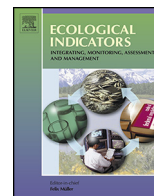




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# Evaluating the impact of rural development measures on nature value indicators at different spatial levels: Application to France and The Netherlands



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## ABSTRACT

This paper proposes an approach for assessing the effectiveness of those agri-environmental schemes and rural development measures aimed at enhancing the natural value of farmland and, more generally, aimed at releasing the pressure on the environment due to agriculture. First, based on fine scale data, indicators derived from the High Nature Value farmland concept are tested at different scales, resolutions and situations: LAU2 for The Netherlands and LAU1 for France. The effect of rural development measures on the evolution of these indicators is then explored. Significant cause-effect relationships are found in the French cases, while only relationships of correlations are observed from the Dutch case study, obviously caused by a lack of data. Using fine scale data on rural development measures related to both 2000–2006 and 2007–2013 programming periods of the Common Agricultural Policy, a spatial econometrics methodology is applied to France, at national level on the one hand, and at a selected NUTS2 level on the other. The results indicate that agri-environmental schemes and specific rural development measures affect the changes in the indicators, and that the spatial scale of the analyses matters. In particular, results indicate that trends observed at the national scale do not necessarily apply at the regional scale (e.g. impacts of conversion to organic farming, the grassland premium, payments for water and biodiversity protection) underlining the importance of multi-scale assessments. Interestingly, delayed effects of the measures implemented in the 2000–2006 programming period, such as machinery investment aids and less-favoured area payments, are detectable. As regards the 2007–2013 rural development measures, the most significant positive effects on the farm nature value indicator are found, at the national level, for locally targeted agri-environmental schemes focused on biodiversity and water issues and, at the NUTS2 level, for supporting organic farming schemes. Given that the farm nature value indicator is built from three different indices (addressing crop diversity, grassland share, and wooded and afforested farmland) the effect of rural development measures on each of these individual indices is also explored. This enables the main structure and the magnitude of policy impacts to be captured and helps with the understanding of why certain objectives were not met. Key findings are relevant in the context of policy monitoring and evaluation, while the methodology proposed, that incorporates spatial effects, is an important contribution to the implementation of the Common Monitoring and Evaluation Framework by Member States to account for national, regional or local characteristics.

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## 1. Introduction

This paper explores the possibilities of systematically and quantitatively evaluating the impact of agri-environmental schemes

(AESs) and, more broadly, rural development measures, on the quality of the environment, particularly the natural value of farmland. As one of the main objectives of AESs is to promote and enhance the environment and the countryside, it is considered that exploring the relationships between the implementation of AESs (or the wider rural development measures) and environmental benefits helps in assessing the efficiency of the policy.

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Since a large part of the land area in Europe is used by farmers, on-farm nature conservation can be an important instrument in restoring, maintaining and enhancing ecosystems dependent on agriculture. AESs are a European Union (EU) mandatory instrument within the Common Agricultural Policy (CAP), under which farmers receive payment for their voluntary efforts in nature conservation, environment-friendly practices or the maintenance of valuable landscapes. The interest in knowing the extent to which these schemes actually enhance the quality of the environment, of nature or the landscape, has driven much research that has examined the effectiveness of AESs and nature-friendly practices (e.g. Kleijn et al., 2006; Kleijn and Sutherland, 2003; Ovenden et al., 1998; Whittingham, 2011). Moreover, the need for such research has been further underlined by the European Court of Auditors (2011, p.28) highlighting that there is “very little information on the environmental benefits of agri-environment payments”. Agricultural land uses have positive and negative effects on the environment and particularly in the biodiversity. On the one hand, streamlined and homogenised land uses have accompanied farm specialisation into fewer arable crops or fewer animal products, with intensive use of machinery and chemical agricultural inputs. Field and farm enlargement often lead to the destruction of landscape features such as hedges and buffer zones, disrupting ecological corridors and fragmenting natural habitats. On the other hand, semi-natural vegetation in agricultural land enhances biodiversity (Doxa et al., 2010) and the supply of regulating ecosystem services such as pollination, maintenance of soil quality, erosion control, and water storage (García-Feced et al., 2014). Maintaining an adequate level of the nature value of agricultural land therefore has multiple benefits. This has been recognised in the CAP.

Starting in the programming period 2007–2013, the concept of High Nature Value (HNV) farmland was introduced into the CAP (European Commission, 2006a) in order to strengthen the role of farming practices in biodiversity maintenance (Beaufoy et al., 1994; EEA, 2004). Many efforts have been made to derive operational indicators from existing data (Peppiette, 2011), but analyses of the effectiveness of policy measures in maintaining and enhancing farmland nature value are less numerous.

