JRC Technical Notes

Case Study – Greece

Sustainable Agriculture and Soil Conservation (SoCo Project)

Nick Barbayiannis, Kyriakos Panagiotopoulos, Demetris Psaltopoulos, Dimitris Skuras

Sustainable Agriculture and Soil Conservation 2007-2009

EUR 24131 EN/8 - 2009

JRC EUROPEAN COMMISSION

Institute for Prospective Technological Studies

Institute for Environment and Sustainability

Case Study Greece

Sustainable Agriculture and Soil Conservation (SoCo Project)

The project 'Sustainable Agriculture and Soil Conservation (SoCo)' is a pilot project commissioned by the Directorate-General for Agriculture and Rural Development, in response to the request of the European Parliament (Administrative Arrangement AGRI-2007-336).

Authors:
Nick Barbayiannis, Kyriakos Panagiotopoulos[1], Demetris Psaltopoulos, Dimitris Skuras[2]

Editors:
Stephan Hubertus Gay, Monika Schmidt[3], Katrin Prager[4]

1 Aristotle University of Thessaloniki, Faculty of Agriculture
2 University of Patras, Department of Economics
3 European Commission, Joint Research Centre (JRC), Institute for Prospective Technological Studies (IPTS)
4 Humboldt-Universität Berlin, Faculty of Agriculture and Horticulture

JRC
EUROPEAN COMMISSION

The mission of the JRC-IPTS is to provide customer-driven support to the EU policy-making process by developing science-based responses to policy challenges that have both a socio-economic as well as a scientific/technological dimension.

European Commission
Joint Research Centre
Institute for Prospective Technological Studies

Contact information
Address: Edificio Expo. c/ Inca Garcilaso, 3. E-41092 Seville (Spain)
E-mail: jrc-ipts-secretariat@ec.europa.eu
Tel.: +34 954488318
Fax: +34 954488300

http://ipts.jrc.ec.europa.eu
http://www.jrc.ec.europa.eu

JRC 55637

EUR 24131 EN/8
ISBN 978-92-79-14945-0
ISSN 1018-5593
DOI 10.2791/38995

Luxembourg: Office for Official Publications of the European Communities

Printed in Spain

Preface

Agriculture occupies a substantial proportion of European land, and consequently plays an important role in maintaining natural resources and cultural landscapes, a precondition for other human activities in rural areas. Unsustainable farming practices and land use, including mismanaged intensification and land abandonment, have an adverse impact on natural resources. Having recognised the environmental challenges of agricultural land use, in 2007 the European Parliament requested the European Commission to carry out a pilot project on 'Sustainable Agriculture and Soil Conservation through simplified cultivation techniques' (SoCo). The project originated from close cooperation between the Directorate-General for Agriculture and Rural Development (DG AGRI) and the Joint Research Centre (JRC). The JRC's Institute for Prospective Technological Studies (IPTS) coordinated the study and implemented it in collaboration with the Institute for Environment and Sustainability (IES). The overall **objectives of the SoCo project** are:

(i) to improve the understanding of soil conservation practices in agriculture and their links with other environmental objectives;

(ii) to analyse how farmers can be encouraged, through appropriate policy measures, to adopt soil conservation practices; and

(iii) to make this information available to relevant stakeholders and policy makers EU-wide.

In order to reach a sufficiently detailed level of analysis and to respond to the diversity of European regions, a case study approach was applied. Ten case studies were carried out in Belgium, Bulgaria, the Czech Republic, Denmark, France, Germany, Greece, Italy, Spain and the United Kingdom between spring and summer 2008. The case studies cover:

- a screening of farming practices that address soil conservation processes (soil erosion, soil compaction, loss of soil organic matter, contamination, etc.); the extent of their application under the local agricultural and environmental conditions; their potential effect on soil conservation; and their economic aspects (in the context of overall farm management);
- an in-depth analysis of the design and implementation of agri-environmental measures under the rural development policy and other relevant policy measures or instruments for soil conservation;
- examination of the link with other related environmental objectives (quality of water, biodiversity and air, climate change adaptation and mitigation, etc.).

The results of the case studies were elaborated and fine-tuned through discussions at five stakeholder workshops (June to September 2008), which aimed to interrogate the case study findings in a broader geographical context. While the results of case studies are rooted in the specificities of a given locality, the combined approach allowed a series of broader conclusions to be drawn. The selection of case study areas was designed to capture differences in soil degradation processes, soil types, climatic conditions, farm structures and farming practices, institutional settings and policy priorities. A harmonised methodological approach was pursued in order to gather insights from a range of contrasting conditions over a geographically diverse area. The case studies were carried out by local experts to reflect the specificities of the selected case studies.

This Technical Note is part of a series of ten Technical Notes referring to the single case studies of the SoCo project. A summary of the findings of all ten case studies and the final conclusions of the SoCo project can be found in the **Final report on the project 'Sustainable Agriculture and Soil Conservation (SoCo)'**, a JRC Scientific and Technical Report (EUR 23820 EN – 2009). More information on the overall SoCo project can be found under http://soco.jrc.ec.europa.eu.

BE - Belgium	**West-Vlaanderen** (Flanders)
BG - Bulgaria	**Belozem** (Rakovski)
CZ - Czech Republic	**Svratka river basin** (South Moravia and Vysočina Highlands)
DE - Germany	**Uckermark** (Brandenburg)
DK - Denmark	**Bjerringbro and Hvorslev** (Viborg and Favrskov)
ES - Spain	**Guadalentín basin** (Murcia)
FR - France	**Midi-Pyrénées**
GR - Greece	**Rodópi** (Anatoliki Makedonia, Thraki)
IT - Italy	**Marche**
UK - United Kingdom	**Axe and Parrett catchments** (Somerset, Devon)

Table of content

List of figures

List of tables

Acronyms

AGROCERT	The Agricultural Products Certification and Supervision Organisation
CAP	Common Agricultural Policy
FAS	Farm Advisory System
GAEC	Good Agricultural and Environmental Condition
LFAs	Less Favoured Areas
NGO	Non-governmental organisation
NSSG	National Statistical Service of Greece
OPEKEPE	Organisation for Payments and Control of Community Guidance and Guarantee Support
SFP	Single Farm Payment
SMRs	Statutory Management Rules

1 Introduction to the case study area

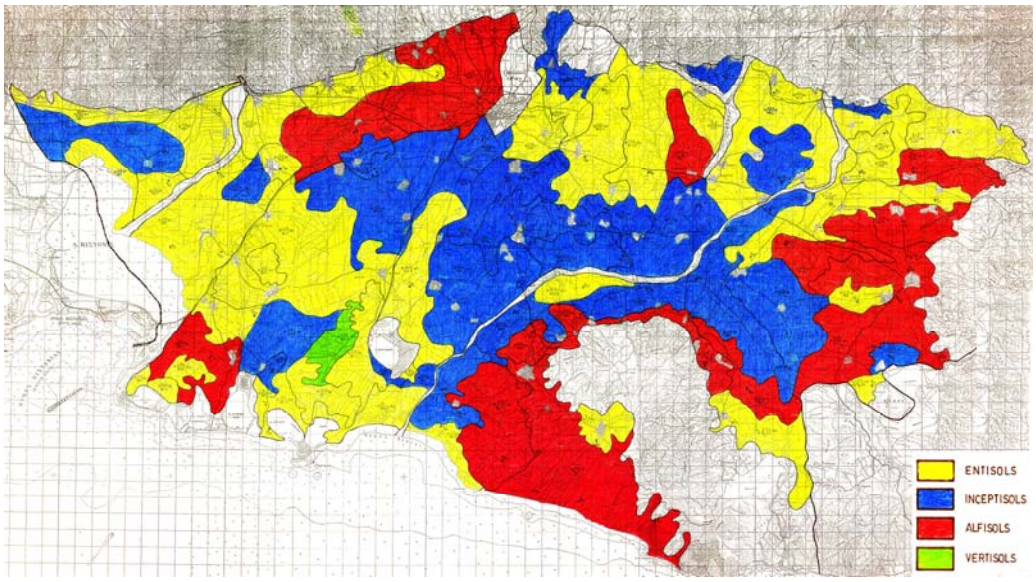
1.1 Spatial and natural characteristics

The prefecture of Rodopi has a total cover of 2,553 km^2 and is of one the three prefectures forming the region of Thraki[5] in North-Eastern Greece (Figure 1). Soil parent materials are formed from river deposits and geomorphologically are characterised as alluvial plains, alluvial fans and terraces. Also a small area is covered by lacustrine deposits. The dominating soil types on the lower parts of the alluvial plains are classified as Fluvisols and are characterised by successive layers of different texture more common sandy loam and sandy clay loam. Those on flat areas are very well or well drained with very little or no erosion. Those on mild slopes have suffered erosion and lost part of the surface layer. Soils on the higher parts of the alluvial plains and alluvial fans are classified as Cambisols and are characterised by slight differentiation and the formation of a cambic horizon. In most cases these are well drained soils with very little or no erosion. Soils on the alluvial terraces are classified as Luvisols and are characterised by a higher degree of differentiation and the formation of an argillic horizon. Luvisols of the area are well drained soils and those on the higher parts of the areas have suffered from erosion. The climate of the region is typical of the Mediterranean type of climate with cold winter and dry warm-hot summer. Mean annual temperature is 14.8º C with mean maximum in August 30.4º C and minimum 1.4º C in December. A very important characteristic of the climate in relation to agriculture is that from beginning of June to the end of August evapotranspiration demands are not supplied by precipitation and irrigation is necessary. Figure 2 presents the distribution of soil types in Rodopi.

Figure 1: Location of the case study area

[5] Note that Thraki and Thrace are different spellings for the same part of the region called Anatoliki Makedonia, Thraki (NUTS2-GR11). They are used synonymously throughout the report.

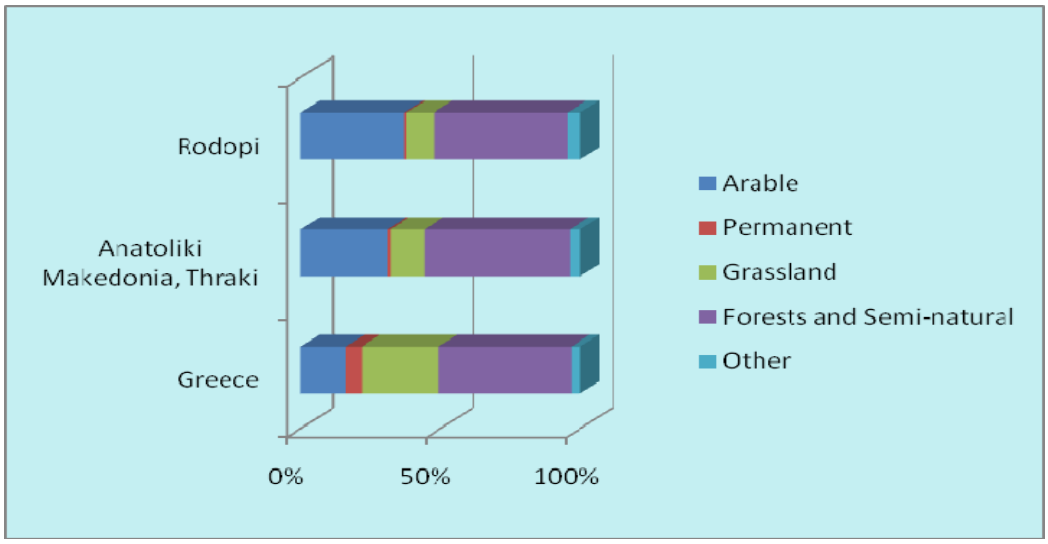
Figure 2: Distribution of soil types in Rodopi



1.2 Land use and farming

Farming in Rodopi covers an area of 255,030 ha of which 96,580 ha are Utilized Agricultural Area (UAE) in the form of arable land and permanent cultivations, 24,650 ha are covered by various types of grassland and are utilized by farm holding, 10,560 ha are natural grasslands and 111,430 ha are covered by forests and mixed grasslands and forests. Extensive areas of bushes and forested agricultural land are characterized as semi-natural land by the relevant statistical authorities of the country. Natural protected land is also occupied by seven Natura 2000 sites covering 104,244 ha. The rest of the land is covered by inland waters (8,260 ha) and urban land and infrastructure (3,550 ha). Figure 3 compares the distribution of land to that of the whole region (Anatoliki Makedonia and Thraki) and of Greece. Rodopi, in comparison to Greece, is well endowed with arable land and forests and semi-natural land while permanent cultivations and grassland covers, proportionately, less land. In comparison to Makedonia and Thraki, Rodopi follows almost the same distribution of land to major land uses.

Figure 3: Land distribution to major uses, Rodopi, Anatoliki Makedonia, Thraki and Greece



Source: Census of Agriculture and Livestock 1999/2000. National Statistical Service of Greece, NSSG

The latest available Survey of the Structures of Agricultural Holdings in 2005, count 16,678 farm holdings of which almost all are privately owned. The average farm size is around 4.8 ha. According to the 2003 Survey of the Structures of Agricultural Holdings of the 16,664 farm holdings, 13,308 were pure farm holdings (79.8 %), 265 are pure livestock (animal raising) holdings and 3,091 are mixed farm and livestock holdings (18.5 %). In 2005, 80,400 ha were cultivated and annual cultivations covered 93 % of the cultivations. For 2003, when more detailed information is available, the annual cultivations occupied by cereals (37,256 ha), tobacco (6,920 ha), cotton (23,575 ha) and sunflower (528 ha). In 2003, land fragmentation was still a very widespread phenomenon with each holding having an average of 7.78 plots of cultivated land with an average size of 0.63 ha per plot. Almost 35.8 % of all farm holdings in 2003 (5,969 of the 16,664 holdings) cultivate holdings of less than 2 ha while 205 holdings were landless and were mostly livestock holdings grazing on commons (NSSG, 2003).

At this point it is important to note that all three major annual cultivations were subject to major policy reforms in late years. The policy regime for common market organisation for tobacco moved to full decoupling and for cotton to partial decoupling while major cereals including wheat, maize and oil seeds have experienced large market fluctuations due to the bio fuel policy and international market shortages. More specifically, areas under tobacco dropped from 6,400 ha in 2005 to 5,000 ha, sugar beet from 2,000 in 2005 to less than 200 ha in 2007 while the non-cultivated land increased from 3,000 ha in 2005 to 12,000 ha in 2007. An important development occurred in cotton cultivations which against all expectations for decreasing areas increased from 23,100 ha in 2005 to 28,000 ha in 2007 mainly due to the price received for cotton seeds used by the bio fuel industry. Tree plantations account for less than 1.5 % of utilised agricultural land and thus are not important. In 2005, livestock consisted of bovine (23,359 heads), sheep (148,381 heads), goats (145,774 heads) and poultry (259,163 heads).

In 2005, almost 88 % of farm households (14,649 out of the 16,678) had access to irrigation and a capability to irrigate 49,400 ha or 67 % of utilized agricultural area. In 2005, 9,756 farm enterprises (almost 60 % of the total number of households) owned their own tractor. With the respective national percentage being at around 30 %, Rodopi's agriculture is highly mechanised. In 2005, the 16,674 farm households employed 38,746 members of the family of which 30,820 (almost 83 %) are employed exclusively or mainly in their household, the rest is being employed partly. There are only 352 farm households employing permanent farm workers and 3,771 employing 22,473 seasonal workers for 210,106 days bringing the average employment per seasonal worker to almost 9.5 days.

1.3 Main soil degradation processes

The major soil degradation problems are related to:

- Soil erosion,
- Decline in soil organic matter,
- Soil compaction, and
- Water salinisation.

These are typical of the soil degradation problems met all over Greece.

Soil erosion presents a medium risk due to the hilly landscape and the minimum or totally absent soil cover in spring and autumn during storm events. Soil loss is estimated to 1-2 t/ha/year and to 2-5 t/ha/year for the hilly areas. Decline in soil organic matter presents also a soil threat since farmers do not implement practices that preserve soil organic matter (until recently straw burning was a common practice because incorporation in the dry soil in July was very difficult). Furthermore, soil compaction may become a major problem due to improper selection of heavy agricultural machinery and increasing use of heavy machinery at harvest.

Soil erosion (water) is due to the hilly landscape in combination with the lack or minimum soil cover in spring and autumn, the major soil threat and possibly the most difficult to combat due to the small acreage of the holdings in the area since farmers follow different and sometimes contrasting cultivation practices (Figure 4). Soil organic matter decline (in most cases around 1 %) is the second major soil threat since farmers do not implement practices that preserve soil organic matter (Figure 5). Until recently straw burning was a common practice because incorporation of crop residues in the dry soil in July was considered very difficult. Soil compaction will probably emerge as a serious problem due to the increasing use of heavy machinery (most farmers use far larger tractors than required for the size of their holdings and the soil type they have to cultivate).

Figure 4: Soil classification and severity of erosion

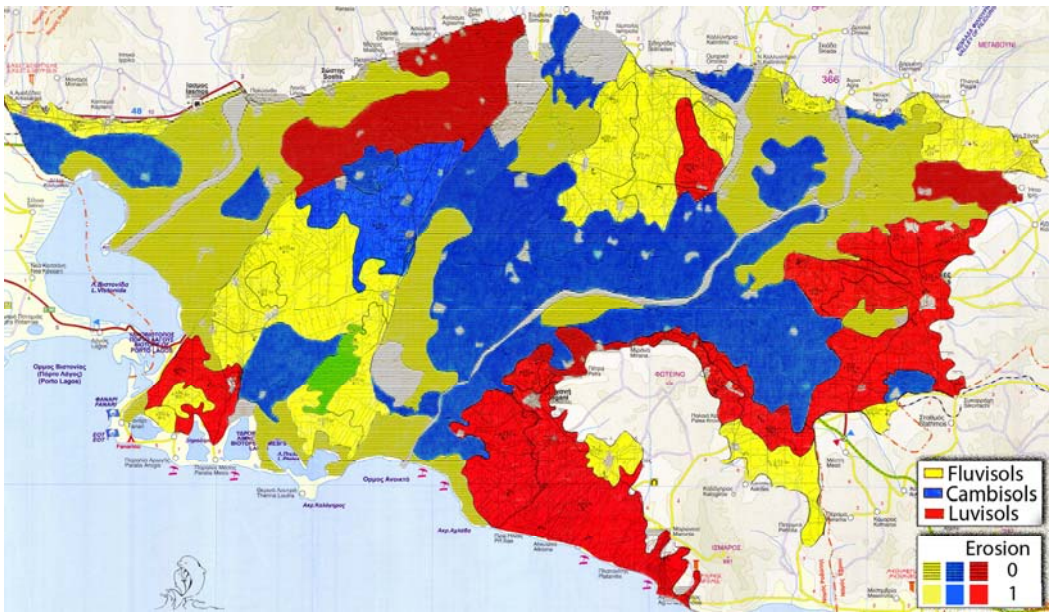
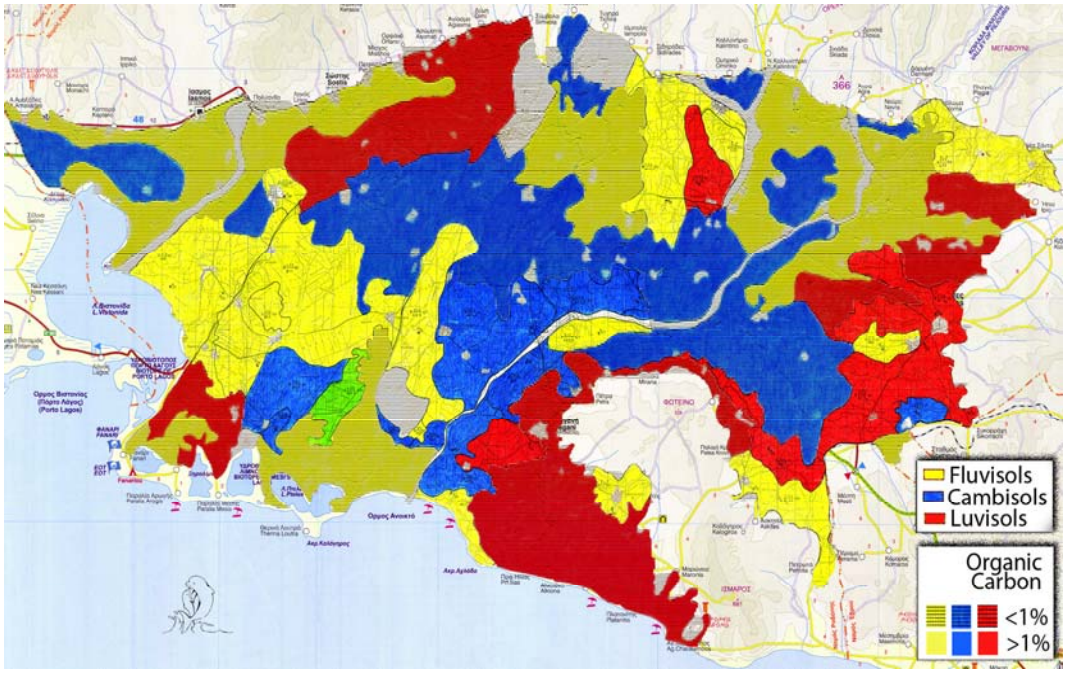


Figure 5: Organic carbon in the case study area

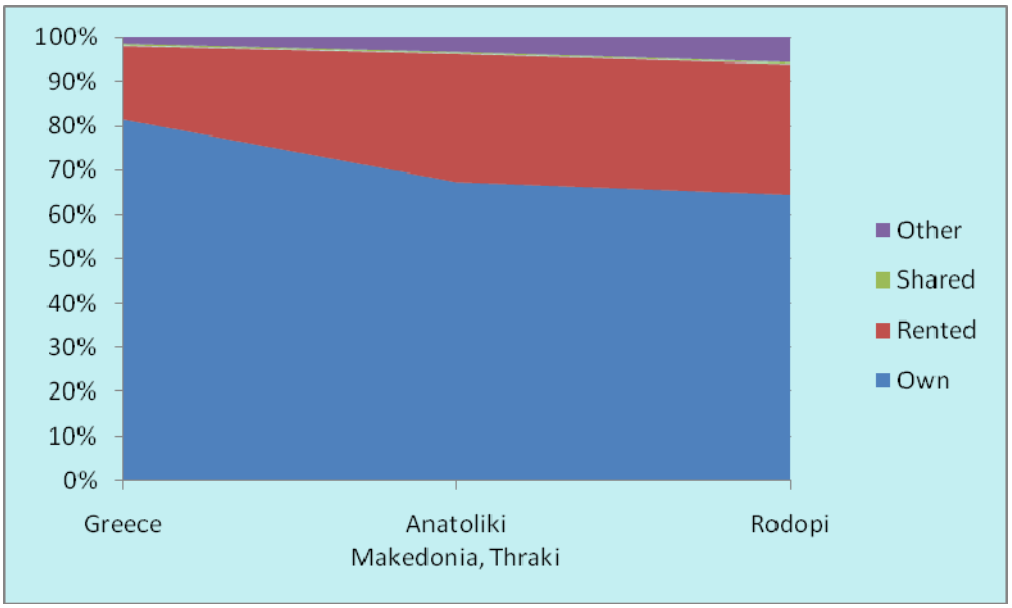


1.4 Land tenure system

Almost all land is privately owned. Unfortunately there are no estimates of land rents or land prices. In 2005, of all households that have land 14,914 households had their own land accounting for 55,000 ha, an average of 3.7 ha of own land per holding. 6,817 households rent in 21,800 ha of land, an average of 3.2 ha per holding. 1,322 holdings have 3,400 ha under other types of property rights.

