SOIL CONSERVATION AND POLICY MEASURES FINDINGS FROM EIGHT CASE STUDIES ACROSS EUROPE[1]

Katrin Prager

Humboldt-Universität zu Berlin
Faculty of Agriculture and Horticulture
Division of Resource Economics
Philippstraße 13, 10115 Berlin, Germany
katrin.prager@agrar.hu-berlin.de

Abstract

There is a lack of knowledge about soil conservation practices in agriculture and little understanding of how farmers can be encouraged through appropriate policy measures to adopt soil conservation practices. The EU funded project "Sustainable Agriculture and Soil Conservation" (SoCo) is aiming to fill this gap. The research was guided by a framework for policy and institutional analysis, using literature and document analyses as well as a stakeholder survey and expert interviews to investigate soil conservation in eight case studies across Europe.

The paper briefly describes the case study areas and presents preliminary findings. The findings highlight i) the need to design policies that target the existing soil threats; ii) the need for good communication and cooperation both between agricultural and environmental authorities as well as between governmental and non-governmental stakeholders; iii) the necessary mix of mandatory and incentive instruments; and iv) the lack of data to monitor and evaluate the effectiveness of policies and soil conservation practices.

1 Introduction

While there are individual policies for water and air addressing issues of pollution and protection there is no European policy primarily concerned with soils or agricultural soils in particular. The same is true for national policies in many member states where soil conservation is rather a by-product of other agricultural and environmental policies. There is a lack of knowledge about soil conservation practices in agriculture and their links with other environmental protection objectives as well as little understanding of how farmers can be encouraged through appropriate policy measures such as the Rural Development Programme to adopt soil conservation practices. The project "Sustainable Agriculture and Soil Conservation" (SoCo) is aiming to fill this gap. The case studies are part of this research that has been commissioned by the European Parliament (SoCo 2008). The case studies complement an EU-wide review of policies and the regulatory environment concerning soil conservation.

Rather than addressing soil conservation issues separately from different disciplinary perspectives this project observed the interdependencies between ecological and social systems and thus applied a common framework for policy and institutional analysis in all case studies (adapted and extended from Hagedorn et al. 2002). The

[1] This paper was presented at the ECOMIT Conference in Piestany, Slovakia, 5-7 November 2008

framework integrates the properties of soil-related transactions, soil-related actors and their characteristics, institutions (the “rules-in-use”) and governance structures. The analysis includes a variety of physical, natural, institutional, socio-economic and historical factors in order to draw conclusions why some soil conservation measures are effective while others fail. This paper places the focus on actors, policies and their effect while the project also included the analysis of farming practices and their impact on soil conservation taking into account soil types and climatic conditions. It should be noted that this paper draws on work in progress and findings are still preliminary.

2 Materials and methods

Eight case studies have been conducted by case study partners across Europe, namely in Germany, the Czech Republic, Bulgaria, Spain, Greece, Belgium, the UK and Denmark. The selection was guided by two main criteria: significant soil conservation issues and territorial balance (geographical coverage across the EU). In addition, a broad range of criteria relating to farming practices and farm structures, policies for soil conservation applied in the area, institutional settings, and governance structures were taken into account.

Soil degradation problems were identified following the definition of soil threats of the Thematic Strategy for Soil Protection of the European Commission (CEC 2006). Five of these threats are directly relevant in the selected case study areas, namely soil erosion, decline in organic matter, soil compaction, diffuse soil contamination (associated with agricultural use), and salinisation (Montanarella 2003).

The case studies are based on two major sources of information, literature and document analyses on one hand and stakeholder surveys and expert interviews on the other hand. Materials analysed for each case study include scientific literature relating to soil conservation policies as well as legal documents such as laws, regulations, directives, decrees, ordinances, and procedural orders. In addition, (regional) statistical information as well as policy, administrative, evaluation, and research reports, e.g., mid-term evaluations of the 2000-2006 Rural Development Programmes, were reviewed.

