Evolution of European Union policies relevant to soil conservation in agriculture

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Abstract
Six of the soil degradation processes recognised at EU level are closely linked to agriculture. Soil degradation implies a need for protection, maintenance and improvement of soil quality. However, due to the public good characteristics of soil quality, the market does not sufficiently assure its provision. Thus, policy intervention is required to reach desired levels of soil quality through appropriate practices. This paper provides an overview and evolution of European Union policies relevant to addressing soil degradation in agriculture. Such policies evolved from focusing on protection against agriculture's negative externalities towards emphasising its positive externalities. To date, soil protection is not a specific objective of EU legislation, nor does a targeted policy framework for soils exist. Existing EU policies pursuing other environmental objectives have nevertheless scope for soil conservation. Currently, the most important EU environmental directives for soil quality are the Nitrates Directive and the Water Framework Directive. Under the Common Agricultural Policy, the compulsory requirement to keep land in good agricultural and environmental condition plays an important role in soil conservation. Rural development policy, in particular agri-environment measures, offers member states or regions options for encouraging farmers to achieve environmental quality beyond a predefined reference level.

Key Words
European Union policies, soil conservation, agriculture, environmental public goods.

Introduction

Soil performs multiple functions for humans and ecosystems. Intensification of production in some regions and concurrent abandonment in others remain the major drivers (threats) to the ecology of agro-ecosystems, impairing the state of soil, water and air and reducing biological diversity in agricultural landscapes in Europe (Stoate *et al.* 2009). For example, six of the soil degradation processes that are recognised in the European Union (EU) (COM(2006) 131) are closely linked to agriculture: erosion, organic carbon decline, soil biodiversity decline, compaction, contamination, and salinisation and sodification. Degradation of abiotic resources inhibits their proper functioning and thus implies a need for protection, maintenance or improvement of their quality. However, due to a market failure, policy intervention is required to reach satisfactory levels of quality.

To date, soil protection is not a specific objective of EU legislation, nor does a targeted policy framework for soils exist. Existing EU policies pursuing other environmental objectives have nevertheless scope for soil conservation. The SoCo project (sustainable agriculture and soil conservation: http://soco.jrc.ec.europa.eu/) provided a comprehensive overview of their relevance and effectiveness. This paper reiterates those policies that are relevant to protection, maintenance or improvement of soil quality in agriculture. In addition, it explores how policies for soil conservation in the EU conceptually evolved over time. Such evolution reflects the changing challenges and needs of society over time, and its response to these changes.

Why policy intervention?

Most environmental problems can be seen as problems of incomplete, inconsistent, or unenforced property rights regimes (Hanna *et al.* 1995). In the case of soil quality, land in the EU is mostly privately owned, and farmers, who at least have the temporary use rights to soil, suffer first from soil degradation. Depending on the time horizon of their use rights, they have a genuine interest in a good condition of their land. When considering soil as a production factor with private good characteristics, other users can be excluded from using the land for agricultural or other production. However, self-interest in this property rights regime normally coincides with society's needs for soil quality, as soil has additional functions, which have the character of public goods (e.g. carbon sequestration, long-term provision of food, landscape). Public goods have two main characteristics: their quantity of supply does not decrease with consumption (non-rivalry) and their access and consumption is general and free (non-exclusion) (Weimer and Vining 2004). Nevertheless,

the provision of these public goods depends often on the quality status of the private good 'production factor'. Thus, overall society needs for soil quality may differ from the quality level farmers provide. Exactly due to the public good character of soil quality, the market does not sufficiently assure its provision (market failure). Property law further reinforces this market failure by assigning no property rights to ecosystem service benefits (Lant *et al.* 2008). Policy intervention is therefore required to reach satisfactory levels of this quality through appropriate farming practices.

Policy types and levels of environmental quality

In analysing whether a policy has scope for protecting, maintaining or improving soil quality, it is important to assess to which degree the desired soil quality can be achieved. When targeting soil quality, the policy process defines soil quality levels (reference, target) in line with property rights regimes (Figure 1) (Bromley 1997; OECD 2001; Pearce 2005). Parallel, in line with their influence on famers' behaviour, policies can be classified as mandatory, voluntary incentive-based, and awareness-raising measures (Baumol and Oates 1979; Weersink 2002).