Figure 6 shows the distribution of land tenure systems in Greece, the region of Anatoliki Makedonia, Thraki and the prefecture of Rodopi. The percentage of owned land is significantly lower in the prefecture of Rodopi than in the rest of Greece while rented land is significantly higher. This provides strong indications that a significant proportion of the utilized agricultural land is not cultivated by its owners. This may be due to the significant migration that took place among the rural population of Makedonia and Thraki especially to European countries immediately after World War II. The land left behind was either passed on and inherited to non-farmers or was abandoned. Thus, land rented out by absentee land owners is widespread.

Figure 6: Distribution of land tenure types, Rodopi, Anatoliki Makedonia, Thraki and Greece



Source: Survey of the Structures of Agricultural Holdings, 2005, NSSG

2 Methodology

Our project anticipated a wide information collection process. Information collection targeted four segments of the population thought to be directly or indirectly involved with soil conservation policy and included:

1. Soil experts,
2. Farmers, their unions and farm advisors,
3. Personnel of governmental bodies involved in the design, implementation or control at local, regional or central level, and
4. Personnel of non-governmental bodies involved in the design, implementation or control at local, regional or central level.

Information collection was carried out mainly through face-to-face interviews with members of the aforementioned groups. Interviews were guided by questionnaires that contained closed questions demanding from the respondent to fill in information or a number or to tick a series of boxes. It also contained open questions where the respondent could record his/her own opinion more extensively or he/she could justify the response provided to one of the closed questions.

Questionnaire 1 was filled in by soil experts providing data on agri-environmental conditions, farming practices and soil conservation measures.

The questionnaire directed at farmers, farming cooperatives, other relevant land users, and cooperative associations (Questionnaire 2) was aiming to elicit information about the respondent; their perception of status of soils in their areas, issues and problems; farm practices being employed to conserve soils, the impacts and motivation for uptake; experiences of policies, approaches to policy administration and implementation; and their perceptions of the effectiveness of soil protection measures. Before starting each interview, the participant was informed about the project, its aims and objectives and about the organisations conducting the survey, i.e., the Universities of Thessaloniki and Patras. We assured all respondents that the information will be treated in a confidential manner. For the interviews with four tobacco farmers of a Muslim origin, we used the agricultural consultant of their tobacco group as an interpreter.

The questionnaire directed at government actors (Questionnaire 3) had the same structure but its aim was to investigate and evaluate soil conservation policy from its design through its implementation, delivery and enforcement. Collection of information was intended to aid understanding of the policies currently in place that impact on soil conservation of agricultural soils, as well as to identify those policies classed as good practice and that could potentially be applied more broadly to address soil threats in Europe.

Finally, the questionnaire directed at non-government actors (Questionnaire no 4) had the same structure as the other questionnaires directed at farmers and governmental bodies and the same aim as the one directed to governmental bodies. Information collection was also extended to many organisations that were not directly conducted in the framework of this work but it was evident from the interviews that their operation has a more or less marginal impact either on policy formulation and design or on policy implementation. From these institutions, we collected reports, studies or information relevant to our work from their websites or through telephone arrangements.

3 Perception of soil degradation in the case study area

3.1 Soil degradation problems

The following soil degradation problems have been identified and extensively discussed with all farmers, administrative and governmental actors as well as actors operating outside the public bureaucracies:

- Soil erosion from water,
- Decline in organic matter,
- Compaction,
- Salinisation.

Table 1 provides an overview of experts' opinion on the main soil problems, their causes and impacts.

Table 1: Experts' opinions on soil degradation processes in the case study Rodopi

Soil degradation process	Causes	Impact
Soil erosion by water	• Surface runoff due to inappropriate irrigation methods • Bare soil at inappropriate times • Cultivation techniques	• Damage to crops • Reduced soil fertility • Loss of resource
Decline in organic matter	• Intensive arable farming • Repeated disturbance to the soil • Soil erosion (see above)	• Structural degradation • Increased vulnerability to compaction and soil erosion.
Compaction	• Working the land when wet • Number of times land is driven over or walked on, or 'trafficked'	• Reduces crop yield/quality because of poor root development • Reduces infiltration • Increases generation of surface runoff
Salinisation	• Irrigation with saline waters from wells affected by sea-water intrusion in the lowlands.	• Accumulation of salts in topsoil in the lowlands • Reduces yield of sensitive to salts crops • Prevents cultivation of orchards in areas affected by salt accumulation

Source: Case study interviews

It should be noted that the assessment of degradation effects and the severity of the problems depend upon, first, the location of the farm and second whether the respondent is a farmer or a person affiliated with a governmental or non-governmental body. There are places where the severity of certain problems is more acute and this is recognised by the participants of the three surveys. On the other hand, farmers and governmental officials tended to have the same perception and assessment of the problem, while persons affiliated with non-governmental organisations had mixed perceptions either similar to the perceptions of farmers, e.g., farmers unions or more pessimistic e.g., environmental NGOs (Table 2 and Figure 7).

Table 2: Perceived severity of soil degradation problems by various actors

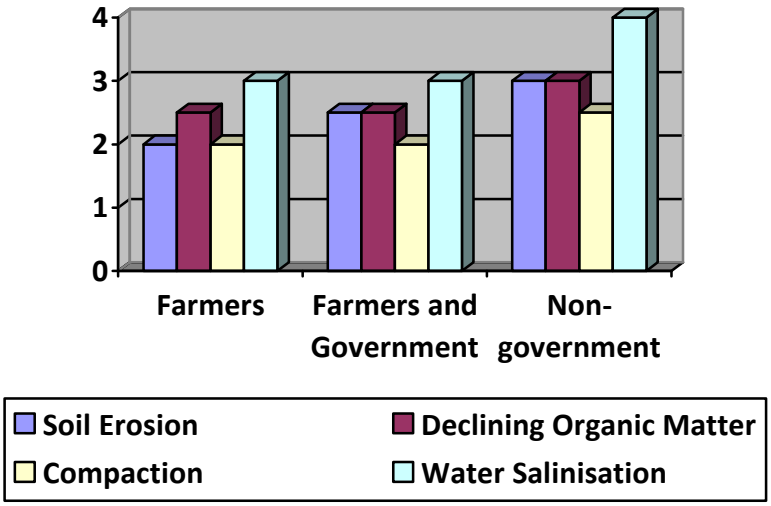
Soil degradation problem	Severity in the area (all respondents)		Severity on the farm (farmers only)
	Farmers and Governmental Officials	Non-governmental officials	
Soil erosion (water)	2.5	3	2
Decline in organic matter	2.5	3	2.5
Compaction	2	2,5	2
Salinisation (water not soils)	3	4	3

Note: 1 = no problem to 5 = severe problem (numbers represent the average).
Source: Case study interviews

Soil erosion due to surface water runoff is a problem in certain semi-mountainous and hilly areas but not a serious problem in the lowlands. Decline in organic matter is a more common

problem especially on farms where demanding cultivations such as maize and cotton have been chosen. Compaction is not a serious problem as yet. It has to be repeated that salinisation does not refer to soils but to irrigation water. This presents a problem to soils but there are not yet evident signs of soil salinisation. Moreover, salinisation is observed in certain land strip next to the sea and where irrigation is intense during the summer months (again due to the chosen cultivations). Furthermore, water salinisation in its most acute form seems to lead the choice of cultivation to plants that present resistance to saline water, e.g., cotton.

Figure 7: Perceived severity of soil degradation problems by various actors



Note: 1 = no problem to 5 = severe problem
Source: Case study interviews, own presentation

3.2 Trends in soil degradation and consequences

The trend of soil degradation problems is presented below in table 3. The difference between the perceived current situation and the 10 year trend is larger among actors representing non-governmental officials. The most rapidly developing problem seems to be soil compaction because the problem is at a low severity-low priority status. Water salinisation, if continued in current trends, will be a very severe problems in the years to come and will also be transferred on soils. On the other hand, one should bear in mind that most of the soil problems are tightly related to the current agricultural commodity markets and agricultural policies. The latter are undergoing changes which are not still evident to the farmers of the region. As one farmer put it, “if prices continue to rise, we will irrigate with pure sea water”.

Table 3: Perceived trend of soil degradation problems by various actors

Soil degradation problem	Trend over the next 10 years	
	Farmers and governmental officials	Non-governmental officials
Soil erosion (water)	3	3.5
Decline in organic matter	3	3
Compaction	3	3.5
Salinisation (water only)	4	4.5

Note: 1 = small increase in severity of the problem to 5 = large increase in severity of the problem (numbers represent the average).
Source: Case study interviews

4 Farming practices and soil conservation measures

4.1 Farming practices and their effects on soil

4.1.1 Farming practices that cause soil degradation

In our research we identified the following farming practices that can contribute soil degradation:

- Burning of the annual cultivation residues (burning of the straw stump) which applies on cereals, maize and cotton cultivations,
- Ploughing that does not always take place along contour lines,
- Lack of cultivation rotation,
- Excess use of machinery sometimes under bad weather conditions,
- Excess use of irrigation water due to old irrigation practices such as sprinkler and in a few cases flooding (gravity),
- Excess use of fertilisers and pesticides.

Table 4 shows the typical cropping systems, their characteristics and the estimation of impacts of soil degradation problems.

Burning of cultivation residues in October each year was a widespread farming practice in Greece and the case study area of Rodopi. This practice had wide environmental implications, until it was prohibited when the cross-compliance measures were introduced, three years ago. Due to the time occurrence of this practice, burning coincided with the first autumn rains and led to soil erosion and a loss of soil organic matter. Furthermore, burning of residues was a dangerous practice contributing to forest and wilderness fires and tempted the involved farmer to put in the fire other residues on the farm such as plastic cover residues used in covering early vegetable cultivations or seed beds. Finally the same practice had severe impacts on the landscape for quite a long period during the year. Burning of the straw stump was preferred to residues incorporation because after a long dry summer the soil was difficult to plough and soil structure damage and consequently erosion with he first autumn rains were likely to occur. The farmer should apply a light irrigation on the straw residue before ploughing a practice that was difficult, taking into account the low water levels at the end of the summer as well as the extra cost involved for irrigating and ploughing the residues. This farming practice has been eliminated due to strict enforcement of the cross-compliance rules.

Ploughing in most cases is done along the slope and most farmers follow that practice because of convenience. However ploughing along the contour lines sometimes is considered dangerous particularly in the cases of slopes over 10 %. However, even if the slope permits contour ploughing, farmers follow a convenient ploughing practice rather than a ploughing practice complying with soil conservation from erosion. As the cross compliance inspector noted “It is difficult to accuse a farmer for not ploughing along the contour lines if this is evidently dangerous and taking into account the so many accidents that occur each year with agricultural machinery

Table 4: Typical cropping systems, their characteristics and the estimation of impacts of soil degradation problems in the case study Rodopi, Greece

Crop	Cotton (all varieties) – Fibre	Durum wheat, winter - Grain	
Production orientation	Conventional	conventional	conventional
Farm type	arable farm	arable farm	arable farm
Tillage type	Ploughing	ploughing	ploughing
Irrigation type	sprinkler – pivot	no irrigation	no irrigation
other management options	reduced tillage and cover crops	reduced tillage	cover crops
Soil quality class[a]	1 and 2	2 and 3	2 and 3
Soil degradation problem	vulnerability		
soil erosion water	Medium	low	low
decline in organic matter	Medium	medium	medium
Compaction	Low	low	low
Salinisation	low		
off-site damages	low	low	low

a: There are three soil quality classes in the case study:
Class 1 means very well drained soils with very little or no erosion, those on slightly inclined slopes have suffer from erosion, soil type: Fluvisols (good quality);
Class 2 means well drained soils mostly on slightly inclined soils with little erosion, soil type: Cambisols (good quality); and
Class 3 means well drained soils mainly on slightly inclined soils with erosion, soil type: Luvisols (good quality).
Source: ZALF

Crop rotation is encouraged and farmers know well the benefits of the practice especially those growing tobacco who try to change field at least every two years as a measure against nematodes. Suitable parcels (meaning for tobacco producers close to the village) increases the rotation usually to three and four years.

The lack of cultivation rotation for the cotton producers is rooted in two different mechanisms: first cultivation specialisation among farmers and second market mechanisms that favour the choice of certain cultivations over their alternatives. Over the years, farmers accumulate physical and human capital in the sense of machineries specialised to certain crops, e.g. a cotton collection machine, knowledge on a specific cultivation and networks for suppliers or networks with specific traders. By rotating the cultivation farmers loose their comparative advantage and feel that this crop rotation is not needed by all soils and thus its compulsory enforcement does not promote justice. On the other hand, market mechanisms and especially prices for output and inputs favour certain cultivations over other and thus farm profit margins are reduced when crop rotation is adopted.

Excess use of machinery and most frequently of heavy collection machines or heavy tractors leads to compaction and destructs the physical properties of soils. Use of machinery is combined with special weather conditions such as extended dry summers which aggravate the problem. Sometimes, the collection of cotton is carried out under very dry conditions while the first ploughing is also carried out under very dry conditions.

Old systems of surface and sprinkler irrigation waste water especially when these are combined with adverse weather conditions. Many cotton and maize farmers still irrigate with surface irrigation while sprinkler irrigation is the most commonly used method. Drip irrigation and similar water saving irrigation methods are not widely adopted by farmers in the case study area. Sprinkler irrigation under very high temperatures (approaching 40°C) during the summer waste valuable water and increase the pressure on the limited water resources. As a result deeper drilling for water aquifers results in water salinisation especially in the lowlands and near the sea areas of the prefecture. Farm modernisation schemes subsidise the purchase of drip irrigation systems and promote the adoption of water saving practices on the farm but these are limited and are lower on the investment agenda of the farmers in the prefecture.

Up to very recent years, the excess use of fertilisers was promoted by policy and market mechanisms that subsidised the produced quantity. In recent years farmers started to understand that fertiliser reduction in conjunction with area based subsidies is a more cost-reducing practice. This year, the tremendous increase in fertiliser prices due to oil price increases resulted in even more rational use of fertilisers. Reductions in the use of fertilisers results to lower levels of soil and water contamination through surface water runoff.

4.1.2 Farming practices that prevent soil degradation

A range of farming practices prevent soil degradation. In some cases these farming practices provide alternatives to the farming practices suggested by policy measures. However, incorporating residues for example has practical difficulties and a better practice is to leave the residues on the land. This practice also allows natural vegetation to grow. Both natural vegetation and the cover crop residues help to reduce erosion. Incorporation of residues and vegetation in spring preserves organic matter. Ploughing along contour lines contributes to decreased soil erosion by water and farmers are aware of the benefits of the practice and in cases they are reluctant to apply it they should be encouraged to try alternatives such as leaving uncultivated strips or cultivate strips along the contours.

Machinery is subsidised and the final choice (i.e. horse power) usually leads to the selection of larger tractors; a fact that can contribute to soil compaction. On one hand, obtaining and maintaining machinery that is larger than necessary imposes a financial burden on farmers. On the other hand, the use of machinery that is heavier than what would be required from the farms needs makes contour ploughing more difficult. When more labour intensive practices are exercised, soil compaction is reduced and the use of heavy machinery is avoided. However, labour intensive practices are gradually abandoned due to lack of labour in rural areas. The use of migrants' labour has provided a temporary solution but has also created social problems in rural areas.

Finally, rotation with legumes that are consequently incorporated into the soil enriches soils with natural nitrogen due to the nitrogen biding processes of the legumes root system. This practice also enhances organic matter because legumes are ploughed in the soil. Thus, soils acquire natural nitrogen and need less nitrogen fertilisation and maintain higher levels of organic matter.

There are many drivers behind the aforementioned farming practices and their action is simultaneous and concurrent. Furthermore, one should not isolate these drivers from the wider physical, social and economic environment of the area or the changes undergone in Greece in general the last decades of the 20th century. After conducting the surveys and having the opinion of local farmers and scientists as well as of other interested or involved parties the whole spectrum of drivers may be classified under three general headings: physical, institutional and economic related to markets.

The physical environment imposes constraints on farming practices favouring soil conservation. The lack of water and the very dry conditions prevailing during the summer months lead to generally dry soils in autumn when some crops such as cotton are harvested. This implies that pressure is put on water resources leading to pumping from very low levels and increased salinisation of water resources in the lowland, near to the sea areas. The dry conditions at the end of the summer prohibit certain farming practices and especially the practice of ploughing straw residues back into the soil.

The institutional environment is also a driver behind certain farming practices. The institutional environment is responsible for a range of measures that had an adverse or a favourable impact on farming practices. The institutional environment provides a series of measures for rural development; some of them had a direct negative impact on soil conservation such as the subsidisation of heavier more specialised and powerful machinery. This was mainly carried out through the farm modernisation scheme. On the other hand the same scheme assisted farmers to adopt drip irrigation practices which have assisted water savings and mitigate water salinisation. The lack of infrastructure and especially infrastructure for irrigation (dams and aquifer charge) have supported deep drilling for water which leads to water salinisation and an extremely high costs for irrigation (approaching sometimes 20 % of total farm operating costs). The institutional environment is also responsible for the introduction and operation of the cross compliance Good Agricultural and Environmental Condition (GAEC) rules and their relevance to local conditions. The two most important issues related to the introduction of GAECs are the lack of information and dissemination campaigns and, of course, the lack of any monitoring and control.

Finally, the economic and market-oriented drivers related to the shaping of farming practices are connected to the continuous efforts of farmers to reduce production costs and to maximise the produced quantity. Cost reduction efforts have assisted the rational use of fertiliser and pesticides as well as of energy inputs (oil and lubricants) and thus irrigation. These efforts were assisted and coupled by increasing prices for inputs caused by increasing world oil prices. At the same time, increased food prices have caused accelerated opposite drivers for increased production and yield maximisation.

4.2 Suitable soil conservation measures

Tables 5 and 6 below show the effects of cropping/tillage soil conservation measures on soil degradation problems and the effects of long term soil conservation measures on soil degradation problems. The most suitable technical measures are the restriction of row crops on steep slopes for soil erosion related problems and irrigation related techniques for water salinisation which may consequently impact soil salinisation in the long run.

Restriction of row crops on parcels of land that have a high slope (higher than 10 %) is also assisted by measures demanding ploughing along contour lines or alternatively ploughing on the diagonal.

Irrigation management refers to measures aiming to save water use on plots with water demanding cultivation (cotton and maize). Irrigation management does not only refer to the technique used to irrigate but also to irrigation practices taking into account the hours of irrigation and the condition of the soil. The techniques used in the case study of Rodopi usually refer to sprinkler irrigation and rarely to flooding (gravity irrigation). These two techniques waste water, while drip irrigation is the most water saving technique available especially for cotton cultivations. Many farmers also follow convenient hours of irrigation and end up irrigating by sprinklers during midday when the temperatures may rise up to 40^0C. Furthermore, farmers often do not plan their irrigation and sometimes do not take account of weather forecasts, they may irrigate just before a rainy day.

On the other hand, very few farmers undertake chemical analyses of the water used for irrigation. As it was noted by many farmers during surveys, there is suspicion that water is sometimes not appropriate for irrigation due to water salinisation but analysing the water (including appropriately taken samples) is costly. Farmers in the lowlands near to the sea areas of Rodopi argued that sometimes the chemical analyses showed a water salinisation of 2000 µS/cm well above the acceptable 600 µS/cm.

