. The higher transaction costs of result-based schemes, would arguably support employment and ultimately contribute to the often disadvantaged rural economies within which they are embedded. One could also envisage the distribution of transaction costs among public, private and semi-private providers.

Quantifying payment levels which reflect different levels of environmental outcome remains, according to Schwarz et al. (2008), one of the key challenges for the practical implementation of strongly result-oriented AES. The Burren Programme (Chapter 3), provides a good example of how to build this into a scheme and how to reward and incentivise high performance. Current result-based payments may be too low to motivate farmers and avoid both land abandonment and intensification (Russi et al., 2016; Wynn-Jones, 2013; Arnott et al., 2019). Russi et al. (2016) argued that the Baden-Württemberg programme acted more as a reward or incentive rather than a proper market based instrument as the payment level was too low to attract potentially interested farmers.

Result-based agri-environment schemes are also associated with increased private risks to farmers, as the outcome of land management practices may be dependent on factors outside the farmers control: such as the behaviour of neighbouring farmers along with many natural processes including - climatic conditions, pest invasion, disease, parasites, and the life cycle stages of mobile species may occur in different geographical locations. Thus, while action-oriented AES may provide a reliable source of funding (with risks transferred to the State), result-based schemes do not offer such security. We need to consider effective risk-management in the program design of result-based AES. A hybrid approach (as in Baden-Württemberg and the Burren Programme), including a base payment to compensate for actions and a bonus payment for outcomes, has been suggested as a means of reducing risks to farmers (Burton and Schwarz, 2013; Wynne-Jones, 2013). In a hybrid approach the State shares the cost of risk-bearing. Result-based AES also need a robust system of dispute resolution that is seen to be fair to both sides.

Potter and Wolf (2014: 406), have cited political concerns regarding "the privatisation of environmental management that could compromise the role of the State as a guardian of the public interest". They also acknowledge institutional and political resistance to change from the current broad-brush AES approach with its aligned vested interests, often within the farming community itself (see also Birge et al., 2017). Burton and Schwarz (2013: 638), conclude that "result-oriented schemes may be better viewed, not as the logical market based successor to action oriented approaches, but rather as part of a mix of agri-environment policy strategies to be targeted at particular situations rather than applied unilaterally". The empirical case-studies presented in this book appear to concur with that statement.

WAY FORWARD

The future of the Common Agricultural Policy (CAP), especially its agri-environment-climate programme, will shape the framework for biodiversity and nature conservation in Europe. As remarked by Arnott et al. (2019: 206), the current 'business-as-usual' action-based approach to agri-environment policy, "may maintain the status quo and stop further intensification and nutrient overload, but it is unlikely that it will deliver for biodiversity and ecosystem services at a landscape scale or promote long term behavioural

change". Under current and likely future RDP budgetary constraints and as specified by the European Court of Auditors (ECA, 2011), it is more important than ever that agri-environment-climate funding is targeted to actually deliver for the environment and society.

There is considerable potential to expand the use of a result-based approach within agri-environment schemes for the next CAP Rural Development Programme 2021-2027. Result-based payment schemes depend on setting clear objectives and result outcomes linked to agricultural practices, which can be measured by reliable (and self-monitoring) indicators. Or where this is not possible considering a hybrid approach - adding a more demanding result-based top-up to existing management based schemes. There are still technical and scientific issues to be ironed out, particularly in relation to indicators and spatial scale considerations, which may ultimately only be resolved by experimentation in a case by case approach. The spatial coordination of ecosystem services and public goods delivery across multiple farm holdings, along with collaboration among government departments and between public and private bodies remains challenging but, according to Hodge and Adams (2012), is not insurmountable. Perhaps, a good place to start is with a locally-led approach, which can effectively integrate and absorb a lot of the above complexity. The increasing EU devolution of responsibility to member states offers greater flexibility in the delivery of national agri-environment programmes, enabling a greater focus on outcomes and maximising cost-effectiveness. There is also a need for greater flexibility in the interpretation of WTO regulations. A true result-based approach should reward the achievements of actual results, above the cost of their delivery, comparable to the profit margin of producing a market product (Reed et al., 2014). The existing WTO 'direct costs and income foregone' calculations favour creation over maintenance, but logically effective habitat creation and restoration must result in a focus on maintenance (Finn et al., 2008). For example, it is currently financially more beneficial for a farmer to reinstate hedgerows which s/he had previously removed, than to maintain existing high quality hedgerows (Finn et al., 2008).