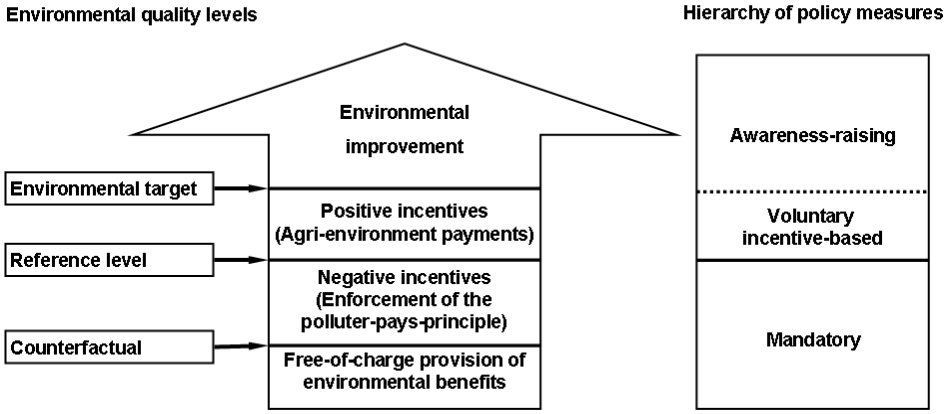

Figure 1. Environmental quality levels and related types of policy measures (Sources: Baumol and Oates 1979; Weersink 2002; Scheele 2008).

Whereas targets relate to the economic criterion of an optimal allocation of resources, reference levels reflect the distribution of costs between farmers and society. The reference level thus distinguishes between what is considered a minimum or mandatory requirement and what exceeds this level and should therefore be obtained contractually or on a voluntary basis. This level thus separates two types of policy measures: mandatory and voluntary incentive-based measures. Under mandatory measures (e.g. cross compliance rules) farmers have to respect the reference level of soil quality at their own expense. Farmers can choose to target a higher level of soil quality (target) under voluntary incentive-based measures (e.g. agri-environment payments). The related payments compensate for income losses due to reduced productivity or extra costs incurred when implementing the contract. Policy measures aiming at a level of soil quality that goes beyond the environmental target are called awareness-raising measures. Advice to farmers fits in the latter category.

Evolution of approaches in EU environmental policies and their relevance for soil conservation

Since the mid-1970s, environmental protection has gradually obtained the status of being a precondition for sustainable economic development in the EU (McCormick 1995). Creation of environmental policies has since become a core part of EU policy making. In the development of EU environmental policies, one can recognise distinct phases. Up to the mid-1990s, the emphasis was very much on protecting the environment against negative effects of human action, thus controlling the risks for human health. Since, the environmental scope has gradually been widened to maintaining or improving environmental quality in its own right (inherent value), a process that coincided with the introduction and development of the EU Treaty.

Protecting the environment for public health

A number of directives directly regulate the discharge of (potentially) harmful substances into water and soil. The Groundwater (80/68/EEC and 2006/118/EC) and Nitrates (91/676/EEC) Directives aim at protecting water quality, whereas the Sewage Sludge Directive (86/278/EEC) primarily affects soils. Parallel, the Plant Protection Products Directive (91/414/EEC) considers effects on both soils and water. Finally, the Birds (79/409/EEC) and Habitats (92/43/EEC) Directives target biotic resources, but have nevertheless positive implications for soil.

Parallel, environmental provisions were incorporated into the Common Agricultural Policy (CAP). The Agricultural Structures Regulation (Council Regulation (EEC) 797/85), authorised member states to introduce special national schemes in environmentally sensitive areas, i.e. particular areas of recognised importance from an ecological and landscape point of view. Nevertheless, even though this regulation paid attention to the permanent conservation of the natural resources used in agriculture, its main focus laid in assisting the continuous development of agriculture in the Community in order to improve the efficiency of holdings and to help develop their structures.