Table 5: Effects of cropping/tillage soil conservation measures on soil degradation problems

	Soil degradation problem									
Measures	soil erosion water	soil erosion wind	decline in organic matter	negative carbon balance	diffuse contami-nation	compaction	salinisation	acidification	decrease of water reten-tion capacity	Off-site damage
restriction of row crops on steep slopes	2		2							
restrictions on the max. amount of N- fertilisation										2

Legend: The numbers indicate *the general effects of soil conservation measures on soil threats in the case study*, examined in Questionnaire 1 with the following unit: 2 = farming practice highly mitigates the threat. The grey marked cells are not relevant because this measure has no relationship to the threat.
Source: ZALF

Table 6: Effects of long term soil conservation measures on soil degradation problems

	Soil degradation problem									
Measures	soil erosion water	soil erosion wind	decline in organic matter	negative carbon balance	diffuse contami-nation	compaction	salinisation	acidification	decrease of water reten-tion capacity	Off-site damage
liming								2		
irrigation management to mitigate salinisation							2			
control of irrigation water/use of appropriate water quality							2			

Legend: The numbers indicate *the general effects of soil conservation measures on soil threats in the case study*, examined in Questionnaire 1 with the following unit: 2 = farming practice highly mitigates the threat. The grey marked cells are not relevant because this measure has no relationship to the threat.
Source: ZALF

5 Evaluation of soil conservation measures

This section describes the main conservation measures applied by farmers in Rodopi. Five large sets of measures are described. The first set deals with measures such as maintaining a green cover, ploughing along the contours, and maintaining terraces and stone walls under the Soil Erosion GAECs. The second set concerns legume incorporation and the prohibition of burning cultivation residues included under the Soil Organic Matter GAECs. The third set discusses measures undertaken by farmers located in Natura 2000 sites. The fourth set of measures refers to farming practices under Organic Agriculture. The final measure refers to irrigation practices and the need to replace current sprinkler irrigation practices by drip irrigation. Although the soil conservation measures are presented according to their prescription in various policies, the following sections focus on the evaluation of the technical conservation measures rather than policies.

5.1 Selected measures under Soil Erosion GAEC standards

Cross compliance requirements as defined by the Good Agricultural and Environmental Condition (GAEC) related to soil erosion are presented below:

- On parcels with a slope of over 10 % a green cover is obligatory during the rain period, till preparing the soil for the next sowing, as appropriate to the cultivation.
- On parcels with more than a 10 % slope where there is danger of erosion, ploughing should be carried out on the level or diagonally, or alternatively stable uncultivated strips should be created as containment zones, at distances in keeping with the characteristics of the land and the slope. In addition, irrigation may not take the form of flooding.
- Terraces or natural borders should not be destroyed.

Being cross compliance requirements, these are mandatory and related to the Single Farm Payment rules. Thus, the measures are not supported by increased payments or subsidies and the driver behind their adoption (given limited monitoring and control) relies purely on farmers' attitude to comply and understand the long-term benefits of the measure on his/her farm viewed as an economic and social asset.

5.1.1 Maintaining Green Cover

The measure concerning maintenance of a green cover during the rain period aims at reducing soil erosion due to water runoff. Of course the same measure has impacts on organic matter conservation because the reduction of water runoff reduces leaching of the top soil containing nutrients and organic matter.

The maintenance of green cover during the rain period on parcels having slopes of over 10 % is an old farming practice that was widely adopted. However, during the last year only, certain parcels were cultivated (and thus ploughed) earlier than usual in order for some farmers to get two cultivations in one period. This rather limited phenomenon occurred due to changes in world cereals prices and changes in the common organisation of cotton markets. More specifically, under the EU's cotton regime farmers receiving the area payment were obliged to cultivate their farm up to a point where the ball was grown irrespective of the grown quantity. Thus, in view of this change, certain farmers chose to cultivate cotton later (as they did not care about quantities) and first grow cereals for which higher prices were expected.

The economic efficiency of the measure for maintaining a green cover on the parcel during the rain period is significant because it incurs no cost to the farm and is very beneficial in economic terms as it provides fodder for the household's animals.

5.1.2 Ploughing Along Contour Lines

The measure aims at reducing the speed of water runoff, thus reducing the risk of soil erosion on parcels of land where water runoff can gain considerable speed due to high slopes. However, the measure concerning ploughing along contour lines on steep parcels (slopes over 10 %) is not widely adopted or respected. The fact is that on certain parcels ploughing along contours is dangerous and farmers adopt a more convenient ploughing pattern that does not support soil conservation from erosion.

The economic efficiency of the measure commanding ploughing along contours has zero costs to the farmer but incurs certain benefits due to increased protection from soil erosion. Its adoption is purely based on whether this is feasible and on whether farmers are aware and have understood the benefits accrued by such a practice. The adverse soil erosion effects coming from not ploughing along the contour is evident in certain parcels and farmers acknowledge soil erosion as a problem both on their farm and the wider hilly area.

In cases where ploughing along the contours is dangerous, the measure provides two alternatives: ploughing should be carried out diagonally, or stable uncultivated strips should be created as containment zones, at distances in keeping with the characteristics of the land and the slope. Ploughing diagonally is not favoured by farmers because the tractor crosses the field and is not easy to move. Maintaining uncultivated strips reduces the surface of land available for cultivation. Taking into account the small sizes and the extreme fragmentation, leaving uncultivated strips may result to substantial loss of available cultivated surface.

5.1.3 Maintaining Terraces and Natural Borders

The measure demands from farmers to maintain stone terraces where these exist and also maintain natural borders. Terraces and natural borders that are along the contour of the plot reduce the speed of water runoff and decrease the risk of surface soil erosion. This measure, besides the aforementioned direct soil conservation aims has also wider environmental benefits. Stone terraces are a significant element of the rural landscape in the mountainous locations of the case study area. Natural borders offer a niche to wild animals and increase biodiversity. However, the cost of maintaining stone terraces is high. Taking into account the ageing population that cannot carry out stone maintenance works this implies that workers should be hired and this is a costly operation.

Social and economic norms are important for adopting and respecting the technical measures concerning soil erosion. In places where small family farming is maintained and especially on small tobacco farms, mechanisation of works is rather limited and adverse environmental effects on soils are minimised. On the contrary, on larger more industrial and consolidated farms cultivating cotton or maize, mechanisation and the use of larger machinery increases soil erosion and allows ploughing practices that do not comply with the measures.

Overall assessment of measures under Soil Erosion GAECs

Economic costs

- The economic efficiency of the measure for maintaining a green cover on the parcel during the rain period is significant because it incurs no cost to the farm and is very beneficial in economic terms as it provides fodder for the household's animals.
- The economic efficiency of the measure commanding ploughing along contours has zero costs to the farmer but incurs certain benefits due to increased protection from soil erosion.
- The cost of maintaining stone terraces is high. Taking into account the ageing population that cannot carry out stone maintenance works this implies that workers should be hired and this is a costly operation.

Technical restraints

- Ploughing along contours is sometimes dangerous (especially when done with large tractors) and farmers adopt a more convenient ploughing pattern that does not support soil conservation from erosion.

Environmental effectiveness

- The environmental benefits of maintain a green cover are evident on hilly and mountainous areas and soil erosion avoidance is empirically assessed as very significant.
- Ploughing along contours has significant benefits for soil erosion mitigation. Alternatives to this measure are also of significant environmental value.
- Terraces and stone walls reduce the velocity of water runoff and thus eliminate surface soil erosion on very hilly and steep plots.
- Terraces and stone walls provide a nest to wild flora and fauna and enhance the ambient environment.

5.2 Selected measures under Soil Organic Matter GAEC standards

There are two GAEC standards on soil organic matter which were defined[6] as follows:

- Farmers must cultivate grain legumes and incorporate these into the soil, in addition to the main crop, on 20 % of the cultivated area of their farm each year.
- Depending on the local conditions, farmers must choose to follow one or more of the following practices for the remains of their crops:
  1) incorporation into the soil,
  2) grazing the stubble,
  3) mulching the ground with the remains and incorporating them into the soil the following spring.

Only in exceptional cases, i.e. in regions outside the Natura 2000 network and with the authorisation of the competent Rural Development Directorate and the fire brigade, farmers may burn the stubble.

Being cross-compliance measures, these are obligatory and related to the Single Farm Payment rules. However, the measure concerning crop rotation with legumes was suspended by the Greek government because it was considered unjust for the farmers especially in the regions of Central Macedonia, East Macedonia and Thraki where the prefecture of Rodopi belongs administratively. Thus, the only remaining measure is not supported by increased payments or subsidies. The driver behind its adoption and its strict monitoring and control relies on the avoidance of burning the straw residues due to the high danger of wilderness and forest fires. Despite its technical inefficiency and economic costs the adoption of the measure has been enforced widely and is considered one of the most successful implementation of cross-compliance measures.

5.2.1 Legume Incorporation into the Soil by a Rotating Method

Rotation with legumes that are consequently ploughed in the soil enriches soils with natural nitrogen due to the nitrogen biding processes of the legumes root system and enhances organic matter because legumes are ploughed in the soil. Thus, soils acquire natural nitrogen and need less nitrogen fertilisation and maintain higher levels of organic matter. The soil conservation objectives of the measure are, first, to advance the soil's organic matter and second, to protect soils that are in danger of deterioration from continuous use with a rotated one year set aside. In other words, the measure targeted both soil enrichment by legume, such as alfalfa or clover, cultivation and land lying idle for one year. The main objection

[6] by Joint Ministerial Decision 324032, article 2, paragraphs 4 and 5 – Controls exemplified by Ministerial Decision 262021, article 5, paragraph 2

against the introduction of the measure was that not all soils needed the same treatment and, as long as there was no coherent soil map of Greece covering all micro types of soils, the application of the measure would create extra costs to farmers that would have otherwise been included. The extra costs are associated with first, the foregone income of not cultivating plus the cost of cultivating legumes and incorporating them in the soil. Furthermore, if one takes into account the conditions of family farming in certain areas of Greece and especially the very small size and extreme fragmentation it would be extremely difficult for many economically marginal farms to apply the measure while it would be difficult for the authorities to really monitor and reinforce its application. The measure has been suspended until a unified soil map of Greece is produced.

5.2.2 Prohibition of Burning Cultivation Residues

This measure prohibited the widely applied burning of stubble (especially straw residues) and is very successful. The measure aims at enhancing organic matter by incorporating residues to the top soil. Burning the residues during autumn had the risk of leaching the nutrients away from the plot by a sudden heavy rain. Technically, its application was not easy especially in certain areas of Greece, but not in our case study area of Rodopi. Incorporation into the soil is not easy when the soils are dry at the end of a prolonged dry summer season. Mulching requires extra costs of labour and machinery while grazing is not always feasible. After the application of the measure the majority of the farmers have chosen incorporation in the soil while mulching has been adopted only on a few larger farms. The drivers behind the measure's application and enforcement were two. First, agronomic soil protection argues for the conservation of soil organic matter and the protection of soils from erosion. This driver may be considered as an internal (within agriculture) driver. Second there was a wider social environmental request (external to agriculture) driver for fire avoidance and protection of the rural and wilderness landscape. Burning of cultivation residues especially at the end of the summer or early in the autumn when the winds are stronger was held responsible for many fires.

The economic efficiency of the measure is low because it accrues costs to the farm without ascribing short term benefits. Farmers that used to incorporate their residues into the soil before the introduction of the measure and thus have a long standing experience with the measure argue that their soils are evidently better off than those of their neighbours. They also argue that when incorporation into the soil becomes a practice the farming costs are reduced because certain cultivation operations (e.g., last irrigation before harvesting, the way of harvest, etc.) are carried out in view of residue incorporation. In that sense the introduction of the measure will not really create innovation but it will alter the way certain cultivation practices are applied in order to create synergies with either residue incorporation or mulching.

The environmental effects of the measure are significant. First, the measure directly contributes to enriching organic soil matter by avoiding burning and leaching of nutrients and organic matter. Secondly, the measure protects soils from erosion especially when mulching is the preferred alternative. Additionally, the measure obviously improves rural landscapes.

The application of the measure is indicative of the resistance due to inertia created by well-rooted farming practices. In our case burning of the farm's residues was a well-rooted practice of convenience that was further supported by financial constraints. Fires on wilderness areas were also used by farmers to increase grazing places or enhance the capacity of deteriorated grasslands especially when intrusion by not favourable plants had occurred. Thus, burning was a usual practice. On the other hand, farms (even the smallest ones) became more specialised and the few animals kept on farm were not enough to sustain grazing of the residues. Let alone the fact that many parcels are far away from the farm's main holding and transferring the animals there is not economically feasible. However, the public's demand for controlling forest fires ignited by residue burning has had an impact on farmers' attitudes. On the other hand, some signs of soil organic matter reduction and medium to low signs of soil erosion on the farm have facilitated the measure's enforcement bypassing social norms.

Overall assessment of measures under Organic Matter GAECs

Economic costs

- The extra costs of legume incorporation are associated first, with the foregone income of not cultivating and second, with the cost of cultivating legumes and incorporating them in the soil.
- The aforementioned cost is significant in the light of the very small size and extreme fragmentation that prevail over many Greek farms.
- The economic efficiency of the measure prohibiting burning of cultivation residues is low because it accrues costs to the farm

Technical restraints

- It is extremely difficult for the authorities to monitor and reinforce the application of legume planting and incorporation in the soil due to the absence of cadastrals and GIS systems for monitoring
- Incorporation of cultivation residues may be difficult after long dry summers unless a light irrigation is preceding.

Environmental effectiveness

- Not burning the cultivation residues directly contributes to enriching organic soil matter by avoiding leaching of nutrients and organic matter.
- The same measure protects soils from erosion especially when mulching is the preferred alternative.
- The same measure obviously improves the rural landscape
- Incorporation of legumes enriches soil organic matter and allows land to lye idle (rest) for one year

5.3 Measures for Farming in Natura 2000 and Other Protected Areas

Supporting farmers located in Natura 2000 sites is one of the agri-environmental measures introduced in the Rural Development Plan for Greece 2000-2006 and continued under the current (2007-2013) plan under Axis 2 that contains all agri-environmental measures.[7] The objective of the measure is to support farmers in environmentally sensitive areas to undertake commitments in addition to those expected by cross compliance rules. These commitments are formed by first a set of general rules applicable to all farmers located within Natura 2000 areas and second by a list of measures to be issued by each Managing Authority. The second set of measures aims at localising the farming rules and adapting them to local farming and environmental conditions.

The first set of measures that applies to all farmers includes:

- Harvesting should be performed from the centre of the field to its outer parts;
- Farmers must preserve natural flora in the boundaries of the fields and allow for uncultivated islands within the field;
- Farmers should not allow grazing animals in the field from 1st of March to 31st of August on uncultivated zones or on the natural borders ;
- Farmers should take action to protect natural water collection elements.

The prefecture of Rodopi includes Natura 2000 areas accounting for about 105,000 ha. Some of them are common with the neighbouring prefectures of Xanthi and Evros and there is not an estimate of the area belonging to the one prefecture or the other. Furthermore there is not an estimate of the area covered by agricultural area versus non –agricultural area (inland waters, wildlands, etc.).

[7] The legal base of the measure are articles 36 (a) (iii) and 38 of Regulation 1698/2005 as well as Regulation 1974/2006 (Annex II).

Along the Natura 2000 measure, especially for farming around the Lagoons of Thrace (Thraki), the Rural Development Plan for 2007-2013 envisages a further payment to farmers that cultivate irrigated land. The scheme has a limit of 20,000 ha in the whole of Thrace and the obligation of farmers is either a five year set aside of 25 % of the irrigated land or a combination of cultivation rotation with dry cultivations on 20 % of the land (all land to be included in a five year period) and uncultivated margins (borders) of 5 % of the total land.

5.3.1 Harvesting from the Centre to the Boundaries of the Field

Harvesting from the centre to the boundaries following spirals protects soils from erosion contrary to the conventional practice of harvesting from the outer parts of the field to the centre.

5.3.2 Preservation of Uncultivated Islands within the Field

This measure primarily aims at enhancing biodiversity and increasing nesting places for wild animals. However, the measure has indirect implications on soil conservation as it reduces surface water runoff and thus decreases the risk of soil erosion from surface water.

5.3.3 Ban on Grazing Uncultivated Zones or Natural Borders

This measure primarily aims at enhancing biodiversity and increasing nesting places for wild animals by preserving natural elements on the field. The ban on grazing applies from 1 March to 31 August. Banning of grazing, however, has indirect effects on soil conservation due to avoidance of compaction especially by larger animals (e.g. cows).

5.3.4 Protection of Water Collection Elements

This is primarily a water management measure. However, as far as natural water collection elements are preserved and aquifers are enhanced, the risk of water salinisation is reduced. By reducing water salinisation the risk of soil salinisation from irrigation is also reduced.

Overall Assessment of the technical measures Natura 2000 and other protected sites

The technical feasibility of the measures is low because there is a complete lack of infrastructure while the networks and local synergies that will allow the measures to operate efficiently have not been set up. During the 2000-2006 operation of the Rural Development Plan for Greece, the measure was a mere very low (in monetary terms) subsidy that was almost automatically provided to those farmers that had voluntarily subscribed to the project. Farmers that are certified under the AGRO 2.1 and/or 2.2 certifications of integrated production are automatically certified for following cross compliance rules and thus, following the additional rules for Natura 2000 farmers was easy.

All the aforementioned aspects justify why the economic efficiency of the measure is minimal (“wasted” as one of the NGO representatives said) and why the subsidy is so low. However, one should stress the fact that such measures provide the ground for local synergies but the networking spirit in the area has not matured to a level that will instigate innovations and create opportunities for environmental conservation including soil conservation.

Economic costs

- Extra costs associated with loss of cultivated land for uncultivated islands and wider strip borders
- Slight reduction in fodder production

Technical restraints

- It is extremely difficult for Management Authorities of Natura 2000 sites to monitor and reinforce the application of the measures due to a lack of appropriate infrastructure.
- Incorporation of cultivation residues may be difficult after long dry summers unless a light irrigation is preceding.

Environmental effectiveness

- The environmental benefits of maintaining uncultivated zones are evident for farms in Natura 2000 sites both for soil and the enhancement of habitat.

5.4 No Use of Certain Chemical Substances under Organic Agriculture

Organic agriculture is one of the agri-environmental measures introduced in the Rural Development Plan for Greece 2000-2006 and continued under the current (2007-2013) plan under Axis 2 that contains all agri-environmental measures.[8] The objective of the measure is to support farmers that adopt organic agriculture and offset their income disadvantage coming from lower yields. The commitments undertaken by farmers are explicit and described in the relevant EU Regulations and national Joint Ministerial and Ministerial Decision laying down the rules of application. Basically, farmers subscribe with one of the three private certification bodies and after a trial period they acquire a certification of organic agriculture specifically for products (not the whole farm). The certification bodies undertake all inspection and control activities as well as sampling and analysing products to check for compliance with regulations and rules. By definition, organic agriculture is a low input agriculture as concerns the use of chemical substances (defined in the relevant EU Regulation) and the utilisation of heavy machinery thus, contributing to soil conservation from contamination and compaction.

5.5 Drip Irrigation

There is no specific technical measure either mandatory or voluntary for the use of drip irrigation. However, drip irrigation is the most water saving sensitive system of irrigation in the case study area. On the other hand, drip irrigation as a technical measure is very expensive. Authorities in the area estimate the cost of installation at around 2,100 Euro per hectare with a life expectancy of around 10 years. Drip irrigation as a technical measure is subsidised by the farm modernisation scheme. This is one of the oldest EU structural schemes[9] operating in Greece. Consequently, experience has been accumulated over the years and over the different variants under which the scheme has operated.

Overall assessment of the Drip Irrigation measure
Economic costs

- Extra costs associated with installing the drip irrigation and sometimes associated costs for water supply
- Subsidies cover significant part of this cost
- For younger farmers having a time horizon of at least 10 years, the installation of drip irrigation is financially feasible

Technical restraints

- There are no evident technical restraints for the adoption of drip irrigation

[8] The legal base of the measure are articles 36 (a) (iv) and 39 of Regulation 1698/2005 as well as article 27 of Regulation 1974/2006 (annex II).

[9] The scheme operated in the Rural Development Plan for Greece 2000-2006 and continued under the current (2007-2013) plan under Axis 1. The legal base of the measure are Regulations 1698/2005 (articles 20 and 26) and 1974/2006 (article 17).

Environmental effectiveness

- The environmental effectiveness is significant because water needs are reduced and thus salinisation due to the need to drill deeper is avoided.

5.6 Conclusion

It is evident from the measures presented above and the aforementioned discussion that the most suitable measures are those protecting soils from erosion and conserving soil organic matter within the GAECs. Experts argue that the obligation to maintain a green cover during winter months, ploughing along the contour lines and incorporation of cultivation residues to the soil are the most relevant direct measures. Farmers disagree that ploughing along the contour lines is technically feasible in the majority of the cases and question the measure's technical feasibility. Both, experts and farmers argue that the costs associated with the incorporation of the residues into the soil are not insignificant but all experts see economic benefits from enriched organic matter while farmers are not fully convinced. As concerns the suspended measure of legume cultivation and incorporation on 20 % of the farm's land, experts' and farmers' opinion are exactly opposite. Experts believe that this measure will benefit every farm despite the fact that other soils will have a great benefit and others a lower benefit. Farmers, in view of the considerable economic loss, cannot see any environmental benefit by arguing that their soils do not physically need this measure.

Greek farmers are, without any doubt, under great economic pressure. The reform of the common market organisation in a series of products that are significant to the region and include tobacco, sugar beets and cotton had a great impact on farm survival. These changes came to a period of global turbulence in the world prices for oil (the major input to agricultural activities as energy or fertiliser) and world market prices for food.