Quantitative data was gathered from soil science and farming practices experts. A stakeholder survey to obtain qualitative empirical data to supplement information from the literature was conducted with three different groups of actors relevant to soil conservation. The first group included farmers, farm managers and related stakeholders; the second group included administrative and governmental stakeholders involved in soil conservation policy design and implementation; and the third group included stakeholders operating outside public bureaucracies such as NGOs, farming advisors, farmers’ unions and other interest groups.

3 Results and Discussion

3.1 Description of case study areas

The size of the case study areas ranges from 42 km² (Bulgaria) to 3300 km² (Spain). The boundaries of areas are aligned to either administrative (municipality, district) or natural units (catchment, basin). The population density varies but all areas are

classed as rural areas. The area with the highest population density is in Belgium while the more scarcely populated case study areas are in Greece and Germany. Soils are heterogeneous, not only between the case study areas but also within individual areas.

Farming systems and agricultural management practices dominantly affect soil degradation and are subject to policy intervention. Approximately 1/3 to 2/3 of the total land of each case study area is used as agricultural land. The land use varies but all areas have in common that the greater share of the utilised agricultural area is used as arable land – up to 93% in the Danish case study.

The case study areas cover the major farming systems and management practices in those areas suffering from soil degradation. Farming systems include rotational cropping systems with intensive fertiliser input and heavy machinery use in the Northern and Eastern areas in Europe, where soil erosion, soil compaction, decline in organic matter, and soil contamination were identified as major soil conservation problems. Perennial cropping systems, such as almonds in Spain, induce different processes of soil degradation. The Bulgarian and the Spanish case study area feature irrigation agriculture which has an important impact on salinisation processes.

Although the severity of the main soil degradation issues differs between the case study areas, soil erosion is identified among the three most relevant degradation issues in all but one of the areas (Table 1). Soil erosion is a complex problem because of its diverse causes (wind, water) and possible off-site impacts. Such off-site impacts of soil erosion, relating to eutrophication of surface waters and habitats, siltation, and infrastructure damage, might by far exceed the detrimental on-site effects of soil erosion.

Table 1: Overview of main soil degradation issues in the case study areas

Case Study Area	Soil Erosion	Decline in Organic Matter	Diffuse Soil Contamination	Soil Compaction	Salinisation
West-Flanders (BE)	4	3	5	2	0
Bjerringbro and Hvorslev (DK)	2	2	1	4	0
Axe and Parrett catchments (UK)	3	4	2-3	5	1
Rodopi (GR)	3	3	1	2	1
Guadalentín Basin (ES)	5	3-4	2-3	2-3	4
Belozem (BG)	1	3	1-2	3	5
Svratka river basin (CZ)	5	3	1	3-4	0
Uckermark (DE)	4	3	2	4	0

Note: The numbers indicate the relevance of the main soil degradation threats for the case study area, with the level being 5 = severe to 0 = not relevant.

Following erosion in relevance, soil compaction and decline in organic matter are cited as a problem for more than 6 out of the 8 case studies. Diffuse soil pollution is highlighted as problematic for the Belgian and UK case study, while salinisation is a severe degradation issue in the cases in Bulgaria and Spain.

The severity of degradation problems varies greatly among the areas as can be seen from the numbers in Table 1. It should be noted, however, that while numbers are assigned to the degradation issues, evoking the impression of quantified measurements, these assessments are mainly meant to show gradations. The severity of a degradation issue depends on various factors such as moisture content and soil types. Thus, soil compaction can be a major problem after heavy rainfall but not after dry times. Erosion may be a severe issue on highly erodible soils but hardly relevant on a less erosion-prone soil a few kilometres away.

Similar constellations are found in the Czech and German case study area with nearly identical severity of degradation issues, and the Greek region featuring similar issues and ratings. Case studies in Denmark and the UK both have soil compaction as the major soil conservation issue. The degradation types and their severity are often but not always representative for the whole country.