The environmental and public goods friendly discourse contained in EU and national policy documents is not reflected in reality when it comes to funding. To paraphrase Arnott et al. (2019: 203) "the first barrier to the success of agri-environment schemes and the delivery of Public Goods is that of economics". Agricultural subsidies are heavily skewed towards productivity, i.e. Pillar I, direct support payments, along with a very limited

mandatory 'green' component. The substantially smaller Pillar 2 funding directed at agri-environment-climate regulation, aims to ameliorate rather than challenge the problems associated with intensive agriculture production. Ultimately we need to address the contradictions in agricultural policy, which appear to be moving towards a 'land sparing' scenario – with the oxymoronic 'sustainable intensification' on productive land and a payment for ecosystem services (PES) in areas of natural constraint. High productivity requires functioning ecosystems and all farmers want to produce, meaning agri-environment-climate schemes must work alongside their established farming practices (Lastra-Bravo et al., 2015; Fischer et al., 2012). Thus, all agriculture needs to be both productive and to operate within the limits of healthy ecosystems. The 'quality food' and 'quality environment' argument contradicts the current globalised neoliberal market economies and the 'food empires' that profit from a cheap food policy (Sage, 2012). Ultimately payment for ecosystem services must be positioned within a joined-up future vision for food, agriculture and the environment.

Endnotes

1 Recent research by McCracken et al. (2015) seems to contradict the common perception that prescriptive action based AES do not actively engage farmers or allow them to develop new environmental management skills. This research found a clear link between biodiversity outcomes, farmer's motivation and their experience, including the length of time and frequency with which they had been involved in agri-environment schemes. They concluded that farmers are not just carrying out prescribed tasks, but are also making decisions which impact on success.

BIBLIOGRAPHY

Adams, WA. (2012) Feeding the next billion: hunger and conservation. Oryx 46(2), 157-158.

Adams, WM., Hodge, ID., Sandbrook, L. (2014) New spaces for nature: the re-territorialisation of biodiversity conservation under neoliberalism in the UK. Transactions of the Institute of British Geographers 39, 574-588.

Ansell, D., Freudenberger, D., Munro, N., Gibbons, P., (2016) The cost-effectiveness of agri-environment schemes for biodiversity conservation: A quantitative review. Agriculture, Ecosystems and Environment 225, 184-191.

Armsworth, PR., Acs, S., Dallimer, M., Gaston, KJ., Hanley, N., Wilson, P. (2012) The cost of policy simplification in conservation incentive programs. Ecological Letters 15, 406-414.

Arnott, D., Chadwick, D., Harris, I., Aleksandra, K., Jones DL. (2019) What can management option uptake tell us about ecosystem services delivery through agri-environment schemes? Land Use Policy 81, 194-208.

Batáry, P., Dicks, LV., Kleijn, D., Sutherland, WJ. (2015) The role of agri-environment schemes in conservation and environmental management. Conservation Biology 29(4), 1006-1016.

Bellebaum, J., Koffijerb, K. (2018) Present agri-environment measures in Europe are not sufficient for the conservation of a highly sensitive bird species, the Corncrake *Crex crex*. Agriculture, Ecosystems and Environment 257, 30-37.

Benton, T, Hartel, T., Settels, J. (2011) Food security: a role for Europe. Nature, 480, 39.