Furthermore, technical measures that could protect the soils from contamination or protect the water from increased salinisation depend very much on the policies promoting their use, i.e., organic agriculture and subsidised investments for farm modernisation. Organic agriculture need to be a viable activity contributing towards most of the soil degradation problems and issues observed in the case study area of Rodopi. However, many problems and obstacles should be overcome before organic agriculture can have a significant (in quantitative terms) effect on soil conservation. On the other hand, the Farm Modernisation Scheme has contributed to sound water management and especially to confronting the water salinisation problem of the case study area. It is unanimously argued that drip irrigation has a high potential to contribute to soil conservation.

6 Soil related actors

6.1 Actors in the farming practices arena

6.1.1 Description of characteristics

In the case study area our visits and interviews concentrated on farms that cultivate the major annual cultivations of the case study area, i.e. tobacco, cotton and corn. Our approach was completely biased with a view to achieve a sample of farmers representative of the area's soil threats and cultivation practices. We visited a total of 12 farms, including six cotton farms, four tobacco farms and three cereals farms. The mean size of the farms varied with the cultivation with tobacco farms being the smallest with an average of around 2 hectares, followed by the cotton farms with an average of 4 hectares and cereals farms with 4.5 hectares.

The farmers' characteristics also varied. All interviewed tobacco farmers are of a relatively lower educational level, absence of vocational training, large families, and located in the hilly and mountainous areas of the prefecture of Rodopi. Tobacco farms were all subsistence farms with a low level of mechanisation and a small proportion of irrigated land. Besides specialisation in tobacco, farming activities were complemented by a small garden and a few animals providing all the basic food needs of the large family. Cotton and cereals farmers are Christians, of a higher educational level and cultivating larger farms in the lowlands. Cotton and cereals farms are more mechanised and irrigated. Their irrigation practices are old and there are still farmers using gravity irrigation while the majority uses sprinkler irrigation.

During the time of the interviews the farming population of the area was very much worried and under great uncertainty as concerns the developments in current agricultural policy and the expected product prices. The common market organisation for tobacco and cotton, the area's major cultivations, had undergone reforms leading to full decoupling for tobacco and partly decoupled payments for cotton. The cultivation of Greek tobacco varieties (except of Basma the variety cultivated in the case study area of Rodopi) had been completely abandoned in the previous year by all Greek farmers in the major tobacco producing areas of Greece except in Thrace and East Macedonia. This was due to the fact that the tobacco variety of Basma could command a relatively good market price which, allowed for the continuation of the cultivation by covering the operational expenses of the farm without covering of course expenses for labour and depreciation of investments. However, most farmers were willing to continue cultivation even under such adverse conditions because they were uncertain on how the decoupled payments will be allocated in the future based on historical records of past production. Thus for tobacco cultivation, land abandonment and compulsory set aside is a scenario that we should keep in mind when soil conservation strategies are contemplated.

The case of cotton was more complicated. Cotton farmers receive the decoupled payment and could receive the rest of the assistance if they cultivated cotton grown to the ball irrespective of whether they would submit cotton quantities to ginners and traders. This allowed cotton farmers many options. First, they could receive the decoupled payment and not cultivate at all. Second they could cultivate with minimum inputs until the ball is grown and then do not harvest. Third they could use the same land for cultivating early cereals and then cultivate cotton to the ball and thus receive the market price for cereals and the decoupled and coupled payment for cotton. Therefore, developments in cotton policy open up a wide range of soil conservation scenarios ranging from land abandonment to extremely intensified production with two cultivations per year.

On top of these considerations farmers had to deal with great uncertainty in prices. First, tobacco market prices were uncertain at the time the interviews were carried out. The prices received by farmers will signal whether cultivation will be continued. In view of lack of alternative cultivations for tobacco farmers, low prices will trigger considerable abandonment. Higher prices will sustain the majority of tobacco producing farm households postponing the same problem to a later time. The prices of cotton were significantly influenced by the price paid by biodiesel producers who, in view of fulfilling their allocated quota, pushed up non-ginned prices for cotton (including cotton seeds). Prices for cotton are also influenced by prices for sunflower which provides a richer material to oilseed producers. Finally, prices for cereals (including maize) are highly influenced by international demand which made prices rise in 2007. However, in view of high prices the response of farmers was immediate and remains to see whether prices will continue their increasing trend or oversupply of cereals will drive prices down.

The aforementioned analysis as it was discussed with farmers in the area shows the complex policy-economy drivers underlying farmers' decision to cultivate by adopting varying strategies. Thus, soil conservation issues at the base of such decisions are influenced by a complex set of drivers pushing and pulling farmers in and out from various cultivations or even in and out of farming. Thus, in the period under consideration we argue that price and policy factors dominate all other factors influencing soil conservation attitudes.

Farmers of the same cultivation form either a group of farmers (as in the tobacco cultivation) or a farmers' cooperative. All cooperatives and farmers' groups in the case study area of Rodopi are joined in the Union of Cooperatives located in the town of Komotini. The Union of Cooperatives is nowadays the major source of information and advice to farmers and their major representative to national forums of policy formulation and especially to PASEGES, the National Union of Farmers. The Union of Cooperatives also manages and holds registries for Single Farm Payments and operates trade activities for products and inputs. This makes the Union a major actor in the economy of the area and a major actor in attitude and opinion formulation.

Table 2 summarises how farmers perceive the soil degradation problems in the area. Water salinisation as a cause of future soil salinisation is a degradation issue perceived by farmers. Decline in organic matter is the second most important while soil erosion and soil compaction are not perceived as very acute soil threats by farmers.

From the interviews we were not able to identify any relationship between a farmer's characteristics and his/her personal characteristics or the features of his/her farm. Table 7 summarises the responses we received by the interviewed farmers on all applied practices (short and long term). It is evident that farmers apply a very restricted set of measures mainly those needed to comply with GAEC standards. This is why most of them declared that a farm advisor instigated the adoption of the measure. Farm advice coincides with cross compliance.

Farmers do not really appreciate the GAEC standards despite the fact that some of them were successful. Farmers think that the Farm Modernisation Scheme in conjunction with large state infrastructure projects can solve the water salinisation problem. One gets the feeling that soil (and wider environmental) conservation issues are the subject matter of state policy and not the individual's farmer responsibility. From the discussions with farmers we realised that the conceptual boundaries between the private and the public good on the farm are not clear. For example water salinisation is considered to be the degradation of a public good (irrigation water) for which the state is responsible to undertake action (and investments). Farmers cannot see this as a problem threatening private capital (their land) and depriving the value of their own wealth. Almost the same attitudes are held for soil erosion issues outside their own farms. As a result, farmers tend to undervalue the current measures and especially GAEC and the agri-environmental measures because they think that a "big" and common solution by means of public irrigation infrastructure is the solution.

Farmers rarely have the opportunity to engage in policy design. Taking into account the aforementioned developments in the market organisation of tobacco, not only farmers, but the wider population of the case study area depending on farm activities, feel betrayed by policy measures and also think that their product (tobacco) was not treated equally to other products in the country or in the EU. As such, one cannot argue that the relations of farmers with policy design and implementation are in the best condition and are surely not governed by trust. The Farmers' Union transmits the farmers' attitudes to their national union which is the major body responsible for representing farmers in the national and EU policy formulation arena.

Table 7: Measures applied by interviewed farmers in the case study area of Rodopi

Measures	Do you apply these measures? Yes/No	Ease of adoption *1=easy to adopt to 5=difficult to adopt*	Costs of adopting *1=low costs to 5=high costs*	Benefits in terms of soil conservation *1=low benefits to 5=high benefits*	Broader environmental impacts *1=low benefits to 5=high benefits*	Why do you undertake this measure?	
						What impact were you hoping to achieve?	What motivated the adoption?
croping/tillage measures							
intercrops	√	**1**	**1**	**2**	**3**	On olive tree grove reduced inputs	Compliance and Cost reduction
grass strips	√	**2**	**2**	**3**	**3**	On olive tree grove reduced inputs	Cost reduction
no tillage/ direct drilling	√	**1**	**1**	**2**	**2**		
contour tillage	√	**1**	**2**	**3**	**2**	Soil erosion reduction	Compliance. Suggested by advisor
restriction of row crops on steep slopes							
wheel sizes and pressure / restricting excessive heavy machinery use	√	**3**	**3**	**3**	**2**	Soil compaction reduction. Consequent soil erosion reduction	Suggested by advisor. Compliance
long term measures							
change of crop rotation	√	**2**	**3**	**3**	**3**	Increasing yields	Own knowledge
control of irrigation water/use of appropriate water quality	√	**2**	**2**	**3**	**3**	Water salinisation	Water control analyses suggested by advisor
change of field patterns and sizes (please specify)	√	**3**	**3**	**3**	**2**	Organic matter	Suggested by advisor
bench terraces	√	**3**	**3**	**2**	**3**	Soil erosion	Farm advisor

Source: Case study interviews

6.1.2 Factors influencing adoption of soil conservation measures

Table 6 above records all the measures applied by farmers in the case study area. Farmers are aware of the following measures/programmes in order of the frequency these were mentioned:

- Cross compliance GAEC measures
- Natura 2000 measures
- Agri-environmental measures
    a. Set aside (old programme)
    b. Organic agriculture
    c. Extensification (old programme)

During the interviews with farmers we realised that farmers are partly confused about cross compliance and confusion spreads to what measures are actually included under cross compliance, whether cross compliance is voluntary or compulsory (mandatory) and whether failure to comply is associated to reductions in Single Farm Payments. For example, concerning the suspended measure for legume cultivation on a rotated 20 % of the farm, we found farmers that believed this measure was compulsory, farmers that were completely unaware of the existence of the measure and farmers that believed this is not compulsory. The confusion about the measures and the low awareness was partly enhanced by the state failure to set up the Farm Advisory Service on time for the implementation of the cross compliance rules. More worrying was the fact that some agricultural farm advisors were also confused about what is required and what is not.

Taking into account the low awareness of the measures and the confusion prevailing the farming population it is not a surprise to note that the drivers behind adoption of the measures presented in table 6 were also confused. Most cross compliance GAEC measures are thought to be adopted on a voluntary basis while the truth is that they are mandatory and linked to penalties. One farmer thought that as far as the cross compliance measures are not subsidised, he had not the responsibility to comply, but had adopted some of them because he thought were good for the farm's yields and protection. In general, however, the major driver behind voluntary measures is the amount provided for subsidy, e.g. the Natura 2000 measure or the market opportunities open to the measure, e.g. the organic cultivation measure.

The major factor preventing adoption is low information about the measure in its various forms. For cross compliance, information dissemination among the farming population was very low. For organic agriculture, technical information is available but information concerning with market opportunities for organically produced cotton is very low.

The second most important barrier to adoption is the burden of administration needed to subscribe to a measure in view of its expected benefits. For example, many farmers thought that the benefits received in terms of subsidies from the Natura 2000 measures are not worth the time and effort to be devoted in bureaucracy. Sometimes, farmers also face external costs due to the fact that some applications are so difficult to complete or require the submission of a plan by an expert consultant. If one takes into account the time and money required to do the paper work, many measures have very high transaction costs in relation to their benefits. One farmer mentioned that subsidies are set low and procedures are complicated so that farmers will not bother going through the trouble applying for the measure. In other words, sometimes farmers are so suspicious and challenge even the fact that soil and environmental conservation measures are drawn under genuine concerns for the environment.

Measures in general are not flexible and thus their appropriateness is sometimes low while their adaptability is also very low. Measures are rather rigid and raise questions about their appropriateness to certain farms that have adopted the measures. However, we should note that, through the interviews, and with the exemption of the water salinisation threat, we had the impression that farmers were not really able to propose new measures or modifications concerning the already used measures.

The resistance of farmers to undertake soil conservation measures that incur a cost to the production should not be interpreted under a social constraint perspective but rather, as a reaction to a highly uncertain environment, greatly influenced by social norms of behaviour. Farmers in the area are always suspicious to the state and the EU interventions. As one farmer mentioned “I cannot see the genuine concern of the EU for the environment. In past years all environmental measures opted to reduce production and surpluses and decrease the amount paid to subsidies. Is this environmental policy?” Another farmer had confused health concerns over smoking with the reform of the common market organisation for tobacco and argued that “the EU should ban tobacco imports”. A representative of a non-governmental organisation argued that, at the end of the day, environmental policies for agriculture equally hit the small family farm and the larger mechanised and more market-oriented farms, but lead to the extinction of the former, in the long term causing a considerable environmental problem due to land abandonment. He also argued that the devastating fires of summer 2007 in the Peloponnese could have been avoided or would have had less impact if the mountainous areas were not abandoned and the rural population had not left. Thus, within this wider context of suspicion and uncertainty, the farmers in the area view soil conservation measures as being of a low priority on the policy agenda and as measures further decreasing their marginal income.

From all the measures that farmers were aware of, cross compliance was the only measure that we could really use as a case study for assessing transaction costs. Farmers did not have a real problem with the administrative effort spent on GAEC measures but their experience with the rest of cross compliance and especially Statutory Management Rules (SMRs) dealing with animal stock is really the worst. The amount of paper work needed on farm and the amount of time spent for keeping the records and having the books ready for inspection is considerable and cannot be fulfilled without external assistance. This applies in particular to those farms where human capital is low. On the other hand, monitoring and control is not strict and inspectors are interested only in the very basic and obvious breaches. As concerns other policies and specifically the Natura 2000 measures, transaction costs in relation to the low payment are the major obstacle to adoption.

Table 8 below summarizes the farmers’ cognition of the different schemes in operation in the case study area or in other areas of Greece but demanded by farmers in the area.

Table 8: Farmers' cognition of policy measures, schemes and regulations (n = 12)

Known policy measures, schemes, initiatives and regulations	**Policy measures, schemes, regulations actively involved with** (number of farmers with knowledge of the measure)	**Reason for adoption**
Mandatory		
Cross Compliance – GAECs on Soil Erosion	2 with full knowledge; 8 have heard of it; 2 have never heard of it	compliance is mandatory and required to receive farm payments
Cross Compliance – GAECs on Organic Matter	3 with full knowledge; 7 have heard of it; 2 have never heard of it	compliance is mandatory and required to receive farm payments
SMRs	6 have heard of it; 6 have never heard of it	compliance is mandatory and required to receive farm payments
NVZs	All cotton (5) and cereals farmers (3) know it; 4 tobacco farmers have heard of it	The measure is not applicable to areas of Rodopi but cotton farmers demand its application
Voluntary		
Agri-environmental measures (extensification, etc.)	5 with full knowledge; 5 have heard of it; 2 have never heard of it	participation is voluntary
Natura 2000 measures	5 farmers within Natura 2000 boundaries have heard of it	participation is voluntary but required if payments are received
Farm Modernization Scheme	All 12 farmers have fairly good knowledge of the scheme	participation is voluntary
Organic Agriculture	All 12 farmers have some knowledge of the measure	participation is voluntary

Source: Case study interviews (n=12)

6.2 Actors in the policy design and implementation arena

6.2.1 Governmental organisations

The major governmental organisations interviewed are:

1. OPEKEPE – the Greek Agricultural Payment Organisation
2. The Prefectural Services of the Ministry of Rural Development and Food
3. The Directorate of Agricultural Policy of the Ministry of Rural Development and Food
4. The Management Unit of the Common Support Frameworks of the Ministry of Rural Development and Food that currently manages the Programme "Alexandros Baltatzis", (Rural Development Plan for Greece for the period 2007-2013)

In all these organisations at least two persons were interviewed in order to cover the various activities carried out by the same organisation. Other governmental organisations were reviewed through the examination of published material including reports, published interviews, websites and legal documentation. These organisations include:

1. AGROCERT the Agricultural Products Certification and Supervision Organisation
2. OGEEKA-DIMITRA (Organisation of Agricultural Vocational Education, Training and Employment) of the Ministry of Rural Development and Food
3. The Management Unit of the Regional Operational Programme for East Macedonia and Thrace
4. N.AG.RE.F – the National Agricultural Research Foundation
5. Organic Department of the Ministry of Rural Development and Food

In the following we will explain why and how each of the aforementioned organisations are involved in the execution of soil conservation policies. OPEKEPE (the payment authority) was established in 2006[10] and especially refers to controls concerning Statutory Management Rules (SMR) and GAEC standards. OPEKEPE is the coordinating authority for the inspections of cross-compliance and Single Farm Payments. OPEKEPE chooses the on-spot-checks sample for cross-compliance inspections according to the clauses of Regulation 796/04 and submits it electronically to its own Prefectural Authorities which are responsible for carrying out the on-spot checks and visits and refer back to the payment authority. Up until last year, OPEKEPE submitted the on-spot checks to the prefectural authorities of the Ministry of Rural Development and Food. This change has been very critically assessed by the prefectural officials of the Ministry because – as they argue – it cut them off from communicating with farmers directly. Besides organising the sampling procedures, OPEKEPE is also responsible for carrying out remote sensing inspections, organising laboratory controls and applying sanctions. The activities are carried out centrally as well as locally through the cooperation of the prefectural authorities of the Ministry of Agriculture (later renamed the Ministry of Rural Development and Food.

The prefectural services of the Ministry of Rural Development and Food are responsible for the application of cross compliance and of all measures of the Rural Development Plan for Greece at local-prefectural level. In theory only, the prefectural authorities of the Ministry are also responsible for disseminating all kinds of information related to the operation of agricultural programmes as well as for demonstrating agricultural practices (a type of extension service provision to farmers).

[10]OPEKEPE was established through national legislation and in particular Ministerial Decision No. 262021/15-4-2005 of the Minister of Rural Development and Food completed by Ministerial Decision 303915 published in the Journal of the Greek Government on 3rd October 2006.

The Directorate of Agricultural Policy of the Ministry of Rural Development and Food is responsible for the design of cross compliance rules and for monitoring the application of cross compliance at policy level. In early 2004, the Directorate set up a committee to work on the introduction of GAECs and SMRs. This committee took a formal role and was enhanced by personnel from the Ministry of Planning and Environment. This committee prepared a draft proposal which was widely discussed with almost all relevant stakeholders. In particular the proposals were communicated to other departments within these two ministries, to other ministries, to the Greek Union of Farmers (PASEGES), to various sectoral farmers' unions, the Geotechnical Chamber of Greece and certain NGOs. Reactions were collected and the proposals were modified in early September 2004. Since the introduction of the cross compliance rules, the Directorate of Agricultural Policy did not have any other serious involvement with cross compliance policy.

The Management Unit of the Common Support Frameworks of the Ministry of Rural Development and Food is responsible for negotiating, designing and implementing the Common Support Framework Programmes for Greek agriculture. The Management Unit was involved with the design and implementation of the Horizontal Operational Programme for Greece and the Rural Development Plan for Greece for 2000-2006. Currently, the Management Unit designed and started implementing the Programme "Alexandros Baltatzis", the Rural Development Plan for Greece for the period 2007-2013. The Rural Development Plan for Greece includes all agri-environmental measures under Axis 2 of the programme and the Farm Modernisation Scheme under Axis 1.

AGROCERT the Agricultural Products Certification and Supervision Organisation is an organisation that is directly controlled by the Ministry of Rural Development and Food and is responsible for certifying the Farm Advisors for the Farm Advisory System (FAS) set up under the cross compliance regulations. The FAS is a totally new system established in 2006, replacing all previous systems of extension services.[11] The basic approach of the new system to the provision of farm advice is a top-down pyramid structure. At the top of the pyramid is the Directorate General of Extension and Research of the Ministry of Agriculture (later renamed Ministry of Rural Development and Food). This supervises AGROCERT which is the intermediate organisation responsible for training, certifying, and controlling the farm advisors. Finally at the bottom of the pyramid there is the Farm Advisors (FA) which may be individuals, farmers' cooperatives or companies. AGROCERT has certified the first 500 advisors and the system, after many ups and downs is ready to operate. Finally, AGROCERT is responsible for issuing the integrated management cultivation certificates AGRO 2.1 and 2.2 which comply, among others, with GAEC standards.

OGEEKA-DIMITRA is the Organisation of Agricultural Vocational Education, Training and Employment of the Ministry of Rural Development and Food. OGEEKA undertakes the training of farmers in its own establishments and organises short or long term seminars and schools on various issues. One important seminar is concerned with the issue of the Green Certificate that is mainly directed at Young Farmers (farmers younger than 40 years). Among the Green Certificate's thematic unit there are units referring to Good Agricultural Practices and especially to soil conservation.

The Management Unit of the Regional Operational Programme for East Macedonia and Thrace is responsible for designing and implementing regional measures of the Common Support Framework Programmes. Among its other responsibilities, the Management Unit provides support to the Farm Modernisation Scheme by providing personnel for inspections and controls and by providing a list of accepted prices for the submission of modernisation schemes.

[11] The details for operating and applying the new system were provided for by the Joint Ministerial Decision 303894 published in the Journal of the Greek Government on 14th September 2006.

N.AG.RE.F is responsible for the operation of soil research and soil laboratories in the regions. N.AG.RE.F has undertaken to compile the soil map of Greece and provide local and prefectural planners with maps indicating micro soil conditions. Oddly enough, N.AG.RE.F has not been consulted by any of the aforementioned policy design organisations when the soil measures were drafted.

Finally, the Ministry's organic cultivation department is responsible for setting up the rules and implementing the general organic cultivation policy in Greece.

6.2.2 Civil society and non-governmental organisations

The major civil society organisations interviewed are:

1. PASEGES – The National Union of Farmers,
2. The Managing Authority of the area's Natura 2000 site including lagoons and protected areas,
3. Ornithologiki Etairia Ellados (Birdlife Greece),
4. WWF–Greece.

Other non-governmental organisations were reviewed through the examination of published material including reports, published interviews, websites and legal documentation. These organisations include:

1. DIO, independent certification organisation for organic cultivation,
2. Bio Ellas, independent certification organisation for organic cultivation,
3. Fysiologiki, independent certification organisation for organic cultivation.