3.2 Farming practices that prevent soil degradation

A number of farming practices have been identified that can help prevent erosion, salinisation or other types of degradation. Examples for cropping and tillage measures are intercrops to maintain soil cover, reduced tillage to reduce erosion, and restrictions on fertiliser and manure to decrease soil contamination. Long term measures include a change of crop rotation, liming to mitigate acidification, drainage management to mitigate salinisation, retention ponds, tree strips and others. Some of these measures are already applied by farmers in the case study areas or have been applied in the past. In many cases, farmers are aware of soil degradation on their farm and in the surrounding area. In transition countries they often lack the resources (finances, machinery, specific knowledge) to tackle the problems.

3.3 Administrative system

Political institutions and types of governance provide a diverse context which affects design, implementation, impact, and adaptation of measures that influence land use and soil conservation practices in various ways. While we find similar production systems and soil conservation issues in case study areas in Denmark, the UK and Belgium, political institutions and governance structures that affect soil conservation differ considerably in these countries. This refers, for example, to tenure systems and policy implementation. Soil conservation policies may be implemented by centralised or decentralised administrative structures. The case study selection includes two federal states - Belgium and Germany - and unitary states. Among the unitary states are some where the central government has devolved more political power to lower levels, such as the UK and Spain, or remained a more centralised system such as the Czech Republic and Greece.

The Czech Republic is comparable with East Germany with respect to natural conditions and farm structures, but went through a different process of institutional, political, and administrative reform. Bulgaria, in contrast, experienced severe problems in changing the political and administrative system and has less developed implementation capacities and extension systems.

3.4 Property rights

Agrarian and social institutions represent complex norms and rules-in-use. These rules strongly influence soil degradation and conservation. An example for such institutions is practiced property rights. They regularise the choices of actors such as farmers and administrators by means of the constraints and incentives they offer. This applies, for example, to the land tenure system which partly still shows commons in Greece, mainly lease-hold in the East German, Czech and Belgian case study, or farmers predominantly cultivating their own land in Denmark, UK, Greece and Spain. In a similar way, land and soil are affected by agricultural structures which are to a certain extent also shaped by agrarian institutions. This is true for large scale farming in East Germany and Belgium as contrasted with small plots and subsistence farming in Bulgaria or Spain.

3.5 Main soil conservation policies

Findings of the case studies show that European legislation has a considerable impact on soil conservation activities: In all case studies at least two European policies such as the Nitrate Directive (EU 1991), the Good Agricultural and Environmental Condition (GAEC) standards under Cross Compliance, or Rural Development Funding, were found to be among the most important policies for soil conservation in the case study area. Individual European directives are of differing relevance in the case study areas. For example, all of West Flanders is a Nitrate Vulnerable Zone (NVZ) under the Nitrate Directive, while only a small proportion of the river basin in the Czech case study is designated as NVZ, and the Directive is not among the important policies for the UK case study area.

Incentive measures such as agri-environmental schemes support farmers who undertake soil conservation measures exceeding the cross compliance GAEC standards. In general, these schemes are well accepted and popular among farmers and are likely to be successful if prescribed measures are implemented. However, we cannot generally assume these schemes to achieve effective soil conservation as the Greek example illustrates: here, the GAEC Soil Organic matter was successful regarding the incorporation of crop residue into the soil and banning straw stubble burning with its negative effects for soils and climate while the measure to cultivate legumes was not locally adjusted and suspended because of farmers' and other stakeholders' objections.

Soil-related policies at national and regional level differ considerably across case study areas. Not all policies impacting on soils have soil conservation as a primary or secondary objective. Instead, soil conservation is often a by-product of the measure but results from implementation. Some countries have established policies that directly target their main soil degradation issue, such as Belgium's Manure Decree and Erosion Decision, while others have broader policies without targeting provisions as is the case in Bulgaria. The targeted policies tend to be more effective than the policies which have soil conservation only as a by-product. However, assessing the effectiveness of policies proves difficult in many cases due to the lack of data. Despite monitoring efforts, e.g. in the context of ex-ante, mid-term and ex-post evaluations of the Rural Development Programmes, indicators for soil are often not included or not available for the whole area. Evaluation of the policies' impact on soils is not common, which might be due to the dominance of action-oriented policies over

result-oriented policies but also to the costs associated with extensive monitoring and data management.