Berendse, F., Oomes, MJM., Altena, HJ., Elberse, WT. (1992) Experiments on the restoration of species-rich meadows in The Netherlands. Biological Conservation 62, 59-65.

Bignal, EM., McCracken, DI., (2000) The nature conservation value of European traditional farming systems. Environmental Review 8, 149-171.

Birge, T., Toivonen, M., Kaljonen M., Herzon, H. (2017) Probing the grounds: Developing a payments-by-results agri-environment scheme in Finland. Land Use Policy 61, 302-315.

Buckingham, H., Chapman, J., Newman, R. (1998) Meadows Beyond the Millennium: The future of Hay Meadows in the Peak District National Park, Peak District National Park Authority, Derbyshire.

Bullock, JM., Aronson, J., Newton, AC., Pywell, RF., Rey-Benayas, JM. (2011) Restoration of ecosystem services and biodiversity: conflict and opportunities. Trends in Ecology and Evolution 26(10), 541-549.

Burton, RJF., Kuczera, G., Schwarz, G., (2008) Exploring farmers' cultural resistance to voluntary agri-environmental schemes. Sociol. Ruralis 48, 16-37.

Burton, RJF and Paragahawewa, UH. (2011) Creating culturally sustainable agri-environmental schemes. Journal of Rural Studies 27, 95-104.

Burton, RJF and Schwarz, G. (2013) Results-oriented agri-environmental schemes in Europe and their potential for promoting behavioural change. Land Use Policy 30, 628-641.

Büscher, B., Sullivan, S., Neves, K., Igoe, J., Brockington, D. (2012) Towards a synthesized critique of neoliberal conservation. Capitalism, Nature, Socialism 23, 4-30.

CBD. (2010) Global Biodiversity Outlook 3. Convention on Biological Diversity, Montreal.

Cooper, T., Hart, K., Baldock, D. (2009) The provision of public goods through agriculture in the European Union. Report for DG Agriculture and Rural Development. Contract No. 30-CE-0233091/00-28. London: Institute for European Environmental Policy.

Costanza, R., d'Arge, R., de Groot, R. et al., (1997) The value of the world's ecosystem services and natural capital. Nature 387, 253-260.

Cumming, GS., Cumming, DHM., Redman, CL. (2006) Scale mismatches in social-ecological systems: causes, consequences and solutions. Ecology and Society 11(1), 14.

Davey, C., Vickerey, J., Boatman, D., Chamberlain, D., Parry, H. (2010) Assessing the impact of entry-level stewardship on lowland farmland birds in England. Ibis 152, 459-474.

de Sainte Marie, C. (2014) Rethinking agri-environment schemes. A result-oriented approach to the management of species-rich grasslands in France. Journal of Environmental Planning and Management 57, 704-719.

de Snoo, GR., Herzon, I., Staats, H., Burton, RJF., Schindler, S., van Dijk, J. et al. (2013) Towards effective nature conservation on farmland: making farmers matter. Conservation Letters 6, 66-72.

Donald, PF, Green, RE, Heath, MF. (2001) Agricultural Intensification and the collapse of Europe's farmland bird population. Proceedings of the Royal Society, London 268, 25-29.

Donald, PF., Sanderson, FJ., Burfield, IJ., van Bommel, FPJ. (2006) Further evidence of continent-wide impacts of agricultural intensification on European farmland birds, 1990- 2000. Agriculture, Ecosystems and Environment 116, 189-196.

Donald, PF., Evans, AD. (2006) Habitat connectivity and matrix restoration: The wider implications of agri-environment schemes. Journal of Applied Ecology 43, 209-218.

ECA, European Court of Auditors (2011) Is agri-environment support well designed and managed? Special Report No. 7, 2011. Luxembourg.

Farley, J., Constanza, R. (2010) Payments for ecosystem services: from local to global. Ecological Economics 69, 2060-2068.