PASEGES – the Union of Greek Farmers is a very important non-governmental actor and the state's prime discussant when agricultural policy issues are regarded. PASEGES maintains its own research centre and has expressed formally its views on all important policy documents including the cross compliance policy and the formulation of the Rural Development Plan for 2007-2013.

The Managing Authority for Rodopi's Natura 2000 site is an independent authority charged with every day management of the protected area as well as with more long-term responsibilities such as drawing up the area's management (master) plan.

Birdlife Greece and WWF–Greece are the only two environmental NGOs that have expressed views on the environmental impacts of agriculture, have specifically commented on the cross compliance policy application in Greece and their members are members on the boards of many Natura 2000 management authorities. Finally, the two NGOs maintain their own environmental programmes in Thrace and East Macedonia.

Finally, the three organic cultivation certification bodies are responsible for implementing, together with the farmers, the organic cultivation policy in Greece.

6.2.3 Resources, capacities and networks

Policy design for soil conservation in Greece is highly fragmented in many dimensions. Thematically, one cannot talk about a coherent and integrated soil conservation policy because soil conservation is the primary or secondary aim of various measures within different policies. Concerning organisations the picture is again highly fragmented because the prime responsibility for designing, implementing and monitoring the different policies belongs to different departments of the Ministry of Rural Development and Food as well as of other governmental and non-governmental bodies. For this reason we are not able to present the whole policy but rather deal with each measure/policy at a time. Consequently, we will first present the policy for cross compliance and the associated GAEC measures, then the agri-environmental measures which follow a relatively different path of policy formulation and implementation.

Policy Design

Cross compliance was designed centrally under the responsibility of the Directorate for Agricultural Policy of the Ministry of Rural Development and Food. The draft on which discussion and communications were based was prepared by a committee of experts from the Ministry of Rural Development and Food. At that stage, none of the environmental NGOs or experts from the National Agricultural Research Foundation (N.AG.RE.F) participated. The draft proposals were based on the Codes of Good Farming already in operation. The key discussants included the relevant directorates of the Ministry, other governmental departments and especially the Ministry of Public Works, Planning and the Environment (in the remainder of the document called Ministry of Planning and Environment) responsible for the establishment and operation of Natura 2000 sites, PASEGES – The National Union of Farmers, and the Geotechnical Chamber of Greece. At the policy analysis stage, a lack of infrastructure relevant to design and planning was observed. The relevant authorities did not have access to a detailed soil map of Greece and only fragments of a soil map were available for the areas where previous research had been undertaken but not linked to the policy design. Many of the responses were used to modify the initial draft and produce the final policy document. This document was exemplified in a series of Ministerial Decisions.

The design of agri-environmental measures differed from policy design procedures for cross compliance. The basic draft was prepared by the Managing Unit of the Common Support Frameworks of the Ministry of Rural Development and Food after detailed consultation with the relevant EU services. The proposals were presented to interested parties and especially PASEGES, the National Union of Farmers. During the policy design stage, the Management Unit did not consult the relevant staff of the Directorate for Agricultural Policy. The Management Unit used the Agricultural University of Athens as its scientific consultant. However, the design stage did not work very well and the agri-environmental measures under Axis 2 had to be withdrawn from the Ministry's website soon after they were released to the public. Still, there are no publicly available Axis 2 measures at the Ministry's website.

At all stages of policy design, the relevant prefectural and regional authorities and local and regional non-governmental bodies were left out from discussions, consultations or proposal submission. As one representative from the Authority Managing the Natura 2000 site noted, "we have never been consulted on the proposals concerning measures related to Natura 2000 sites for which we have the responsibility but also, and more importantly, the local knowledge and expertise". Local planners (government and non-government) feel that this complete absence and exclusion from policy design underlines the central hierarchical (top down) policy design procedure. Local experts are then called in to implement a policy which is completely unknown to them, have not contributed to its formulation and could have recognised obvious flaws.

Policy Implementation

Cross compliance followed a rather coherent policy implementation procedure. The stages involved a wide policy dissemination campaign, policy monitoring and setting up of new procedures for control, identification of infringements and imposition of penalties.

Since the policy's introduction, the staff of the Directorate for Agricultural Policy of the Ministry of Rural Development and Food undertook the following actions:

1) Produced a guide simplifying the cross compliance scheme that was:

- Disseminated to all farmers receiving Single Payments at the time of filling in the special request for aid paper;
- Sent to all farmers' cooperatives to be disseminated to their members;
- Sent to all Municipal authorities (spatial Unit of less than NUTSIII) to be presented (posted) at special points and disseminated;
- Made available on the Ministry's main Website (www.minagric.gr) where the guide can be downloaded for free for further dissemination.

2) Organised 120 workshops on the new Common Agricultural Policy (CAP) and the obligations of farmers with regards to cross-compliance all over Greece from 1/1/05 to 31/8/05. During the workshops, the guide and the presentations were disseminated to participants

3) The Ministry's website (www.minagric.gr) was extended to contain:

- The guide;
- A section on Frequently Asked Questions (FAQs);
- All the relevant EU and national legislation.

The guide was revised in 2007 to include the 2006-2007 SMRs. The major body responsible for providing information relevant to cross compliance is the Rural Development Department at each prefecture (NUTSIII level of spatial dissagregation) where farmers submitted until last year their request for Single Payments and are thus provided with the guide and other relevant information (flyers, etc.). The Rural Development Departments were assigned the role of:

- Disseminating the legal information concerning cross compliance regulations in Greece (Joint Ministerial Decision No. 324032/24-12-2004 and the consequent ministerial decisions exemplifying the rules)
- Disseminating the “Guide to Farmers”, a simplified text providing codified guidance to farmers on cross-compliance requirements. This Guide is available in hard copy as well as electronically (from www.minagric.gr).
- Disseminating a leaflet (flyer) on the basic principles and the innovations of the new CAP. This leaflet was distributed to farmers in the context of the distribution (to farmers) of Temporary Files of Personal Rights related to the Single Farm Payment (SFP).
- Workshops on the new CAP and the obligations of farmers with regards to cross-compliance all over Greece.

These responsibilities have been directly assigned to OPEKEPE’s regional services. Furthermore, the Ministry was successful in involving the Farmer’s Unions in policy dissemination.

First and second-tier farmers unions undertook the obligation of:

- Disseminating the “Guide to Farmers”
- Disseminating the leaflet
- Proving their premises for holding workshops on the new CAP

Prefectural and local authorities as well as various local development agencies provided their premises and assisted the organisation of workshops. From 2006 onwards, the workshops are organised by DIMITRA, the specialised state agency for continuous farm training and education.

Cross compliance set up two new procedures. The first concerned with Single Farm Payments monitoring and controls and the establishment of an integrated system of sampling farms to be inspected, on-site inspections, transmission of inspection results, and appeals. Secondly, the establishment of the Farm Advisory System that, after many problems, will operate in 2008 instead of the envisaged operation in 2006, is indicative of the problems encountered due to fierce bargaining among organisations for the control of the new service.

At local level, the prefectural authorities of the Ministry of Rural Development and Food were until last year responsible for disseminating the policy, carrying out inspections and controls, and communicating their results to the central premises of OPEKEPE. Last year this system changed and OPEKEPE is in charge of implementing cross compliance policy at regional and local levels.

Thus, the prefectural authorities of the Ministry, which are the most relevant authorities for this type of policy, were completely cut off from communication with farmers as concerns cross compliance. The paper work for Single Farm Payments is undertaken by the Union of Cooperatives and the payments, inspections and controls are carried out under the responsibility of OPEKEPE. This has been judged by our respondents as a very unfortunate development as concerns policy implementation.

Policy implementation, like policy design, lacks adequate infrastructure and resources. There are still no detailed soil maps available while a cadastre showing the location and ownership of plots of farmland still faces problems as many plots cannot be identified in the electronic Integrated System for Managing Payments. Furthermore, the personnel available at local level are neither adequately prepared nor are there enough staff to undertake policy implementation. As a result, agriculturalists working at local level complain that the policy implementation (including all kinds of policies) have transformed them to administrative staff neglecting their scientific role and restraining them from performing other, more valuable tasks, such as extension services and field work. Outside governmental authorities, non-governmental authorities share the same views. The authority managing the Natura 2000 sites has not as yet its master plan and the official decision defining geographic boundaries and setting activities is still pending.

During policy implementation actors feel isolated. There is no continuous interaction among actors and the assessment or monitoring of policy implementation is done only if this is mandatory, e.g., if EU measures are implemented. Assessment seems to lead nowhere as there are no correcting actions undertaken if assessment studies show that there is need to reshape and reformulate some policy measures. Sometimes local actors feel that the top-down approach dominates all dimensions of policy design and implementation and masks a power war among central organisations. As a result, local actors feel they are the collaterals of a war that is carried out far away in Athens. Actors feel that the power games are carried out at two levels, first among organisations and secondly, within the departments of the same institution. Thus, the outcome of policy measures reflects the result of gaining or losing power over other organisations and departments. For example, the Natura 2000 measures are under the responsibility of the Ministry of Rural Development and Food (which has its own environmental directorate) while the administration of the sites and the supervision of their Managing Authorities is the responsibility of the Ministry of Planning and the Environment. Lack of communication and coordination among the two organisations is evident and clear to local actors.

6.3 Conclusions

There is no coherent and integrated soil conservation policy in Greece. Policies are rather fragmented in the sense that measures aiming at soil conservation are the subject of many policies and are largely uncoordinated. The fact that different measures concerning soil conservation are found in very many different policies is not always a bad approach if these fragments are coordinated. However, the lack of any horizontal coordination of the vertically fragmented measures aggravates the feeling of local actors that policy has no focus, perspective and vision.

Soil conservation measures are the subject of a highly concentrated top-down policy approach with the local actors being the recipients and the central authorities being the designers and coordinators of policy measures. Local authorities are rarely consulted and thus the design of policy lacks local expertise and knowledge. Failure to consult local actors makes targeting of policies very difficult. Lack of targeting is a clear sign that policies are designed centrally and thus convenient to remote control.

Relevant parties, especially environmental NGOs and scientific experts, are systematically excluded from the design of policy while farmers unions and professional chambers are consulted.

Lack of infrastructure for policy design and planning (soil maps, databases, etc.) is a major obstacle which restraints policy planners from good planning practices and assessments. Especially the lack of detailed soil maps is a major obstacle to planning at central as well as local level. It is an obstacle to the devolution of policy and the targeting of policy at a spatial level. Lack of specialised personnel and lack of personnel in general is another major obstacle to carrying out the policy at local level and especially the controls and inspections. Time allocation between administration and real scientific work on the field becomes a puzzle.

At central, as well as local/regional levels, communication among the different organisations is limited. Moreover, communication among departments of the same institution is also limited. Policy outcomes are, sometimes, the outcome of power games between organisations and among departments of the same organisation. There were many cases where gaining power was the main aim of policy design. The establishment of the Farm Advisory System and its associated delays are a vivid example.

Assessments of policy results are rarely done if they are not requested (are not mandatory). Central environmental NGOs and scientific experts are used in some cases while local actors are not even consulted in cases where policy review and assessment is mandatory.

7 Policies for soil conservation

7.1 Existing policies and their classification

A number of policies have objectives that relate to the protection of agricultural soils. The most important soil related objectives defined for the case study area concern protection from soil erosion, halting the decline in organic matter and mitigating soil compaction. Protection from soil erosion is the primary objective of the national soil conservation policy. Decline in organic matter and soil compaction are also high in the soil protection agenda from a national point of view. Salinisation is a rather local problem in Greece and thus, has received attention under regional soil conservation programmes. Soil contamination was not a problem in Greek agriculture until the start of the 90's when the spreading of manure and of treated municipal waste waters was adopted by farmers. Finally, protection from floods and landslides is really part of the forest protection policy. All the aforementioned stated objectives are highly relevant to EU soil protection objectives and have been incorporated to EU soil protection measures that are exemplified below.

The major active policies in the case study area of Rodopi directly or indirectly affecting soil conservation comprise of:

- Cross compliance policy (both the GAECs and SMRs)
- the Programme "Alexandros Baltatzis", (the name of the Rural Development Plan for Greece) for the period 2007-2013 which contains:
    - The agri-environmental schemes under Axis 2 (including organic agriculture and measures for Natura 2000 farmers)
    - The Farm Modernisation Scheme under Axis 1 and especially the capital subsidies provided for drip irrigation systems
    - Agricultural infrastructure under Axis 1

- Integrated management of farming and certification under the Agro 2.1 and Agro 2.2 standards for food, including environmental standards and administered by AGRO-CERT the Agricultural Products Certification and Supervision Organisation
- Integrated management of cotton production
- The Farm Advisory System (FAS) with 500 new agricultural consultants with responsibility to consult (among others) on the GAECs
- The education programme undertaken by OGEEKA-DIMITRA (Organisation of Agricultural Vocational Education, Training and Employment) which, among others, concerns the Green Certificate issued to young farmers

Other major policies that are not active in the case study area of Rodopi but, when applied, may have a significant impact include:

- The designation of Nitrate Vulnerable Zones (NVZ) currently provided by Axis 2 of the Rural Development Plan for Greece, 2007-2013;
- The programme for restoring stone terraces that currently targets other areas and is provided by Axis 2 of the Rural Development Plan for Greece, 2007-2013;
- The major infrastructure for the area is a large irrigation project that will allow the authorities to manage and distribute surface water and ban water pumping from wells. The project is not currently included within the projects to be financed for the period 2007-2013.

The following policy measures are analysed in more detail in the next section containing the policy fiches:

1) GAEC Soil Erosion,
2) GAEC Soil Organic Matter,
3) Agri-environmental scheme - Natura 2000 measures,
4) Agri-environmental scheme Organic Agriculture,
5) Farm Modernisation Scheme.

Table 7: Classification of policy measures in Rodopi - East Macedonia and Thrace

Type of Policy Mechanism/ Mode of governance	Practical classification Nature of the Policy Objective			Policy relationship to agriculture	Geographical level	Analytical classification – Channels of Impact Primary (1) and Secondary (2) impacts. Y = Yes, N = No		
	Soil conservation is the **primary objective** of a policy measure	Soil conservation is the **secondary objective** of a policy measure	Soil conservation is a **By-product**	Agricultural (AG) or non Agricultural (NAG) focused policy	European (E), national (N), regional (R) or local (L) measure, and policy reference	Developing new/altering existing rules (institutions)	Developing and/or altering governance structures/ implementation approaches	Directly impacting on farmer behaviour/ decision making/ factor allocation and management practices
Command and Control			*Nitrate Vulnerable Zones*	AG	E-Nitrates Directive (91/676/EC) and articles 36 (a) (iv), 39 of Regulation 1698/2005; and article 27 and annex II of Regulation 1974/2006	Y- Setting up of new rules to require identification and implementation of NVZs		Y – restricts the use (not bans) of fertiliser in certain areas
Incentive based measures/economic instruments	Cross Compliance GAEC measures (Soil erosion, soil organic matter)			AG	E- Joint Ministerial Decisions 324032 and Ministerial Decision 262021	Y – Developing on Good Farming Practice Rules	Y- Developing new Monitoring and Control Structures	Y – Restricts burning of cultivation residues (straw)
		Cross compliance SMRs (soil contamination)		AG	E- e.g. Sewage Sludge Directive (86/278/EEC)	Y – Developing on Good Farming Practice Rules	Y- Developing new Monitoring and Control Structures	Y – Restricts spillages of inland surface water
			Cross compliance SMRs (all other measures)	AG	E- e.g. Groundwater Directive (80/68/EEC), Fauna, Flora and Habitat Directive (92/43/EEC)	Y – Developing on Good Farming Practice Rules	Y- Developing new Monitoring and Control Structures	

Case study Greece

Type of Policy Mechanism/ Mode of governance	Practical classification Nature of the Policy Objective			Policy relationship to agriculture	Geographical level	Analytical classification – Channels of Impact Primary (1) and Secondary (2) impacts. Y = Yes, N = No		
	Soil conservation is the **primary objective** of a policy measure	Soil conservation is the **secondary objective** of a policy measure	Soil conservation is a **By-product**	Agricultural (AG) or non Agricultural (NAG) focused policy	European (E), national (N), regional (R) or local (L) measure, and policy reference	Developing new/altering existing rules (institutions)	Developing and/or altering governance structures/ implementation approaches	Directly impacting on farmer behaviour/ decision making/ factor allocation and management practices
			Organic Agriculture	AG	E- Regulation 2092/91 on Organic (Biological) agriculture and articles 36 (a) (iv), 39 of Regulation 1698/2005; article 27 of Regulation 1974/2006 (annex II) N- Common Ministerial Decision 245090/10-2-06	Y – Develops completely new and certified Farming Rules	Y- Certification, control and monitoring carried out by independent non-governmental bodies	Y – Completely new
			Farm Modernisation	AG	E- Regulation 1698/2005 (articles 20 and 26); Regulation 1974/2006 (article 17)	N – Conventional capital investment practice	N- Old and established measure	Y – Alters investment behaviour of farmers. Indications of non-additionality of investments and of private capital substitution by subsidised capital
		Restoring of Terraces		AG	E- Regulation 1698/2005 (articles 36 (a) (vi), 41; Regulation 1974/2006 (article 29)	N – Subsidisation of conventional practice	N	Y – as far as it impacts on time allocation of the farm household
Moral Suasion Initiatives ie it has a normative dimension that farmers should protect soils								

Case study Greece

Type of Policy Mechanism/ Mode of governance	Practical classification Nature of the Policy Objective			Policy relationship to agriculture	Geographical level	Analytical classification – Channels of Impact Primary (1) and Secondary (2) impacts. Y = Yes, N = No		
	Soil conservation is the **primary objective** of a policy measure	Soil conservation is the **secondary objective** of a policy measure	Soil conservation is a **By-product**	Agricultural (AG) or non Agricultural (NAG) focused policy	European (E), national (N), regional (R) or local (L) measure, and policy reference	Developing new/altering existing rules (institutions)	Developing and/or altering governance structures/ implementation approaches	Directly impacting on farmer behaviour/ decision making/ factor allocation and management practices
Information and capacity building measures, i.e. guidance, advisory measures and farmer support initiatives		Cross Compliance Farm Advisory Service		AG	E- Council Regulation No 1782/2003 and Commission Regulation No 796/2004 N - Joint Ministerial Decision 303894 of 14 Sept 2006	Y – Develops completely new and certified farm advisors with a clear mandate	Y- advisory services are carried out by independent non-governmental private consultants paid by the state	Y – Completely new
		Agricultural Vocational Education Training and Employment		AG	National	Y – Green certification	N	Y – By increasing educational training and introducing the value of continuous vocational training

Note: *Italicised* policy measures are currently not applied or available in the case study area (prefecture of Rodopi).

7.2 Description, analysis, and evaluation of policy measures

7.2.1 Fiche 1: GAEC soil erosion measures under cross compliance

Part A: Summary of Measure	
Formal title of measure and date of implementation	Cross Compliance Regulation 1782/2003 Good Agricultural and Environmental Conditions (GAECs) Implemented by Common Ministerial Decision No. 324032 published in the Journal of the Greek Government on 24th December 2004. The GAECs are listed in paragraphs 1 to 9 of article 2 of the above mentioned Joint Ministerial Decision and exemplified by Ministerial Decision 262021 published in the Journal of the Greek Government on 21st April 2005.
Short description of the measure	The GAECs on soil erosion have been developed from the Codes of Good Farming introduced officially in 2004 (by Joint Ministerial Decision 568 of 20/1/2004 revised partly by Common Ministerial Decision 639 of 25/1/2005). The GAECs aim to address soil erosion issues in hilly and mountainous areas (slopes of over 10 %). Soil erosion is one of the most acute soil degradation problems in Greece. The measure will continue to be in operation in the new period and at least up to 2013.
Type of policy measure	The measure is a mandatory requirement, as failing to comply has impacts on the amount of payments through the Single Farm payment mechanism.
Objective of policy measure and relevance	The farmer should take care that: 1) On parcels with a slope of over 10 % a green cover is obligatory during the rain period, till preparing the soil for the next sowing, as appropriate to the cultivation. 2) On parcels with more than a 10 % slope where there is danger of erosion, ploughing should be carried out on the level or diagonally, or alternatively stable uncultivated strips should be created as containment zones, at distances in keeping with the characteristics of the land and the slope. In addition, irrigation may not take the form of flooding. 3) Terraces or natural borders should not be destroyed The measure has direct effects on soil conservation from erosion.
	How relevant are the objectives of the measure to the soil degradation threats in your region? ☐ ☐ ☐ ☐ √ Not very Very
Indirect effects	Indirect effects include landscape conservation due to the maintenance of the green cover and the maintenance of terraces and natural borders.
Linkages to other policy measures	This measure is directly related to the Natura 2000 measures of the agri-environmental programme. The measure is applied to fields of a slope higher than 10 %. Most of these fields are located within Less Favoured Areas (LFAs - Council Directive 75/268/EEC) where the LFAs Payment scheme applies.