Some countries such as the Czech Republic and Germany have specific soil protection laws that are able to secure a baseline protection but are enforced to a limited extent or provisions for Good Agricultural Practice are not well monitored. This illustrates the necessity of both, well-defined rules and the existence of an effective implementation structure, i.e. governance structure. In contrast, Denmark has no national legislation explicitly addressing soil degradation issues because the Danish government assessed the soil degradation issues and concluded that they are of minor importance or no problem at all. Another notable case is the UK case study where there is no national soil legislation but a number of incentive schemes offering payments to farmers to protect natural resources. A local partnership of governmental and non-governmental stakeholders has been formed, pursuing the improvement of soil management as one of its objectives. The Farming and Wildlife Advisory Service (FWAG) is the NGO organising the implementation of this initiative.

Local approaches such as the Municipal Erosion Plans in West Flanders where municipalities may undertake subsidised actions for erosion control based upon their erosion plan or agri-environmental schemes supporting particular soil conservation measures allow for better targeting and thus are more likely to mitigate degradation problems. Local or regional policies also allow the integration of stakeholder knowledge and feedback to a greater extent than national or European policies. A number of examples from the case studies showed that policies are more successful if they are accompanied by information and advice, e.g. provided by local agriculture offices or advisory bodies, so that farmers, landowners and land managers are aware of the problems, understand the measures and apply them adequately.

There is anecdotal evidence that implementation works better if the designing authority is also the one implementing a policy because less effort is needed for coordination. In general, vertical communication of sectoral units appears to work better than horizontal communication across departmental borders. However, policies seem more successful if a broad range of agricultural and environmental stakeholders have been consulted – or better, involved – in policy design. This has often created a common understanding of purpose and objectives of the policies and stakeholders were able to communicate this to their constituency and/or farmers as the actors making the on-ground change.

4 Conclusion

It is too early yet to assess whether European, national or local approaches to soil conservation are more effective. Command and control policy measures prevail in most cases, while in the UK case study there is a dominance of voluntary, incentive-based measures. In most case studies a mix of policies is applied, including command and control, incentive-based policy measures and – to a lesser extend – moral suasion initiatives and information and capacity building measures.

Emerging cross-cutting themes highlight i) the need to design policies that target the existing soil threats; ii) the need for good communication and cooperation both between agricultural and environmental authorities as well as between governmental and non-governmental stakeholders; iii) the necessary mix of mandatory and voluntary incentive-based instruments coupled with sufficient information and advice

to farmers and landowners; and iv) the lack of data to monitor and evaluate the effectiveness of policies and soil conservation practices.

Acknowledgements

The project has been funded by the European Union. The partners that carried out the individual case studies are listed on the SoCo website.

References

Commission of the European Communities (CEC) (2006). Thematic Strategy for Soil Protection – COM (2006) 231 final. Available at http://ec.europa.eu/environment/soil/pdf/com_2006_0231_en.pdf.

European Commission - Environment (1991). Council Directive 91/676/EEC of 12 December 1991 concerning the protection of waters against pollution caused by nitrates from agricultural sources (91/676/EEC) Nitrates Directive. Available at http://ec.europa.eu/environment/water/water-nitrates/directiv.html

Hagedorn, K.; Arzt, K. and Peters, U. (2002). Institutional Arrangements for Environmental Co-operatives: a Conceptual Framework. In: Hagedorn, K. (ed.): Environmental Cooperation and Institutional Change: Theories and Policies for European Agriculture. Cheltenham: Eward Elgar, pp.3-25.

Montanarella, L. (2003). The EU Thematic Strategy on Soil Protection. Available at http://eusoils.jrc.it/events/SummerSchool_2003/prog.html

SoCo (2008). Website of the SoCo Project. Sustainable Agriculture and Soil Conservation. Available at http://soco.jrc.ec.europa.eu/