This article addresses the extent to which an HNV-derived indicator, based on agricultural statistical data and existing modelling, can support the evaluation of the impact of rural development measures (with a focus on AESs). To tackle this issue, a set of indicators, based on Paracchini and Britz (2010) and Pointereau et al. (2010), is proposed and tested. These indicators measure the impact of farming practices on farmland natural value, focusing not only on areas that are hotspots of biodiversity, but on the whole intensity range. Proposed indicators are empirically tested on two case studies, France and The Netherlands. In France, investigations are based on an LAU1 regional resolution, for both the national level and the Midi-Pyrénées NUTS2 Region, while in The Netherlands, investigations are conducted on an LAU2 resolution for the Noord-Holland NUTS2 region<sup>1</sup>. In each case, attempts are made to link changes in the indicators to a set of rural development measures and AESs. Given the heterogeneity (e.g. in terms of natural conditions, environmental concerns, agricultural features, production systems, etc.) of our case-study areas spatially explicit analyses might be required. Piorr et al. (2009) argue that

<sup>1</sup> Nomenclature of territorial units for statistics (NUTS) was set up by Eurostat as a single, coherent system for dividing up the EU's territory in order to produce regional statistics. At the local level, two levels of Local Administrative Units (LAU) have been defined: the upper LAU level (LAU1), formerly NUTS4, is defined for most, but not all, EU countries, while the lower LAU level (LAU2), formerly NUTS5, consists of municipalities or equivalent units in all 27 EU Member States. Additional information can be retrieved from [http://epp.eurostat.ec.europa.eu/portal/page/portal/nuts\\_nomenclature/introduction](http://epp.eurostat.ec.europa.eu/portal/page/portal/nuts_nomenclature/introduction).

it is necessary to take regional heterogeneity into account while conducting policy assessments. Moreover, considering spatial issues in assessments of the impacts of AESs, such as the one we present, is in line with Farmer et al. (2008) who: (i) point to a lack of studies relating CAP measures to information on the condition and location of the biodiversity resource; and (ii) state that studying the relationship between CAP expenditure and its environmental impacts in a spatial way helps underpin an analysis of the future rationale for European agricultural policy post-2013. A similar recommendation is made by Piorr et al. (2009) who highlight the fact that spatial approaches are required in order to properly evaluate the policy impacts on environmental services provided by agriculture. Conducting spatial analyses is therefore relevant where the focus is placed on complex policy instruments, such as rural development policy (RDP), which targets various objectives.

The paper is structured as follows. The next section briefly presents EU rural development (RD) and agri-environmental contexts along with the HNV concept, while the following section details the data, the indicators, and the proposed methodology. The fourth section presents the results. The final sections provide discussion, conclusions and recommendations.

## 2. Rationale and background

### 2.1. Rural development programming in the EU

AESs were first introduced into EU agricultural policy at the end of 1980s through the integration of environmental considerations into structural policy, with the objective of supporting specific farming practices that protect the environment and maintain the countryside. Implementing agri-environmental programmes was then made compulsory for EU Member States from 1992 through the MacSharry CAP reform. Three main measures accompanied this reform:

- EU Regulation no. 2078/92, being the main pillar for agri-environmental programmes, introduced aids for agricultural production methods supporting the protection of the environment and the maintenance of the countryside;
- EU Regulation no. 2079/92, set up an aid scheme for early retirement from farming;
- EU Regulation no. 2080/92, set up an aid scheme for forestry measures in agriculture.

Although Regulation no. 2078/92 was seen as the backbone of AESs, the other two regulations were likely to have indirect environmental impacts. The early retirement scheme may, for instance, lead to the conversion of land from agricultural into non-agricultural uses, while forestry measures contribute to countryside management. Since the MacSharry reform, the CAP (and its environmental component) has undergone several reforms.

In 1999, the enforcement of the ‘Agenda 2000’ CAP reform divided the CAP into two pillars. While measures aimed at supporting agricultural production were gathered under the first pillar, the RDP was introduced as the second pillar (European Commission, 2003). In the following, this RDP is also referred to as RDP1. RDP1 is based on an integrated approach towards the rural economy, acknowledging the multifunctional features of agriculture. RDP1 encompasses 22 measures, falling into two main groups:

- Accompanying measures introduced from the MacSharry reform: early retirement, less-favoured areas (LFA) and areas with environmental restrictions, agri-environment, and forestry;
- Measures to modernise and diversify agricultural holdings: investments in agricultural holdings; the setting up of young

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