Funding	There is no specific funding for the GAECs. Farmers are not compensated or subsidised for adopting and following the good farming practices they have just to comply otherwise are penalised with reductions from the single farm payment. However, the cross-compliance policy is funded by the EU and national sources in order to set up and operate the monitoring and control mechanisms as well as the Farm Advisory System which is not as yet in operation and is estimated to cost about 1.5 million Euro.
Summary of assessment and conclusions	The measure has been partly successful. Maintenance of the green cover has been adopted by the overwhelming majority of farmers and no breaches have been detected by on site controls. Ploughing along the contours has not been fully adopted or reinforced. Indeed, this measure may cause some danger to tractor operators. The alternatives to contour ploughing i.e., ploughing the diagonals or maintaining containment zones are not easily applicable. Ploughing the diagonals implies that ploughing will cross the filed making mechanised works on the filed difficult. Containment zones reduce the surface available to cultivation. In cases where the plots are small and fragmented containment zones coincide with natural borders. Finally the obligation to maintain terraces is not easy to follow due to the cost involved in maintaining terraces. On the contrary, the obligation to maintain natural borders can be followed more easily despite the fact that it can reduce available surface by as much as 5 %.
Recommendation	The measure is designed for hilly and mountainous areas of the country which are included within the LFAs scheme. Drawing form the interviews conducted with experts, farmers and representatives from governmental and non-governmental bodies our recommendations are: When the slopes are high (over 10 %) and ploughing along the contour is dangerous and the presence of soil erosion threat is high, the farmer should be somehow compensated to allow large strips of uncultivated land along the contours. The payment may take the form of a higher compensation within the LFAs scheme and to the proportion of the land withdrawn from production and dedicated to containment zones. But, in order to achieve this, farms should be further targeted as concerns their physical characteristics. A second recommendation concerns maintaining terraces. The policy should again be targeting the areas in which terraces have been used for a long time and are an integral part of the rural landscape. The same areas suffer from lack of workers and an aged farm population making maintenance of terraces a high cost operation.
Part B: Detail on the Measures Design, Implementation, Enforcement and Impacts	
Policy design	In early 2004 the Ministry of Agriculture[12] set up a committee to work on the introduction of GAECs. This committee based its work on the GAEC standards already implemented through Good Farming Practices and their relevant Code (see above). Furthermore, these standards were controlled and checked for farmers receiving LFA payments and thus, the committee also had a background on which controls could be suggested. The committee was set up by personnel from the Ministry of Agriculture and the Ministry of Planning and Environment. This committee prepared a draft proposal for the

[12] The Ministry of Agriculture was later renamed to Ministry of Rural Development and Food. Practically is the same ministry.

	introduction of GAECs which was widely disseminated and discussed with almost all relevant stakeholders at central level. Furthermore, the experience from the application of the Codes of Good Farming Practice was widely utilised by stakeholders. In particular the proposals were communicated to other departments within these two ministries, to other ministries, to the Greek Union of Farmers (PASEGES), to various sectoral farmers' unions, the Geotechnical Chamber of Greece and certain, not all, NGOs.
Policy implementation I: Implementation at administrative level	OPEKEPE is the Payment Authority for the Greek agriculture, coordinating the inspections, cross compliance and SFP. OPEKEPE chooses the on-spot-checks sample for cross-compliance inspections according to the clauses of Regulation 796/04 and submits it electronically to the Prefectural Authorities which are responsible for carrying out the on spot checks and visits. This is a recent development because up to one year ago, the competent authorities at local-regional level were the prefectural offices of the Ministry of Rural Development and Food.
Policy implementation II: Method of delivery to farmers	The applicants have to fill certain documents for receiving the SFP. Some of these documents refer to cross-compliance rules including the GAECs on soil erosion. The farmers must comply with all rules detailed for cross compliance (keeping records and documents on farm, etc.). The farmers would receive assistance by the Farm Advisors that would have been set up. Unfortunately, the scheme setting up the Farm Advisory Service (FAS) had some ups and downs and was not set up until very recently in 2008. The certification of advisors was at the end undertaken by the Organisation for Certification and Inspection of Agricultural Products (AGROCERT) which certified 500 advisors. Their work has not begun as yet, and detailed directions are still pending.
Targeting	The measure is not targeting specific groups. Being related to cross-compliance and the SFP, targeting provisions are not provided. Even if targeting was within the objectives of the Ministry of Rural Development and Food, there is a lack of basic infrastructure and of human capital to design and implement targeted approaches as those suggested in the recommendations section above.
	To what extent does the implementing body have flexibility in the targeting of the policy measure so that it is adapted to local conditions? √ ☐ ☐ ☐ ☐ Low High
What Drives Uptake?	Uptake is driven by obligation and reinforced by monitoring and controls. Failing to comply has impacts on the amount of SFP received by the farmer.
	√ ☐ ☐ ☐ ☐ Obligation Financial Incentive Information & support Exhortation Other
Technical measures	The technical measure of maintaining a green cover is well adapted to local conditions and very sound. Moreover, as many farmers argued, maintaining a green cover is part of the farming tradition. The technical measure concerning with ploughing along the contour is not well adapted to the physical conditions and the alternatives presented to the farmers are costly (containment zones) or not applicable (ploughing the diagonals – crossing the field).

Enforcement and control	OPEKEPE is the coordinating authority for the inspections of cross-compliance. OPEKEPE chooses the on-spot-checks sample for cross-compliance inspections according to the clauses of Regulation 796/04 and submits it electronically to its own Prefectural Authorities which are responsible for carrying out the on spot checks and visits.
Monitoring and evaluation	Usually, cross compliance inspections coincide with inspections for eligibility of Single Farm Payment. This practice minimises the cost of inspection and the time associated with these inspections. Farmers do not get any notice before an inspection visit. In exceptional cases at most a 2 day notice is given. Taking into account the size of many prefectures and the need for three inspectors in many inspection visits (two agriculturalists and one veterinary surgeon) the number of personnel directly involved to inspection visits is far more than 150. No new inspectors were recruited for the cross compliance controls and this resulted to personnel shortages in the prefectures. There is not any official assessment of the measure and especially in the form of indicators.
Outcomes of policy measure	The measures have raised awareness as concerns the problems of soil erosion and have achieved considerable benefits in the places where this is applicable. However, in places where the measures are not easily applicable, they support a perspective of non-compliance without any control or penalty. This creates and aggravates a widespread confusion as concerns the obligatory nature of the measure.
Analysis of drivers of policy measures' outcomes	The rules applied by the GAECs on soil erosion were a continuation of past rules applied within the framework of the Codes of Good Farming. The measure has a direct impact on farmers because failure to comply has impacts on SFP received.
Part C – Evaluation of the Policy Measure	
Effectiveness of policy measure (in relation to the extent to which objectives are achieved, and cost-effectiveness)	The measure's primary objective is soil conservation from erosion. The measure's objectives are partly met. The measure is very effective in terms of the extent to which its objectives respond to soil erosion in areas where slopes are over 10 % by maintaining a green cover on the fields during winter months. However, it was not extremely effective in introducing a new perspective as concerns ploughing rules even on fields were the slopes are less than 10 %. Unfortunately, the GAECs (including the GAECs on soil erosion) have not undergone any official assessment of their effectiveness. This is partly due to the fact that the Greek state failed to establish the Farm Advisory Service on time for disseminating the information (and especially the benefits of the rules), and for supporting and assisting farmers.
Constraints to achieving full potential of the policy measure	The major constraints to achieving the full potential of the policy measure are the following: 1) The absence (as yet) of the FAS aiming to assist and support farmers on the field.

	2) The absence and inability of targeting the measures to fractions of the rural population and especially to those in need of the measure. Inability to target is partly based on the absence of infrastructure such as databases and soil maps as well as appropriate personnel. 3) The lack of personnel for serious controls and monitoring on the field and in various times around the year. 4) The lack of infrastructure concerning with the design (detailed soil maps), implementation and control of the measures (computerized GIS cadastral and farm registries). 5) The lack of financial resources to support certain costly activities such as the maintenance of stone terraces. A major problem that was brought about by the change in the control and monitoring of the system at regional level from the Ministry of Rural Development authorities to OPEKEPE was that many farmers now have not any reason to conduct the regional authorities (SFP registries are held by the Union of Cooperatives). Thus, the major authority for rural development at regional level (i.e., the prefectural authorities of the Ministry of Rural Development and Food) is completely cut off the rural population of the area.
Reasons for the success of the policy measure (where appropriate)	The reasons for the partly success of the policy measure are: 1) The experience in the measure that was gained during its application within the Good Farming Practice rules. 2) There are low or no costs to the farmer especially for changing ploughing rules on plots where this is possible. 3) Certain practices were already embedded to local farming practices such as the one concerning with maintaining a green cover.

7.2.2 Fiche 2: GAEC soil organic matter measures under cross compliance

Part A: Summary of Measure	
Formal title of measure and date of implementation	Cross Compliance Regulation 1782/2003 Good Agricultural and Environmental Conditions (GAECs) Implemented by Common Ministerial Decision No. 324032 published in the Journal of the Greek Government on 24th December 2004. The GAECs are listed in paragraphs 1 to 9 of article 2 of the above mentioned Joint Ministerial Decision and exemplified by Ministerial Decision 262021 published in the Journal of the Greek Government on 21st April 2005.
Short description of the measure	The GAECs on soil organic matter have been developed from the Codes of Good Farming introduced officially in 2004 (by Joint Ministerial Decision 568 of 20/1/2004 revised partly by Common Ministerial Decision 639 of 25/1/2005). The GAECs aim to address the decrease in soil organic matter observed in Greek agriculture. At the same time the measures also address soil erosion issues. Both soil erosion and the decrease in soil organic matter are considered to be potential problems in Greece. The measure will continue to be in operation in the new period and at least up to 2013.

Type of policy measure	The measure is a mandatory requirement, as failing to comply has impacts on the amount of payments through the Single Farm payment mechanism.
Objective of policy measure and relevance	The GAEC standards on soil organic matter are two (Joint Ministerial Decision 324032, article 2, paragraphs 4 and 5 – Controls exemplified by Ministerial Decision 262021, article 5, paragraph 2), as follows: 1) Farmers must cultivate grain legumes and incorporate these into the soil, in addition to the main crop, on 20 % of the cultivated area of their farm each year. 2) Depending on the local conditions, farmers must choose to follow one or more of the following practices for the remains of their crops: • incorporation into the soil, • grazing the stubble, • mulching the ground with the remains and incorporating them into the soil the following spring. In exceptional cases, only in regions outside the Natura 2000 network and with the authorisation of the competent Rural Development Directorate and the fire brigade, farmers may burn the stubble.
	How relevant are the objectives of the measure to the soil degradation threats in your region? ☐ ☐ ☐ ☐ √ Not very Very
Indirect effect	Indirect effects include soil conservation from erosion due to the prohibition of burning of the straw.
Linkages to other policy measures	This measure is directly related to the Natura 2000 measures of the agri-environmental programme.
Funding	There is no specific funding for the GAECs (see fiche 1 above). Farmers are not compensated or subsidised for adopting and following the good farming practices. They have just to comply; otherwise they are penalised with reductions from the single farm payment. However, the cross-compliance policy is funded by the EU and national sources in order to set up and operate the monitoring and control mechanisms as well as the Farm Advisory System which is not as yet in operation and is estimated to cost about 1.5 million Euro.
Summary of assessment and conclusions	The measure has been successfully by 50 %. The first part of the measure was suspended almost 6 months after its operation. The second part was completely applied and established new practices in Greek agriculture. The first measure targeted both soil enrichment by legume cultivation and land set aside for one year. The main objection against the introduction of the measure was that not all soils were in need of the same treatment and, as far as there was not a coherent soil map of Greece covering all micro-types of soils, the application of the measure would cause extra costs to farmers. Furthermore, taking into account the conditions of family farming in certain areas of Greece and especially the very small size and extreme fragmentation, it would be extremely difficult for many economically marginal farms to apply the measure while it would be difficult for the authorities to really monitor and reinforce its application. The measure has been suspended until a unified soil map of Greece is produced.

	The second measure was fully applied due to very strict enforcement and control not from the Ministry of Rural Development and Food but from the independent authorities of the regional-local fire brigades.
Recommendation	The sole recommendation concerns the development of detailed soil maps for Greece showing the areas needing organic matter enrichment.
Part B: Detail on the Measures Design, Implementation, Enforcement and Impacts	
Policy design	In early 2004 the Ministry of Agriculture[13] set up a committee to work on the introduction of GAECs. This committee based its work on the GAEC standards which were already implemented through Good Farming Practices and their relevant Code (see above). For organic matter, the committee introduced a new compulsory measure for legume cultivation on 20 % of the farm's area and prohibited burning of straw by offering a range of alternatives for treating the cultivation's residues on the field. The proposals were communicated to other departments within these two ministries, to other ministries, to the Greek Union of Farmers (PASEGES), to various sectoral farmers' unions, the Geotechnical Chamber of Greece and certain, not all, NGOs.
Policy implementation I: Implementation at administrative level	OPEKEPE (Payment Authority) is the coordinating authority for the inspections, cross-compliance and SFP. OPEKEPE chooses the on-spot-checks sample for cross-compliance inspections according to the clauses of Regulation 796/04 and submits it electronically to the Prefectural Authorities which are responsible for carrying out the on spot checks and visits. This is a recent development because up to one year ago the competent authorities at local-regional level were the prefectural offices of the Ministry of Rural Development and Food.
Policy implementation II: Method of delivery to farmers	The applicants have to fill certain documents for receiving the SFP. Some of these documents refer to cross-compliance rules including the GAECs on soil erosion. The farmers must comply with all rules detailed for cross compliance (keeping records and documents on farm, etc.). The farmers would receive assistance by the Farm Advisors that would have been set up. Unfortunately, the scheme setting up the Farm Advisory Service (FAS) had some ups and downs and was not set up until very recently in 2008. The certification of advisors was at the end undertaken by the Organisation for Certification and Inspection of Agricultural Products (AGROCERT) which certified 500 advisors. Their work has not begun as yet and detailed directions are still pending.
Targeting	The measure is not targeting specific groups. Being related to cross-compliance and the SFP, targeting provisions are not provided. Even if targeting was within the objectives of the Ministry of Agriculture, there is a lack of basic infrastructure and of human capital to design and implement targeted approaches as those suggested in the recommendations section above. However, the lack of targeting resulted in failing to implement the first of the two measures. Experts argue that targeting is feasible in the sense of soil zones in need for organic matter protection if soil maps are available.

[13] See previous footnote.

	To what extent does the implementing body have flexibility in the targeting of the policy measure so that it is adapted to local conditions? ☐ ☐ ☐ √ ☐ Low High
What Drives Uptake?	Uptake is driven by obligation and reinforced by monitoring and controls. Failing to comply has impacts on the amount of SFP received by the farmer.
	√ Obligation ☐ Financial incentive ☐ Information & support ☐ Exhortation ☐ Other
Technical measures	The technical measure of legume cultivation was suspended because it was not economically feasible and could not be uniquely applied as not all farms need organic matter protection at such a high cost. The technical measure concerning the management of cultivation straws was also rather difficult to be implemented but incurred much lower cost and was demanded by society. In essence, the measure changes cultivation practices and norms.
Enforcement and control	OPEKEPE is the coordinating authority for the inspections of cross-compliance. OPEKEPE chooses the on-spot-checks sample for cross-compliance inspections according to the clauses of Regulation 796/04 and submits it electronically to its own Prefectural Authorities which are responsible for carrying out the on spot checks and visits. For the measure concerning avoidance of straw burning, the role of the fire brigade was essential in controlling illegal actions and breaches of rules.
Monitoring and evaluation	Usually, cross compliance inspections coincide with inspections for eligibility of Single Farm Payment. This practice minimises the cost of inspection and the time associated with inspections. Farmers do not get any notice before an inspection visit. In exceptional cases at most a 2 day notice is given. Taking into account the size of many prefectures and the need for three inspectors in many inspection visits (two agriculturalists and one veterinary surgeon) the number of personnel directly involved to inspection visits is far more than 150. No new inspectors were recruited for the cross compliance controls and this resulted to personnel shortages in the prefectures. There is no official assessment of the measure and especially in the form of indicators.
Outcomes of policy measure	The measure was completely successful in minimising the number of farms which burn the cultivation's residues and especially straws. This has first promoted the state of organic matter and second has protected soils from erosion. The measure has raised awareness of the farming population as concerns the impact of fires on the field. The fact that the measure concerning legume cultivation was suspended supported the view among the farming population that sometimes the measures are not well designed, communicated and discussed. As one farmer argued "it is difficult to design measures from your office downtown Athens if you do not keep close to the rural population and its problems".

Analysis of drivers of policy measures' outcomes	The rules applied by the GAECs on soil organic matter introduced a new rule (compulsory legume cultivation) and continued a rule (burning of straw) applied within the framework of the Codes of Good Farming. The first measure was suspended and it is estimated to have great economic impact should it have been in operation.
Part C – Evaluation of the Policy Measure	
Effectiveness of policy measure (in relation to the extent to which objectives are achieved, and cost-effectiveness)	The measure's primary objective is soil's organic matter conservation. The measure's objectives were partly met because soil organic matter enrichment with legume cultivation was suspended. The measure would have been very effective, if it is correctly implemented and targeting the correct soils and farms. The measure providing management rules for cultivations' straws have been the best success from the whole range of GAECs rules. Unfortunately, the GAECs (including the GAECs on soil erosion) have not undergone any official assessment of their effectiveness. This is partly due to the fact that the Greek state failed to establish the Farm Advisory Service on time for disseminating the information (and especially the benefits of the rules), and for supporting and assisting farmers.
Constraints to achieving full potential of the policy measure	The major constraints to achieving the full potential of the policy measure are the following: 1) The absence and inability of targeting the measure concerning legume cultivation to fractions of the rural population and especially to those in need of the measure. Inability to target is partly based on the absence of infrastructure such as detailed soil maps as well as appropriately trained personnel. 2) The lack of infrastructure concerning with the design (detailed soil maps), implementation and control of the measures (computerized GIS cadastral and farm registries). The measure prohibiting burning of straw was successful due to the synergies developed with institutions outside agriculture such as the fire brigade and the forest service.
Reasons for the success of the policy measure (where appropriate)	The reasons for the success of the policy measure concerning with management of cultivations' residues are: 1) The experience in the measure that was gained during its application within the Good Farming Practice rules. 2) Its low or no cost to the farmer especially for changing rules managing residues (putting on fire) to ploughing and mulching. 3) The expressed social demand for controlling fires which were held responsible for starting major fires in Greek forest and wilderness areas.

7.2.3 Fiche 3: Agri-environment measures - Natura 2000 measures

Part A: Summary of Measure	
Formal title of measure and date of implementation	Supporting Farmers Cultivating in Natura 2000 sites. Measure of Axis 2 of the Rural Development Plan "Alexandros Baltatzis" of Greece 2007-2013. The measure existed in the Rural Development Plan for Greece 2000-2007. Regulation 1698/2005 and annex II of Regulation 1974/2006

Short description	The measure aims to protect and improve natural areas within the geographic boundaries of Natura 2000 sites by offsetting the economic disadvantages of farmers cultivating in Natura 2000 areas. Those farmers have to comply with sound cultivation practices on top of cross-compliance rules.
Type of policy measure	Incentive based measure.
Objective of policy measure and relevance	The measure commands that: • Harvesting should be performed from the centre of the field to its outer parts. • To preserve natural flora in the boundaries of the fields and allow for uncultivated islands within the field. • No use of grazing animals on pasture from 1st of March to 31st of August so that uncultivated zones and the natural borders are not grazed. • To protect natural water collection elements. • To comply with all extra rules imposed by the Management Authorities of specific Natura 2000 sites.
	How relevant are the objectives of the measure to the soil degradation threats in your region? ☐ ☐ ☐ √ ☐ Not very Very
Indirect effects	The measures have direct impact on soil compaction and water preservation.
Linkages to other policy measures	The measure is directly linked to cross-compliance measures and provides additional rules that may be tested for further inclusion in future cross-compliance rules.
Funding	For the period 2007-2013, 8 million Euro have been allocated which are comprised of 75.6 % EU contribution and 24.4 % national contribution. No private contribution required.
Summary of assessment and conclusions	The value of the measure for soil protection is significant if we consider the extensive areas covered by Natura 2000 sites in Greece. However, the very small subsidy of about 50 Euro per hectare diminishes the importance of the measure. In the period 2000-2007, the measure was used for direct income subsidisation without any significant impacts on the environment. This is because most of the Management Authorities of the Natura 2000 sites have not legally defined the geographic boundaries of the zones of activity and thus have not set up management plans and further management rules (including rules for practicing agriculture).
Recommendation	The measure should acquire a serious funding and the control and reinforcement procedures should be passed on from the Ministry's offices to the Management Authorities of the Natura 2000 sites.

Part B: Detail on the Measures Design, Implementation, Enforcement and Impacts	
Policy design	The measure is applicable to all farmers that cultivate within the geographic boundaries of Natura 2000 sites and the uptake is voluntary. The absence of further planning and targeting creates completely stochastic patterns of protection without any prior plan. Thus, farmers that voluntarily subscribe to the plan may not cultivate in areas that are of higher importance and interest, or may not cultivate continuous areas of land in order to achieve a significant impact.
Policy implementation I: Implementation at administrative level	The implementation procedures for the period 2007-2013 are still pending.
Policy implementation II: Method of delivery to farmers	The implementation procedures for the period 2007-2013 are still pending.
Targeting	Complete absence of targeting. The prefecture of Rodopi includes Natura areas accounting for about 105,000 ha (see also section 5.3).
	To what extent does the implementing body have flexibility in the targeting of the policy measure so that it is adapted to local conditions? ☐ ☐ ☐ ☐ √ Low High
What Drives Uptake?	There is a subsidy of 50 Euro per hectare.
	☐ Obligation ☐ √ Financial incentive ☐ Information & support ☐ Exhortation ☐ Other
Technical measures	The technical measures are very general and are not adapted to local conditions. The Management Authorities will define additional rules of compliance that are coherent with their own management plans which are not completed as yet. (Certain areas have made use of Measure 3.9 of the RDP concerning with low input agriculture surrounding Natura 2000 sites.)
Enforcement and control	Enforcement and control relies on on-spot-checks and visits by the prefectural authorities of the Ministry of Rural Development and Food rather than the Managing Authorities of the sites.
Monitoring and evaluation	Usually, monitoring and evaluation coincide with inspections for eligibility of Single Farm Payment. This practice minimises the cost of inspection and of the time associated with inspections. There is no official assessment of the measure and no indicators are used. However, for the period 2007-2013 the Ministry has set a target of 4,000 farm holdings and 32,000 hectares to be enrolled all over Greece. There are no estimates for the case study area of Rodopi.