Feehan, J., Gillmor, DA., Culleton, N. (2005) Effects of an agri-environment scheme on farmland biodiversity in Ireland. Agriculture, Ecosystems and Environment 107, 275-286.

Finn, JA., Kurz, I., Bourke, D. (2008) Multiple factors control the environmental effectiveness of agri-environment schemes: implications for design and evaluation. Tearmann: Irish journal of agri-environmental research 6, 45-56.

Finn, JA., Bartolini, F., Bourke, D., Kurz, I., Viaggi, D. (2009) *Ex post* environmental evaluation of agri-environment schemes using experts' judgements and multi-criteria analysis. Journal of Environmental Planning and Management 52, 717-737.

Finn, JA., Ó hUallacháin, D. (2012) A Review of Evidence on the Environmental Impact of Ireland's Rural Environment Protection

Scheme (REPS). Biology and Environment: Proceedings of the Royal Irish Academy, 112B, 1-24.

Fischer, J., Brosi, B., Daily, GC., Ehrlich, P.R. et al. (2008) Should agricultural policies encourage land sparing or wildlife-friendly farming? Frontiers in Ecology and the Environment 6(7), 380-385.

Fischer, J., Hartle, T., Kuemmerle, T. (2012) Conservation policy in traditional farming landscapes. Conservation Letters 5, 167-175.

Fischer, J., Abson, DJ., Van Butsic, et al. (2014) Land Sparing Versus Land Sharing; Moving Forward. Conservation Letters 7(3), 149-157.

Fleury, P., Seres, C., Dobremez, L., Nettier, B., Pauthenet, Y. (2015) 'Flowering Meadows', a result-oriented agri-environmental measure: Technical and value changes in favour of biodiversity. Land Use Policy 46, 103-114.

Foley, JA., Ramankutty, N., Brauman, KA., Cassidy, ES. (2011) Solutions for a cultivated planet. Nature 478, 337-342.

GATT, (1994) The Results of the Uruguay Round of Multilateral Trade Negotiations. In: The Legal Texts. GATT, Geneva.

Green, RE., Cornell, SJ., Scharlemann, JPW., Balmford, A. (2005) Farming and the fate of wild nature. Science 307, 550-555.

Grau, R., Kuemmerle, T., Macchi, L. (2013) Beyond 'land sparing versus land sharing': environmental heterogeneity, globalisation and the balance between agricultural production and nature conservation. Current Opinion in Environmental Sustainability 5, 477-483.

Groth, M. (2009) The transferability and performance of payment-by-results biodiversity conservation procurement auctions: empirical evidence from northernmost Germany. Working Papers Series in Economics No. 19, University of Lünebury.

Halada, I., Evans, D., Romao, C., Petersen, JE. (2011) Which habitats of European importance depend on agricultural practices? Biodiversity and Conservation 20(11), 2365-2378.

Hanley, N., Whitby, M., Simpson, I. (1999) Assessing the success of agri-environmental policy in the UK. Land Use Policy 16, 67-80.

Hanley, N., Banerjee, S., Lennox, GD., Armsworth, PR. (2012) How should we incentivize private landowners to 'produce more biodiversity? Oxford Review of Economic Policy 2(1), 93-113.

Hasund, KP., (2013) Indicator-based agri-environmental payments; A payment-by-result model for public goods with a Swedish application. Land Use Policy 30, 223-233.

Herzon, I., Staats, H., Burton, RJF. et al. (2013) Towards effective nature conservation on farmland: making farmers matter. Conservation Letters 6, 66-72.

Herzon, I., Birge, T., Allen, B., Povellato, A. et al. (2018) Time to look for evidence: Results-based approach to biodiversity conservation on farmland in Europe. Land Use Policy 71, 347-354.

Hodge, I., Reader, M. (2007) Maximising the Provision of public goods from future agri-environment schemes. Department of Land Economy, University of Cambridge, Final Report, Project No. 15932 (www.lupg.org.uk).