Environmental integration for provision of ecosystem services and sustainability
Environmental integration, i.e. making sure that environmental concerns are fully considered in the decisions and activities of other sectors, has become a priority since the mid-1990s. Against the background of sustainable development, this priority was incorporated into the EU Treaty and subsequently put into practice with the Cardiff Process (1998). Since, environmental objectives have to be integrated into EU sectoral policies, including the CAP. The EU Sustainable Development Strategy (Lisbon 2001) put a further emphasis on policy coordination and integration. This current, coordinated approach coincides with a new generation of environmental directives whereby so-called framework directives aim to harmonise existing policies on the respective topics, and fill gaps where needed. The Water Framework Directive and the Framework Directive on the Sustainable Use of Pesticides are examples of such overarching policies. However, a targeted policy framework for soils is currently missing. To fill this gap the European Commission proposed the Soil Framework Directive (COM(2006) 232). Its overall goal is to protect soils and use them sustainably and would require member states to preserve soil functions, to identify where degradation already occurs and to set their own level of ambition and timetable to combat such degradation.

Parallel, since its conception in the Treaty of Rome (1957), the CAP underwent a series of reforms, mainly driven by international trade obligations and EU budget concerns (Ackrill *et al.* 2008). These reforms also responded to an increasing pressure to deal with the environmental implications of the early CAP. With the 1992 reform, member states were required to introduce agri-environment measures throughout their territory (as opposed to the target areas in the 1985 provision). Thus, farmers got an incentive to voluntarily deliver environmental quality at a level beyond the reference quality level. In 1999, the provisions of this regulation were incorporated into the Rural Development Regulation. The aim of their incorporation was to help achieve coherence within Rural Development Plans (EC 2005). Since, the CAP comprises two main elements: market price support and direct income payments (Pillar 1), and incentive payments targeting rural development (Pillar 2). The most recent reform of the CAP, in 2003, included decoupling of payments from production, introduction of cross compliance, extension of rural development measures and, gradual transfer of funds from farmers' income support to rural development (modulation). Finally, the CAP Health Check revision (2009), i.e. an intermediate review of the CAP after introduction of the CAP direct payments, included minor changes for some of the environmental provisions. In particular the requirement to keep land in good agricultural and environmental condition, a cross compliance instrument, and agri-environment measures, financed under rural development, are relevant to and facilitate the targeting of soil quality.

Discussion and conclusions
Since the mid-1970s up to nowadays, EU environmental directives and environmental measures in the CAP have evolved from focusing on protection against agriculture's negative externalities towards emphasising its positive externalities and providing a range of ecosystem functions and the benefits humans derive from them (ecosystem services). Policies relevant to the environment thus evolved from addressing a single concern and environmental component (e.g. pollution of water by nitrates), often restricted to target areas, to overarching policies, addressing different aspects of the same environmental domain (e.g. aiming at a good status of all waters) or even including policies with multiple objectives (e.g. agri-environment measures). This evolution has gone along with a gradual shift in society's and farmers' minds from seeing soil exclusively as private goods, towards respecting the public good characteristics of these resources as well. We can reasonably assume that the policies that are relevant to soil quality have also contributed to raising awareness for their conservation.

Nevertheless, as it takes time for ecosystems to reach a new equilibrium, it also takes time before impacts of policy measures on soil quality are recorded. In this respect, the history of soil-relevant policies incorporated into the CAP is relatively young. Even though agri-environment measures exist since 1985, they were at first restricted to targeted areas. Since 1992, they became more widespread, both in terms of covering more

territory as well as covering more environmental objectives and thus touching more farming operations. The view of agri-environment measures broadened in particular with their inclusion in rural development policy. This evolution occurred in synergy with, since 2005, making direct payments conditional on complying with a series of environmental policies (cross compliance).

Overall, a range of EU policies is relevant to soil conservation. However, very few policies directly address soil degradation processes, and even if they do, are not oriented towards specific results of soil quality. A lack of defining quality levels has in a lot of cases resulted in policies that only describe the farming operations required (action-oriented) to address soil degradation. Unlike the Water Framework Directive (2000/60/EC) for water quality, a coordinating instrument for soil quality is currently missing.

Disclaimer

The views expressed are purely those of the authors and may not in any circumstances be regarded as stating an official position of the European Commission.

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