Outcomes of policy measure	The outcome of the measure is minimal because it has been used as an income support mechanism rather than an environmental measure. However, as the representative of the Managing Authority argued, the measure has the potential to achieve great benefits if better targeted and it should be backed with larger investments. Investments refer not only to direct payments to farmers but also to investments that will allow the Managing Authorities of Natura 2000 sites to get involved in the planning, monitoring and control of the measure.
Analysis of drivers of policy measures' outcomes	The subsidy is the sole driver behind the measure.
Part C – Evaluation of the Policy Measure	
Effectiveness of policy measure (in relation to the extent to which objectives are achieved, and cost-effectiveness)	The invested amount is wasted because it is too low to have any impact or to allow competent authorities to be very demanding and strict in the application and control.
Constraints to achieving full potential of the policy measure	The major constraints are: Lack of targeting of the farming population in terms of location and cultivations within the boundaries of Natura 2000 sites. No involvement of local Management Authorities in the various phases of planning, monitoring and controlling the measure's application.
Reasons for the success of the policy measure (where appropriate)	The measure cannot be considered as successful.

7.2.4 Fiche 4: Agri-environment measures – Organic Agriculture

Part A: Summary of Measure	
Formal title of measure and date of implementation	Regulation 2092/91 on Organic (Biological) agriculture, Common Ministerial Decision 245090/10-2-06 (ΦΕΚ 157Β) Implemented within Axis 3 Measures of the Rural Development Plan for Greece (Measure 3.1)
Short description of the measure	Applies to the organic production of all cultivations and in all regions of Greece. No targeting. In Rodopi, the programme refers to 64 producers cultivating almost 600 ha of feedstuff. On the contrary, in Greece organic agriculture is estimated to account now for almost 3 % of total agricultural utilised area.

Type of policy measure	Incentive based. Organic agriculture is voluntary and depends highly on the subsidies provided to the different chosen crops (except those that may be directed to energy production). Fruits and vegetables are exempted.
Objective of policy measure and relevance	Organic agriculture supports farmers to avoid the use of certain chemical substances (fertilisers or pesticides) that contribute to soil nitrate and contamination from other residual substances. Waters (inland) are also protected.
	How relevant are the objectives of the measure to the soil degradation threats in your region? ☐ ☐ √ ☐ ☐ Not very Very
Indirect effects	Organic agriculture also sets up a range of Good Farming Practices that assist efforts to combat soil erosion, enhance organic matter and avoid compaction from the use of heavy machinery.
Linkages to other policy measures	Direct linkages to cross-compliance policy and other agri-environmental programmes (organic animal raising, production extensification, production in nitrate vulnerable zones, etc.)
Funding	For the period 2007-2013 314 million Euro have been allocated which are comprised of 76 % EU contribution and 24 % national contribution. No private contribution required.
Summary of assessment and conclusions	The value of the measure for soil protection is significant. Organic farmers comply with all GAECs for cross compliance and, on top, they make efforts for the enrichment of soils in organic matter and avoidance of soil and water contamination. Furthermore, organic agriculture is not based on the use of heavy machinery and thus, soil compaction is avoided. However, one should note the extremely low uptake of the measure among the farming population.
Recommendation	The measure should be maintained but efforts should be made to increase the scheme's uptake. Meager subsidies, the lack of interest and other obstacles kept organic production in Greece small compared with other European countries. However, in recent years impressive progress has been made to encourage both farmers and consumers to switch to naturally-grown foods and the new Rural Development Plan (Alexandros Baltatzis) has taken a step towards this end.
Part B: Detail on the Measures Design, Implementation, Enforcement and Impacts	
Policy design	The scheme is administered by the Ministry of Rural Development and Food as part of the Rural Development Plan. Farmers need to subscribe to one of the three quality control independent inspection and certification bodies: DIO, founded in 1993 (after the poetic name for Demeter, the goddess of fertility); Bio Ellas (formerly SOGE - Syllogos Oikologikis Georgias Elladas or Association of Organic Agriculture in Greece) founded in 1985; and Fysiologiki (The Natural One), founded in 1994.

Policy implementation I: Implementation at administrative level	The implementing body is public (the Ministry of Rural Development and Food) but the certification and inspection bodies are private independent bodies. The subsidy includes expenses for advisory services and soil analysis as well as income foregone due to lower yields from conventional cultivations. For the period 2007-2013 the following subsidies for foregone income in Euro per hectare have been provisionally set: Table olives 72, olives for olive oil 411, raisins 631, table grapes 885, grapes for wine 709, cereals and other dry cultivations 106, maize 527, maize for feedstuff 585, alfalfa 408, other fodder plant 147, cotton 585.
Policy implementation II: Method of delivery to farmers	The farmers have to declare the plots of their farm holding that are under the organic agriculture cultivation rules and bring a contract with one of the three certification and inspection bodies. All other procedures (consultation, inspection, and certification) rest with the independent body chosen by the farmer.
Targeting	No targeting. All farmers in all geographic zones and almost all major cultivations are eligible.
	To what extent does the implementing body have flexibility in the targeting of the policy measure so that it is adapted to local conditions? ☐ ☐ √ ☐ ☐ Low High
What Drives Uptake?	Organic agriculture is subsidised. However, its uptake is driven by the fact that it provides an alternative to conventional markets.
	☐ Obligation ☐ √ Financial incentive ☐ Information & support ☐ Exhortation ☐ Other
Technical measures	All technical measures in Regulation 2092/91 for organic cultivation.
Enforcement and control	The certification and inspection bodies control all farmers subscribing to their services (there are no sampling mechanisms). Furthermore, the product is sampled by independent government bodies as well as export controlling agencies.
Monitoring and evaluation	The target indicator is the number of hectares to be included under organic cultivation in the new programming period. The goal is set to 180,000 hectares.
Outcomes of policy measure	Greek organic production is very small compared with other European countries. Factors which stimulated other European countries to present higher adoption rates such as national laws, subsidies for farmers, organised marketing, national labels and certification, consumer/farmer information and state research, have started very late in Greece. However the progress in recent years is impressive.
Analysis of drivers of policy measures' outcomes	Agenda setting and instruments to assist farmers are the main drivers behind measures' outcome. The state decided to put an agenda for organic cultivation and also decided to allocate a considerable amount of the Rural Development Plan to assist organic agriculture thus, putting it high on the rural development agenda.

Part C – Evaluation of the Policy Measure	
Effectiveness of policy measure (in relation to the extent to which objectives are achieved, and cost-effectiveness)	The effectiveness of the organic agriculture measure is great in terms of soil conservation but the uptake is still small so that the overall impact of the scheme is minimal. Organic agriculture is considered by both experts and officials to be the most effective measure for soil conservation.
Constraints to achieving full potential of the policy measure	The major constraint to achieving the full potential of the measure is the lack of education and information. This implies that there is poor understanding of the real demands of organic agriculture. Many farmers consider it easier to convert 'extensive' cultivation to organic farming, rather than intensive (irrigated, with high levels of chemicals), believing that extensive agriculture is organic. For this reason, the Ministry's efforts in terms of subsidies have been directed to cultivations being very intensive such as cotton and maize, as well as grapes.
Reasons for the success of the policy measure (where appro-priate)	There are two reasons for the success of the measure up to now: The fact that markets for conventional food products have faced limited growth and there is an obvious turn in consumer demands for healthier food. Secondly, the measure was assisted by independent certification and in-spection bodies interested in increasing the number of farmers adopting the scheme.

7.2.5 Fiche 5: The Farm Modernisation Scheme (RDP)

Part A: Summary of Measure	
Formal title of measure and date of imple-mentation	The Farm Modernisation Scheme – Rural Development Plan 2000-2006 measure 1.1 and Rural Development Plan "Alexandros Baltatzis" 2007-2013 Axis 1. Regulation 1698/2005 (articles 20 and 26); Regulation 1974/2006 (article 17); implemented within Axis 1 Measures of the Rural Development for Greece
Short descrip-tion of the measure	The measure aims at supporting farms that will undertake investments for improving productivity, increasing incomes and supporting employment in rural areas. The measure is partly targeted as LFAs island areas received different assistance from farms located in mainland Greece. Furthermore, young farmers are also targeted with higher capital subsidy rates. This is very important because the majority of young farmers have undergone spe-cial training for the acquisition of the so called "Green Certificate" that intro-duces them, among others, to environmentally friendly and sound cultivation practices.
Type of policy measure	Incentive based. The farmer voluntarily submits a farm modernisation plan and, if accepted, he/she gets the capital subsidy depending on the type of investment and the location of his/her farm.

Objective of policy measure and relevance	To support investments that will increase productivity and farm income, create employment, comply with EU standards in the production and manage resources more efficiently. The scheme also supports certain soft activities.
	How relevant are the objectives of the measure to the soil degradation threats in your region? ☐ ☐ ☐ √ ☐ Not very Very
Indirect effects	The measure has two indirect impacts on soil conservation. The positive impact concerns with investments on irrigation systems and especially subsidisation of drip irrigation installations. This can assist the rational use of water resources against water salinisation and consequently, in the long term, against soil salinisation. The negative impact concerns with investment in heavier integrated machinery that may aggravate soil compaction.
Linkages to other policy measures	The measure is directly linked to pillar one market organisation condition and cross compliance standards.
Funding	For the period 2000-2006, a total of 932 million Euro were spent comprised of 29.33 % EU funding, 12.72 % national funding and 53.74 % private funding. In the period 2007-2013 a total of 859 million Euro is envisaged with private contribution comprising 50 % of total expenditures.
Summary of assessment and conclusions	The value of the measure for soil protection is significant because this is a widely adopted measure as the number of beneficiary farms was over 40,000 in the period 2000-2006 and is estimated to reach 8,000 farms in the period 2007-2013. Unfortunately there is not, as yet, a quantified estimate of the farms that purchased drip irrigation systems and their cultivation and hence water savings benefits cannot be estimated.
Recommendation	The measure could be more regionally targeted allowing regions to set up a range of priorities, including environmental priorities.
Part B: Detail on the Measures Design, Implementation, Enforcement and Impacts	
Policy design	The scheme is administered by the Ministry's of Rural Development and Food - Rural Development Plan. Farmers should submit a plan and, if accepted, they must start the implementation using private funds and instalments of the capital subsidy.
Policy implementation I: Implementation at administrative level	The implementing body is public (the Ministry of Rural Development and Food) but the role of private consultants drawing up the investment is significant. The investment is controlled during the construction (or purchase) phase and is finally checked by a committee before it is accepted by the state and the final instalment is paid to the farmer.
Policy implementation II: Method of delivery to farmers	The farmers are aware of the scheme due to its long history of implementation. The farm modernisation scheme is one of the oldest schemes in Greek agriculture and there is a lot of experience in its administration and among the farming population.

Targeting	There is a degree of geographical targeting where small islands receive capital subsidies as much as 75 % of total capital investment, LFAs receive 50 % and all other areas receive 40 %. For young farmers the subsidies to LFAs increase to 60 % and for other regions 50 %.
	To what extent does the implementing body have flexibility in the targeting of the policy measure so that it is adapted to local conditions? ☐ √ ☐ ☐ ☐ Low High
What Drives Uptake?	In general, uptake is driven by capital subsidisation. However, in certain cases it may be argued that uptake is driven by real environmental and soil degradation problems. The need to install drip irrigation is sometimes a response to water shortages and drives the adoption of the farm modernisation scheme. In other cases (but not in our case study) the eligibility for NVZ payments drives adoption of drip irrigation and consequently leads farmers to the farm modernisation scheme.
	☐ √ √ ☐ ☐ (two drivers) Obligation Financial incentive Information & support Exhortation Other
Technical measures	The measure of interest for our case study area is subsidisation of drip irrigation as following: Drip irrigation was subsidised (2006 prices – Region of East Macedonia and Thraki) by 2100 Euro per hectare for annual cultivation, 2300 Euro per hectare for tree plantations and 2500 Euro per hectare for grapes and kiwi fruits. Furthermore, transfer of water to the farm is assisted by 15 Euro per meter for hydraulic works.
Enforcement and control	Control is undertaken by committees set up by the authorities of the Ministry of Rural development and Food in order to ensure that the submitted plan was followed and the expenditures are eligible and in accordance with maximum subsidised targets.
Monitoring and evaluation	The target indicator is the number of farms submitting and undertaking a farm modernisation plan. The current (2007-2013) goal is set to 8,000 farm households.
Outcomes of policy measure	The farm modernisation scheme has been widely assessed but the various evaluations do not contain data that will allow us to estimate its impact on water management or soil conservation practices.
Analysis of drivers of policy measures' outcomes	Agenda setting and capital subsidisation instruments to assist farmers to undertake investments are the main drivers behind measures' outcome.

Part C – Evaluation of the Policy Measure	
Effectiveness of policy measure (in relation to the extent to which objectives are achieved, and cost-effectiveness)	The effectiveness of the farm modernisation scheme and especially capital subsidies for installing drip irrigation may be great in terms of soil conservation through rational water management. Effectiveness will be accelerated if drip irrigation subsidies are allowed to get a head start (through increased ratios of subsidy or through regional agenda setting mechanisms).
Constraints to achieving full potential of the policy measure	The major constraint achieving the full potential of the measure is that drip irrigation still has a low priority among farmers' choice of investments. Unfortunately, due to the rapid reorientation of Greek agriculture and especially in the case study area where old cultivations of tobacco and sugar beet have been abandoned, the need to channel investments to new cultivations is greater than the respective need to install water management techniques. For this reason, the Ministry's efforts in terms of subsidies could have a green dimension.
Reasons for the success of the policy measure (where appropriate)	The success of the measure up to now can be found in the synergies created by other programmes or by real needs demanding a sound utilisation of water.

7.3 Summary of policy use and evaluation of effectiveness

Unfortunately, there is no official and publicly available information concerning the effectiveness of the soil conservation policies carried out through cross-compliance. However, some information concerning the effectiveness of agri-environmental measures implemented by the RDP are available through ex-ante and on-going assessment exercises that are carried our regularly by independent private consultants. The indicators usually employed in such studies refer either to the degree of physical implementation or to various indicators combining physical and financial data.

Farm and production data are relatively available and accessible due to the strict monitoring system related to Single Farm Payments. On the other hand, knowledge and data concerning soils present gaps while there are not digitized soil maps.

As concerns sanctions, the only available results made available during our interviews with OPEKEPE's officials concern with cross compliance sanctions. In 2005, provisional data show that out of a total of 4,784 controls for GAECs 1,191 breaches were verified and almost all (1,153) concerned with crop rotation that was later abandoned. 37 breaches concerned with minimum maintenance levels and especially the ones concerned with no minimal farming interventions on the parcel required to keep it in good condition and prevent it from the encroachment of unwanted vegetation (20 out of 37), breaches of the maximum stocking density of 3 LUs per hectare (11 out of 37) and breaches of the minimum stocking density of 0.2 LU per hectare (6 out of 37). This shows that the implementation of soil conservation rules and especially of those related to the Single Farm Payment is relatively poor. Reasons for this include incomplete controls and the inability to apply the support of farm advisory system.

GAECs are the policies most focussed on soil conservation. Natura 2000 measures, organic agriculture and the farm modernisation scheme are the next most relevant policies to soil conservation threats. These policies are complemented by a range of other measures promoting educational and vocational training, farm extension and advice, certification of agricultural practices or products, etc. Some policy measures are mandatory and some are on a voluntary basis. Policy measures are fragmented and by no means constitute a coherent soil conservation policy. Measures are applicable everywhere and do not target problem areas, problematic farming practices or crops. Even if policies are by definition targeted, e.g. measures concerning Natura 2000 areas, the lack of targeting within the Natura 2000 boundaries misses a chance for a more focused and concentrated policy.

The GAECs cross compliance requirements address directly the soil threats and degradation issues in the case study area. More specifically the GAECs on soil erosion and organic matter introduce mandatory farm practices which can mitigate the soil degradation threats adequately and effectively. However, the procedures for controlling and enforcing the GAECs are rather loose and farmers are rarely penalised for failing to comply. At the same time, the state failed to provide a robust farm Advisory System that would assist farmers to understand and follow the GAEC rules. Taking also into account the inability of the local agricultural services to fulfil their role in extension and advisory services due to lack of personnel, farmers were asked to comply without any assistance. As such, it would be odd if the policy was to penalised farmers that failed to comply with a policy that they do not really know and have not received any assistance to understand and practically apply it.

The Natura 2000 measure sets additional soil conservation rules to be followed by all farmers and leaves open the opportunity to local managing authorities to set up additional rules adapted to local conditions. So, the policy leaves some room to local actors but, in essence, and taking into account the situation of the managing authorities, only a few will create additional, locally adapted measures. Furthermore, the measures do not allow local managing authorities to target special areas within the Natura 2000 site or to target specific cultivations. One should also keep in mind that the Natura 2000 measures are managed by the Ministry of Rural Development and Food while the managing authorities of the Natura 2000 sites administratively belong to the Ministry of Public Work, Planning and the Environment. Finally, payments by this measure are so low that farmers do not bother adopting the scheme especially in view of the needed bureaucracy and paper work.

None of the Managing Authorities of Natura 2000 sites have been actively involved in the design, implementation (including delivery) and monitoring/control of the measure. The Managing Authority for Rodopi has specific proposals for the formulation of the measure and its representative expressed his arguments and possible explanations for the technical inability of the measure. First, official definition of the boundaries of the zones of Natura 2000 sites is not finished for the majority of the sites. Thus, there is no legal base defining and allocating permitted and banned activities within the boundaries of the site. Second, the Managing Authority (and most managing authorities around the country) has not finished the process of drawing up their master management plans. Third, Managing Authorities have not been equipped with the appropriate infrastructure for managing agricultural activities, such as infrastructure indicating the location of activities (a basic GIS), registries of farmers within the boundaries of the sites, etc. The Managing Authority of the site could propose specific measures to be undertaken within their Natura 2000 and set up the priorities of this site which are different to the priorities for the other sites across the country. Furthermore, the Managing Authority could coordinate a network of actors including organisations for monitoring the implementation of the measure. One of the main issues raised by representatives of the Managing Authority is the lack of targeting of the measure. Lack of targeting does not allow planners to direct subsidies to the locations (and cultivations) that need further regulation in relation to the protected zone of the site. Non-targeting creates a random locational pattern of conservation and creates patches of conservation at random? Targeting could allow local

planners to create strips (or zones) of protection or, at least, regulate certain cultivations that are contributing to water contamination or are heavy users of water.

The major problem of organic agriculture in the area of Rodopi is its low uptake rates and the unwillingness of farmers to adopt the rules for organic cultivation. The reasons behind low adoption rates are varied and most of them were revealed in discussions with farmers and government officials in the area. The low educational level and training of the population decreases the chance of adopting organic cultivation measures. Second the dominant crops of the area i.e., tobacco and cotton, are not well-known organic cultivations. Organic cultivations refer mostly to products that directly enter the food chain or that are in the production of feedstuff. Third, the low adoption rates and the lack of a critical mass of producers does not support the operation (and effects) of agglomeration economies in the production of organic products. Thus specialised suppliers of organic agriculture inputs do not exist, and trade networks are at an infant stage. Furthermore, it is important to note that there is no specialised personnel to act as advisors for the organic cultivation of cotton or tobacco in the area. Thus, despite the fact that in the rest of Greece organic agriculture shows dynamism in recent years, in the area of Rodopi the uptake is very low. In Rodopi only 64 producers cultivating approximately 600 ha of feedstuff have adopted organic agriculture. Such a low number of producers cannot have any significant impact on the environment. These early adopters are important because they serve as a paradigm for local efforts to support organic agriculture.

The efforts of local planners (governmental and non-governmental) have been directed in two channels. First, planners aim to support existing farmers and utilise their farms for demonstration purposes to other farmers willing to adopt organic rules of cultivation. Second, planners aim to diffuse organic cultivation to other cultivations, mainly cotton. The latter implies efforts to set up local synergies connecting the prospective cotton organic farmers to the national trade networks for organically cultivated cotton including the textiles industry of the country.

Capital subsidies for the installation of drip irrigation systems directly affect water salinisation as they introduce a sound and environmentally sensitive water management practice. Drip irrigation reduces water demand and conserves water in aquifers and thus reduces the trend of salt water from sea to intrude inland under surface waters. Second, capital subsidies allow farmers to purchase heavier machinery especially for the collection of cotton and maize and thus aggravate soil compaction. The purchase of heavy machinery is not always a direct investment of the farm modernisation scheme. The operation of the farm modernisation scheme allows farmers to substitute their own capital with subsidies and thus release their own capital for other uses including the purchase of heavier machinery.

The technical feasibility of the Farm Modernisation Scheme is significant because the measure has accumulated great experience from the institutional side as well as from the farmers' side. It is well known and widely used and one of the very few measures for which competition among farmers is fierce and many applications are not served. The experience gained by the long-term application of the measure has allowed modifications as concerns targeting and the creation of synergistic effects with other programmes. As concerns targeting, the scheme targets both geographic zones by introducing a different proportion of assistance to islands and LFAs versus regular areas, as well as targeting the young farmer versus the mature farmer with increased proportion of assistance.