H**odge, I., Adams, WM.** (2012) Neoliberalization, rural land trusts and institutional blending. Geoform 43, 472-482.

Hodge, I. (2013) Agri-environment policy in an era of lower government expenditure: CAP reform and conservation payments. Journal of Environmental Planning and Management 56(2), 254-270.

Kaiser, T., Rohner, M-S., Matzdorf, B., Kiesel, J. (2010) Validation of grassland indicator species selected for result-oriented agri-environmental schemes. Biodiversity and Conservation 19(5), 1297-1314.

Keenleyside, C. and Tucker, G., (2010) Farmland Abandonment in the EU: An assessment of trends and prospects. Report prepared for WWF. Institute for European Environmental Policy, London.

Keenleyside, C., Radley, G., Tucker, G., Underwood, E., Hart, K., Allen, B. & Menadue, H. (2014). Results-based Payments for Biodiversity Guidance Handbook; Design and implementation result-based agri-environment schemes 2014-2020. Report Prepared for the European Commission DG Environment, Contract No. ENV.B.2/ETU/2013/0046, Institute for European Environmental Policy, London.

Kleijn, D., Berendse, F., Smit, R., Gilissen, N. (2001) Agri-environment schemes do not effectively protect biodiversity in Dutch agricultural landscapes. Nature 413, 723-725.

Kleijn, D., Sutherland, WJ. (2003) How Effective are European agri-environment schemes in conserving and promoting biodiversity? Journal of Applied Ecology 40, 947-969

Kleijn, D., Baquero, RA., Clough, Y. et al., (2006) Mixed biodiversity benefits of agri-environment schemes in five European Countries. Ecological Letters 9: 243-254.

Kleijn, D., Kohler, F., Báldi, A., Batárt, P. et al. (2008) On the relationship between land-use intensity and farmland biodiversity in Europe. Proc. R. Soc. B 276, 903-909.

Kleijn, D., Rundlof, M., Scheper, J., Smith, HG., Tscharntke, T. (2011) Does conservation on farmland contribute to halting the biodiversity decline? Trends in Ecology and Evolution 26(9), 474-481.

Lastra-Bravo, XB., Hubbard, C., Garrod, G., Tolón-Becerra, A. (2015) What drives farmers' participation in EU agri-environmental schemes? Results from a qualitative meta-analysis. Environmental Science and Policy 54, 1-9.

Maher, C., Moran, J., Beaufoy, G. et al. (2018) Result-based Agri-environmental Payments General Guidance Handbook. Step-by-step guide to designing a result-based payments scheme: lessons from Ireland and Spain. Report prepared for the European Union, Agreement No. 07.027722/2014/697042/SUB/B2.

Matthews, A. (2002) Has agricultural policy responded to the Rio challenge? Achievements and Challenges – Rio +10 and Ireland (eds. F. Convery & J. Feehan), pp. 73-82. The Environmental Institute, UCD, Dublin.

Matthews, A. (2013) Greening Agricultural Policy in the EU's Common Agricultural Policy. Bio-based and Applied Economics 2(1), 1-27.

Matzdorf, B., Kaiser, T., Rohner, M-S. (2008) Developing biodiversity indicator to design efficient agri-environmental schemes for extensively used grasslands. Ecological Indicators 8, 256-269.

Matzdorf, B., Lorenz, J. (2010) How cost-effective are result-oriented agri-environmental measures? An empirical analysis in Germany. Land Use Policy 27, 535-544.

McCracken, ME., Woodcock, BA., Lobley, M., Pywell, RF., Saratsi, E., Swetnam, RD., Mortimer, SR., Harris, SJ., Winter, M., Hinsley, S., Bullock, JM. (2015) Social and ecological drivers of success in agri-environment schemes: the roles of farmers and environmental context. Journal of Applied Ecology 52, 696-705.

McIntyre, S., Barrett, GW., Kitching, RI., Recher, HF. (1992) Species Triage – Seeing Beyond Wounded Rhinos. Conservation Biology 6(4), 604-606.