As concerns the positive effects of subsidising the installation of drip irrigation especially in cotton cultivations, the efficiency of the measure is significant. Experts argue that the capital subsidy of 210 Euro per hectare for drip irrigation and the associated subsidy of 15 Euro per meter of technical works for water supply are of considerable value taking into account the cost savings of the drip irrigation in labour and fuels (or electric energy). On the other hand, experts argue that the negative effects that may be created from the purchase of heavier machinery are not that significant. This argument is based on the view that the opportunities

to substitute own funds by assisted capital and then release own funds to the purchase of heavier machinery is restricted to very few large farmers.

The environmental effectiveness of subsidising the purchase and installation of drip irrigation systems is high. In Thraki, water demand for agriculture accounts for 95 % of total water demand, a figure that is higher than the respective figure for other areas of Greece and considerably higher than the respective European average figure. The acute water salinisation problems observed in the sea side of Thraki will be soon transferred to the soil causing soil salinisation. The Farm Modernisation Scheme is a good measure for the installation of on farm water management techniques. However, as all farmers noted, this is not enough because water supply is the primary problem. Adequate water supply needs the execution of large infrastructure in the sense of water catchments that will supply water and ban water extraction from wells. On the contrary, the representative of the environmental NGO argued that if appropriate research is carried out, the solution may be found in small water management investments that will repair the old and open irrigation water transportation channels and on farm water management rules including drip irrigation and sound irrigation practices (hours of irrigation, time of irrigation, etc.). Unfortunately, there is no official assessment of the water management issue and thus one may not be certain what the solution is. However, the confrontation over the solution to the irrigation water management system is a good indication of the various perspectives under which society views water management problems and their solutions in the case study area.

The measures to address the soil degradation processes of the case study area Rodopi have a varying degree of suitability. The GAECs are in general suitable to protect soils from erosion and compaction and enrich organic matter. However, the GAEC enhancing organic matter by compulsory legume cultivation was suspended not because it was not suitable but because it added a high cost to all farmers (including the small ones) irrespective of how acute the need to conserve soil organic matter is. In this respect a serious disagreement between policy designers (experts) and farmers emerged. The disagreement concerning the measure's cost efficiency in view of its effectiveness to every farm in a region. Farmers argued that soil analyses or detailed soil maps should have been used before such costly measures were enforced. The suitability of ceasing the burn of cultivation residues was high and its effectiveness surpassed any prior expectations.

A serious disagreement for the suitability of ploughing along contour lines when slopes exceed 10 % also emerged between farmers and soil experts. The alternatives provided, i.e., that ploughing should be carried out on the level or diagonally, or alternatively stable uncultivated strips should be created as containment zones, at distances in keeping with the characteristics of the land and the slope, were not easily achieved in technical terms. So farmers tended not to follow the measures.

Soil conservation measures are the subject of a highly concentrated top-down policy approach. Local authorities, local unions of farmers and local non-governmental organisations are rarely consulted and thus the design of policy lacks local expertise and knowledge. Failure to consult local actors makes targeting of policies very difficult. Lack of targeting is a clear sign that policies are designed centrally. This implies that policies can be easily controlled from the centre but their effectiveness is not maximised.

Another major constraint is related to the lack of appropriate infrastructure and especially to detailed soil maps and GIS relating farming activity and soils. Recommendations for policy improvement are included in Chapter 8, Conclusion.

For soil erosion, the measure demanding the maintenance of a green cover on parcels with a slope of over 10 % during the rain period is unanimously considered as a good practice which was both suitable and cost effective. For soil organic matter the measure prohibiting burning of cultivation residues was also widely applied despite the fact that not all farmers considered it to be a good practice. It is important however, to note that this measure provided alternatives, e.g., incorporation into the soil, grazing the stubble, and mulching the

ground with the remains and incorporating them into the soil the following spring, which instigated the adoption of new farming practices. Finally, as concerns water salinisation, the measure subsidising the installation of drip irrigation has been a very good practice. The measures that failed to have any impact such as cultivation with legumes incurred a high cost to farming and did not provide any compensation for this. Other measures that had partial success such as the measure on ploughing along contours were either badly planned from a technical point of view or the provided alternatives were costly given the small size of farms and extreme fragmentation. Finally, measures that were delayed, such as the setting up of the Farm Advisory System show that power games and the willingness of institutions to control newly created structures can be very inefficient for policy design and implementation.

A series of policy measures applicable to other parts of the country are not applied to the case study area due to a lack of appropriate research and backing by data and hard facts. As a result the Nitrate Vulnerable Zones (NVZs) programme is not applied in Rodopi although it has been successfully implemented in other cotton producing areas such as the region of Thessaly. The introduction of a NVZ could assist the control of soil contamination and promote rational water management. The NVZ scheme provides considerable subsidies offsetting the foregone farming income and is thus well received by farmers. Presently, the prefectural authorities of the Ministry of Rural Development and Food have set up a programme of measurements and data collection in order to prepare the area to submit a plan of Nitrate Vulnerable Zones (NVZs). This would justify (or not) the need to establish a NVZ in the case study area of Rodopi.

8 Conclusions

Greece does not have a coherent and integrated soil conservation policy. Various technical measures targeting soil conservation exist as parts of certain agricultural policies that directly or indirectly address environmental issue. However, all these measures are not coordinated and by no means constitute an integrated soil conservation policy. The compulsory technical standards (GAECs) under the cross compliance requirements are the only ones that have a clear soil conservation reference and a direct impact on soils. Several other technical measures have soil conservation as their by-product because their main reference and target is different as for example the non-use of certain chemical substances that protects soils from contamination under the organic agriculture policy.

One may refer to several good practice examples as well as failures and constraints to current technical measures and the policy under which they operate. The technical measure not allowing burning of cultivation residues especially straws from cereals and cotton cultivation was an extremely important measure that had impacts on soil organic matter conservation as well as protection of soils from erosion. Furthermore, the measure minimised the risk of fires especially during dry summer months. The measure was practically enforced by cross compliance GAECs and its enforcement was undertaken by many Greek services not related to agricultural policy such as the Fire Department, the Greek Forest Service and others. The success of the measure is not only that burning of residues really stopped but it also instigated the adoption of a range of good farming practices such as direct incorporation into the soil, and mulching the ground with the remains and incorporating them into the soil the following spring. The success of the measure is due to: a) the real need to avoid fires starting from burning the residues and spreading to nearby wilderness areas or forests while there was not primarily a genuine concern about organic matter decline; b) the fact that this measure had a wider social support and concern and c) that its enforcement and control was undertaken by departments (the Fire Department, the Forest Service) that have the personnel and the expertise to monitor and legally penalise misbehaviour.

The measure concerned with maintaining a green cover during winter months on all parcels of farm land with a slope of over 10 % also has been very successful due to the fact that it already constituted a farming practice in most mountainous and hilly communities of the

study area. The technical measure re-confirmed and recognised the good farming practice and made it part of the cross compliance policy. The practice is beneficial to farm households that keep a few animals for the household needs usually indoor during winter months. Thus, the green cover can make good feedstuff when cut in spring (not grazed) and support the low income of small holdings. Especially small tobacco producers in the hilly areas of the case study area have benefited from the measure.

On the other hand, two technical measures faced great difficulties that lead them either to suspension or to partial application. The measure demanding cultivation of 20 % of the farm's area with legumes and incorporation into the soil was suspended in the case study area and in Greece. The reasons for suspension were: a) the high cost to be incurred especially by the very small producer, b) the utility of measure was not clearly proved and not all farms were in need of this measure enhancing organic matter, c) the extremely difficult application and control of the measure given the extreme fragmentation of the farm households in the area. The measure is suspended until detailed soil maps are produced which will allow the targeted application of the measure. The technical measure concerning ploughing along the contours was partly applied in practice by farmers. The measure demands that on parcels with more than a 10 % slope where there is danger of erosion, ploughing should be carried out on the level or diagonally, or alternatively stable uncultivated strips should be created as containment zones, at distances in keeping with the characteristics of the land and the slope. In certain cases following contour lines when ploughing is dangerous for machinery operators. On the other hand, the alternatives are either not technically feasible (ploughing diagonally) because the tractor crosses the field or because the alternatives reduce the land available for cultivation and impose a considerable cost to the farmer. The cost of creating stable uncultivated zones increased with the fragmentation of farms and their small sizes. Taking into account that smallness and fragmentation increase in mountainous locations of the case study area (where also slopes of over 10 % are met) one can understand why the measure was applicable only partially. What could have been done to achieve a better application of the measure? If it is not technically feasible to plough along the contours then farmers should be compensated to leave land uncultivated. The compensation should take the form of a subsidy similar to that used for set aside land.

From an environmental point of view, the policies encourage the appropriate soil conservation measures but they do not target the problem areas and problem cultivations in the case study area. In other words, while conserving organic matter is an appropriate strategy, not all fields have the same need and not all cultivations (and their associated farm practices) reduce organic matter by the same amount. However, the answer to such questions demands that previous scientific work has been undertaken. Thus, the design of measures is based on hard scientific facts while their implementation is made possible by infrastructure (soil maps, GIS), that allows targeting.

A number of technical measures are feasible and accepted and are mostly related to cross compliance policy. The baseline for a measure to be acceptable is either to incur no cost or low cost or to compensate for lost income. This is the fundamental criterion of acceptance. If the measure leads to an increase in income (e.g., maintaining green cover during the winter) or saves money i.e., is a cost reduction measure such as maximum amount of fertilisation or drip irrigation versus flooding (gravity) or sprinklers, then the efforts farmers make to adopt the measure are higher. At the same time, these measures are the most effective because with low cost activities (except of installing drip irrigation) the gain is significant. On the other hand, measures outside cross compliance policy can be effective if they are well delivered to the farming population. For example, the diffusion of organic cultivation will consequently diffuse the technical measures concerning land conservation from contamination with chemical substances. But the effect of such measures depends on the effectiveness of organic agriculture.

Policy design, delivery, implementation and control could be greatly improved if:

- Local actors (farmers, governmental and non-governmental organisation) were widely consulted;
- Policy had a certain degree of devolution by providing general guidelines and leaving the details for application to local authorities, utilising local expertise and knowledge;
- Policy measures should be coupled with the provision of Farm Advisory Services, vocational training and demonstration projects;
- Create infrastructure for the application and control of soil conservation measures and especially the lack of soil maps and GIS for designing and monitoring the measures;
- Institutionalise the communication among the actors involved in the design, implementation and assessment of policy measures. This may be done by setting up committees which will have a mandatory participation of experts (or officials) from the various departments or ministries which are involved in policy design;
- Provide mandatory assessment (and even environmental impact assessment) of the measures aiming at soil conservation and especially of the GAECs for soil erosion and soil organic matter which are not scientifically assessed or reviewed;
- Create the underlying conditions for spreading and diffusing organic cultivation to traditional cultivations of the area such as the cultivation of organic cotton.

Unfortunately, trends in policy development are rather gloomy and alarming. Cross compliance, the major policy delivering mandatory soil conservation technical measures to all farmers and all locations within the case study area of Rodopi, has not undergone any formal assessment and its future trend is static (remain as it is). If no changes to the current set of measures are envisaged, then the processes for design, delivery and monitoring will not change. The only difference will be made when the FAS is fully operational but again, no assessment of the measure is contemplated and thus, no evaluation information will be available.

At the same time, our impression from the case study area of Rodopi, which holds true for other regions of Greece, is that the future of farming will be extremely different from its present. A number of cultivations will eventually follow a very declining trend. Certain cultivations have already been abandoned (sugar beets) while others have been partially abandoned (tobacco) and others will follow shortly (cotton). This will create a new picture as concerns farming systems in the area with significant consequences for soil conservation. First, abandoned land may increase. Second, alternative cultivations may emerge either in the form new crops e.g., sunflower for oil production, or in the form of alternative practices, e.g. organic agriculture. On the other hand, if prices for cereals and maize remain at their present high levels the spreading of these cultivations is possible. This will create further problems particularly for the conservation of agricultural soils. For example, maize is one of the most water demanding cultivations of the case study area. Our conclusion is that the policy already in place is not able to manage such changes and is not prepared to address the issues that will emerge at such a large scale. For example, replacement of tobacco (a generally dry cultivation) by maize will increase water demand in hilly areas which are still using traditional gravity irrigation systems.

The evolution of the common market organisation of the cultivations in the case study area and more specifically the extent of decoupled payments will be the most crucial factor for the future of farming systems. This, in turn, will have consequences for soil conservation which will be more important and significant from all other developments and more unpredictable because small turns in prices can lead cultivations to either abandonment or intensification.

References

Beopoulos, N. and Skuras, D. (1997): Agriculture and the Greek Rural Environment, *Sociologia Ruralis* 37(2), pp. 255-269.

Caraveli, H. (2000): A comparative analysis on intensification and extensification in Mediterranean agriculture: dilemmas for LFAs policy. *Journal of Rural Studies* 16, pp. 231-242.

Cross-compliance: A Guide to Farmers. Ministry of Rural Development and Food. Athens, 2006.

DIO – Organisation for Control and Certification of Biological Products: http://www.dionet.gr/

Ex-ante Evaluation of the Rural Development Plan 2000-2006.

Fanariotu, I.N. and Skuras, D.G. (1989): Environmental Protection Under the EEC's Socio-Structural Policy for Agriculture, *Journal of Environmental Management* 28, pp. 269-275.

Fanariotu, I.N. and Skuras, D.G. (1991): Fertiliser use and environmental policy in Agriculture: A Socio-economic Study in Greece, *Environmental Conservation* 18(2), pp. 137-142.

Joint Ministerial Decision 277628 of 27th July 2006 published in the Journal of the Greek Government No 764 "Complementary Measures for the Application of Articles 3 and 4 of Regulation (EC) 1782/2003 of the Council and Referring to Requirements of Points B and C of Annex III of this Regulation.

Joint Ministerial Decision 297285 of 26th August 2005 published in the Journal of the Greek Government No 1447 "Modifying and Completing Ministerial Decision 262021/21.4.2005 (FEK 538B').

Joint Ministerial Decision 303894 of 14th September 2006 published in the Journal of the Greek Government No 1375 "Complementary Measures for Applying the Farm Advisory System (Regulation 1782/2003).

Joint Ministerial Decision 324032 of 24 December 2004 published in the Journal of the Greek Government No 1921 "Application of the Cross Compliance and Other Complementary Measures for the Execution of Regulation EC 1782/2003 of the Council.

Mid-Term Evaluation of the Rural Development Plan 2000-2006.

Ministerial Decision 262021 of 21st April 2005 published in the Journal of the Greek Government No 538 "Details for Applying Joint Ministerial Decision 324032/24.12.2004

Ministerial Decision 282471 of 13th September 2006 published in the Journal of the Greek Government No 1307 "Details for Applying Joint Ministerial Decision 277628/29.5.2006.

Ministerial Decision 303915 of 3rd October 2006 published in the Journal of the Greek Government No 1447 "Modifying and Completing Ministerial Decision 262021/21.4.2005 (FEK 538B').

Ministry of Rural Development and Food: http://www.minagric.gr/

National Statistical Service of Greece (NSSG) (2003): Survey on the Structure of Agricultural Holdings. Athens. Data provided on the NSSG's Web Site: www.statistics.gr.

OPEKEPE. Circular – Manual of Processes Applied During Controls and Imposed Deduction Under the Single Payment and Other Support Regimes in the Framework of Regulation 1782/2003. Directorate OSDE, 70746, 20.7.2006.

Ornithologiki Etairia Ellados (Birdlife Greece): http://www.ornithologiki.gr/.

Papageorgiou, K. (1999): Final report for Evaluation of the Efficiency of the Compensatory Allowance Scheme in Less Favoured and Mountain Areas (Reg. 950/97). Laboratory of Rural Policy and Cooperatives, Agricultural University of Athens. (in Greek).

PASEGES. The New Common Agricultural Policy (CAP). Athens, April 2005.

PASEGES: http://www.paseges.gr/.

The Geotechnical Chamber of Greece: http://www.geotee.gr/.

The Greek Payment Organisation: http://www.opekepe.gr/.

Tsiboukas, K. (2005): An Ex-Ante Estimation of the Effects of the CAP Reform in Greece. Agricultural University of Athens. (in Greek).

Tsiboukas, K. et al. (2002): Final Report for the Ex-ante Evaluation of Sub-Programme I 'Structural Adjustments' of the Operational Programme of the Agricultural Sector 1994-1999. Agricultural University of Athens. (in Greek).

WWF – Hellas: http://www.wwf.gr/.

Annexes

Annex 1: Overview of the results of Questionnaire 1

Main farm types	arable, livestock
Main crops	cotton, durum wheat, tobacco, maize
Livestock	bovine (race: Holstein-Friesian), sheep (Greek races), goat (Greek races)
Main production orientation	conventional
Average field size	4.8 ha
Irrigation methods	centre pivot (sprinklers) mainly for cotton and maize; tendency to replace centre pivot with drip irrigation for cotton (10 % is already irrigated with drip irrigation).
Source of irrigation water	wells
Usual salt content of irrigation water	600-1000 µS/cm (about 2000 µS/cm in waters from wells in the lower part of the case study)
Drainage systems	none
Existing grass strips	no
Separation of fields by hedges	no
Main soil degradation problems	soil erosion, decline in organic matter
Applied soil conservation measures (cropping/ tillage measures)	restriction of row crops on steep slopes, restrictions on the max. amount of N- fertilisation
Applied soil conservation measures (long term measures)	liming, irrigation management to mitigate salinisation, control of irrigation water/use of appropriate water quality

Annex 2: Glossary of policy measures

English title of policy measure (law, regulation, initiative)	**National title of policy measure**
Cross compliance	Pollapli Symmorfosi
Organic Agriculture	Viologiki Georgia
Farm Modernisation Scheme	Eksygxronismos Georgikon Ekmetallefseon
Natura 2000 measures	Metra Perioxon Natura 2000

Annex 3: List of interviews

Interview Date	Interviewee (affiliation/position)	Type of interview
15 April 2008	Cotton Farmer	face-to-face
17 April 2008	Cotton Farmer	face-to-face
18 April 2008	Cotton Farmer	face-to-face
25 April 2008	Cotton Farmer	face-to-face
26 April 2008	Cotton Farmer	face-to-face
27 March 2008	Tobacco Farmer	face-to-face
28 March 2008	Tobacco Farmer	face-to-face
31 March 2008	Tobacco Farmer	face-to-face
1 April 2008	Tobacco Farmer	face-to-face
21 April 2008	Cereals Farmer	face-to-face
22 April 2008	Cereals Farmer	face-to-face
24 April 2008	Cereals Farmer	face-to-face
4 April 2008	Farm Advisor	face-to-face
4 April 2008	Environmental Specialist with the Directorate of Agricultural Policy, Ministry of Rural Development and Food	face-to-face
8 May 2008	Member of Staff, OPEKEPE	Telephone
8 May 2008	Director General, PASEGES	face-to-face
10 April 2008	Director, Rodopi Prefectural Service of Ministry of Rural Development and Food	face-to-face
9 April 2008	Inspector of Cross Compliance, Rodopi Prefectural Service of Ministry of Rural Development and Food	face-to-face
10 April 2008	Director, Union of Farm Cooperatives of Rodopi	face-to-face
9 April 2008	Agricultural Advisor, Union of Farm Cooperatives of Rodopi	face-to-face
7 May 2008	Responsible for Agricultural Programmes, Ornithologiki Etairia Ellados (BirdLife)	face-to-face
7 May 2008	Member of Staff, WWF Hellas	face-to-face
9 April 2008	Member of Board, Management Authority of Porto Lagos Lagoon in Xanthi and Rodopi	face-to-face
18 April 2008	Member of Staff, Section A, Directorate of Planning and the Environment, Ministry of Rural Development and Food	face-to-face
18 April 2008	Member of Staff, Section B, Directorate of Planning and the Environment, Ministry of Rural Development and Food	face-to-face

European Commission

EUR 24131 EN/8 – Joint Research Centre – Institute for Prospective Technological Studies
Title: Case Study – Greece, Sustainable Agriculture and Soil Conservation (SoCo Project)
Author(s): Nick Barbayiannis, Kyriakos Panagiotopoulos, Demetris Psaltopoulos, Dimitris Skuras

Luxembourg: Office for Official Publications of the European Communities
2009
EUR – Scientific and Technical Research series – ISSN 1018-5593
ISBN 978-92-79-14945-0
DOI 10.2791/38995

Abstract

This Technical Note 'Case Study – Greece' is part of a series of case studies within the 'Sustainable Agriculture and Soil Conservation' (SoCo) project. Ten case studies were carried out in Belgium, Bulgaria, the Czech Republic, Denmark, France, Germany, Greece, Italy, Spain and the United Kingdom between spring and summer 2008. The selection of case study areas was designed to capture differences in soil degradation processes, soil types, climatic conditions, farm structures and farming practices, institutional settings and policy priorities. A harmonised methodological approach was pursued in order to gather insights from a range of contrasting conditions over a geographically diverse area. The case studies were carried out by local experts to reflect the specificities of the selected case studies.

The mission of the Joint Research Centre is to provide customer-driven scientific and technical support for the conception, development, implementation and monitoring of European Union policies. As a service of the European Commission, the Joint Research Centre functions as a reference centre of science and technology for the Union. Close to the policy-making process, it serves the common interest of the Member States, while being independent of special interests, whether private or national.

JRC
EUROPEAN COMMISSION

LF-NH-24131-EN-C

ISBN 978-92-79-14945-0

Publications Office
Publications.eu.int