McKenzie, AJ., Emery, SB., Franks, JR., Whittingham, MJ. (2013) Forum: Landscape scale conservation: collaborative agri-environment schemes could benefit both biodiversity and ecosystem services, but will farmers be willing to participate? Journal of Applied Ecology 50, 1274-1280.

MEA (Millennium Ecosystem Assessment) (2005) Ecosystems and human wellbeing: synthesis report. Washington, DC: Island Press.

Morris, C., Potter, C. (1995) Recruiting the new conservationists: farmers' adoption of agri-environmental schemes in the UK. Journal of Rural Studies 11, 51-63.

Moxet, A. and White, B. (2014) Result-oriented agri-environmental schemes in Europe: A comment. Land Use Policy 39, 397-399.

Musters, CJM., Kruk, M., de Graaf, HJ., Keurs, WJT. (2001) Breeding birds as a farm product. Conservation biology 15, 363-369.

Norgaard, RB. (2010) Ecosystem Services: from eye-opening metaphor to complexity blinder. Ecological Economics 69, 1219-1227.

NPWS (National Parks and Wildlife Service). (2008) "The Status of EU Protected Habitats and Species in Ireland". National Parks and Wildlife Services, Department of Environment, Heritage and Local Government, Dublin, Ireland.

NPWS (National Parks and Wildlife Service). (2013) "The Status of EU Protected Habitats and Species in Ireland". Habitat Assessments Volume 2, Version 1.0. National Parks and Wildlife Services, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

Ó hUallacháin, D., Finn, JA., Keogh, B., Fritch, R., Sheridan, H. (2016) A comparison of grassland vegetation from three agri-environment conservation measures. Irish Journal of Agricultural and Food Research 55(2), 176-191.

Opperman, R., Beaufoy, G., Jones, G. (2012) High Nature Value Farming in Europe. Germany: Ubstadt-Weiher, 544p.

O'Rourke, E., Kramm, N. (2009) Changes in the management of the Irish Uplands: A case-study from the Iveragh Peninsula. European Countryside 1, 53-69.

O'Rourke, E., Kramm, N., Chisholm, N. (2012) The influence of farming styles on the management of the Iveragh uplands, southwest Ireland. Land Use Policy 29, 805-816.

O'Sullivan, CA., Finn, JA., O hUallachain, D., Green, S., Martin, S., Meredith, D., Clifford, B., Moran, J. (2017) The development of a national typology for High Nature Value farmland in Ireland based on farm-scale characteristics. Land Use Policy 67, 401-414.

Pe'er, G., Dicks, LV., Visconti, P. et al. (2014) EU Agricultural reform fails on biodiversity. Science 344 (6188), 1090-1092.

Phalan, B., Onial, M., Blamford, A., Green, RE. (2011) Reconciling food production and biodiversity conservation: land sharing and land sparing compared. Science, 333, 1289-1291.

Plieninger, T., Schleyer, C., Schaich, H., Ohnesorge, B., Gerdes, H., Hernández-Morcillo, M., Bieling, C. (2012) Maintaining ecosystem services through reformed European agricultural policies. Conservation Letters 5 (2012) 281-288.

Potter, C., Tilzey, M. (2005) Agricultural Policy discourse in the European post-Fordist transition: neoliberalism, neomercantilism and multifunctionality. Progress in Human Geography 29(5), 581-600.

Potter, C. and Wolf, SA. (2014) Payments for Ecosystem Services in relation to US and UK agri-environmental policy: disruptive neoliberal innovation or hybrid policy adaptation. Agriculture and Human Values 32, 397-408.

Primdahl, J., Peco, B., Schramek, J., Andersen, E., Onate, JJ. (2003) Environmental effects of agri-environmental schemes in Western Europe. Journal of Environmental Management 67, 129-138.

Primdahl, J., Vesterager, JP., Finn, JA., Vlahos, G., Kristensen, L., Vejre, H. (2010) Current use of impact models for agri-environment schemes and potential for improvements of policy design and assessment. Journal of Environmental Management 91, 1245-1254.

Reed, MS., Moxey, A., Prager, K., Hanley, N., et al., (2014) Improving the link between payments and the provision of ecosystem services in agri-environment schemes. Ecosystem Services 9, 44-53.

Redford, K.H. and Adams, WM. (2009) Payment for Ecosystem Services and the Challenge of Saving Nature. Editorial, Conservation Biology 23, 4785-787.

Ribeiro, PF., Santos, JL., Santana, J., Reino,

L., Beja, P., Moreira, F. (2016) An applied farming systems approach to infer conservation-relevant agricultural practices for agri-environment policy design. Land Use Policy 58, 165-172.

Russi, D., Margue, H., Keenleyside, C. (2014) Result-Based Agri-Environment Measures: Market-Based Instruments, Incentives or Rewards? The case of Baden-Württemberg. A case-study report prepared by Institute for European Environmental Policy (IIED) with funding from the Invaluable project.

Russi, D., Margue, H., Opperman, R., Keenleyside, C. (2016) Result-based agri-environment measures: Market-based instruments, incentives or rewards? The case of Baden-Württemberg. Land Use Policy 54, 69-77.

Sage, C. (2012) Environment and Food. London, Routledge.

Schroeder, LA., Isselstein, J., Chaplin, S. Peel, S. (2013) Agri-environment schemes: Farmers' acceptance and perception of potential 'Payments by Results' in grassland – A case study in England. Land Use Policy 32: 134-144.

Schomers, S., Matzdorf, B. (2013) Payments for ecosystem services: a review and comparison of developing and industrialized countries. Ecosystem Services 6, 16-30.

Schwarz, G., Moxey, A., McCracken, D., Huband, S., Cummins, R. (2008) An analysis of the potential effectiveness of a Payment-by-Results approach to the delivery of environmental public goods and services supplied by Agri-Environment Schemes. Report to the Land Use Policy Group, UK, 108pp. Macaulay Institute, Pareto Consulting and Scottish Agricultural College.

Stoate, C., Báldi, A., Beja, P., Boatman, ND., Herzon, I., van Doom. A., de Snoo, GR., Rakosy, L., Ramwell, C. (2009) Ecological impacts of early 21st century agricultural change in Europe – a review. Journal of Environmental Management 91: 22-46.

Strohbach, MW., Kohler, ML., Dauber, J., Klimek, S. (2015) High Nature Value farming: From indication to conservation. Ecological Indicators 57, 557-563.

Tscharntke, T, Klein, AM., Kruess, A. et al. (2005) Landscape perspectives on agricultural intensification and biodiversity – ecosystem service management. Ecological Letters 8(8), 857-874.

Tscharntke, T., Clough, Y., Wanger, TC. et al. (2012) Global Food Security, biodiversity conservation and the future of agricultural intensification. Biological Conservation 151, 53-59.

Uthes, S., Matzdorf, B. (2013) Studies on agri-environmental measures: a survey of the literature. Environmental Management 51(1), 251-266.

Whittingham, MJ. (2007) Will agri-environment schemes deliver substantial biodiversity gain, and if not why? Journal of Applied Ecology 44, 1-5.

Whittingham, MJ. (2011) The future of agri-environment schemes: biodiversity gains and ecosystem service delivery? Editorial: Journal of Applied Ecology 48, 509-513.

Wittig, B., Richter, A., Zacharias, D. (2006) An indicator species approach for result-oriented subsidies of ecological services in grasslands – a study in North-western Germany. Biological Conservation 133(2), 186-197.

Wynn-Jones, S. (2013) Connecting payments for ecosystem services and agri-environment regulation: An analysis of the Welsh Glastir Scheme. Journal of Rural Studies 31, 77-86.

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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