



COST 634 workshop

# Farm level adoption of SWC measures and policy implications in Europe

October 1 – 3, Wageningen

Erosion and Soil & Water Conservation (ESW) group  
Wageningen University

## Scientific Report

Editors

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WAGENINGEN UNIVERSITY  
ENVIRONMENTAL SCIENCES



# **Scientific report COST634 workshop in Wageningen**

**1 – 3 October 2006**

**J. de Graaff, M. Riksen and A. Kessler (Eds.)**

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# Introduction

## Objectives

The aim of this workshop was to discuss research methodologies and results on farm level adoption of SWC measures and “best practices”, and on the policy measures required for improved adoption. The workshop built upon the outcome of earlier COST 634 conferences, and in particular the one in Mont Saint Aignan on “Soil conservation management, perception and policy”.

It concerned the two COST 634 working groups

WG 1: Policy issues in the implementation of sustainable land use, and

WG 2: Sustainable farm-scale management.

## Topics

The workshop focused on the following issues in European agriculture:

Under WG2 :

- Farmer’s perception and adoption behaviour with regard to SWC
- Socio-economic (and physical) factors, affecting adoption of SWC measures

Under WG1 :

- On- and offsite impact of soil erosion and SWC measures
- Effects of policy measures (CAP, etc.) on adoption of SWC measures

## Short overview of the programme

On the first day an excursion was held to southern Limburg where the problems of muddy floods were discussed with technicians and farmers. On the next two days oral presentations were given in four different sessions, more or less following the above mentioned four issues. In the late afternoon of the first day a poster session was held, whereby attention was also given to the physical aspects of erosion and soil and water conservation. And in the late afternoon of the second day group discussion were held to discuss future research and project collaboration.

## Partipants

A total of 52 persons, from 17 different countries, participated in the workshop

## Website

The programme and the papers are available on website [www.esw.wur.nl](http://www.esw.wur.nl)

# Excursion

## ***Sunday 1 October Excursion to Southern Limburg: an impression of the area, its erosion problems and control measures***

Reporting by Piet Peters and Caroline te Pas

The excursion to South Limburg started, after breakfast, with a two-hours bus drive to Roer and Overmaas Water Board in Sittard. Here we enjoyed a good piece of traditional pie ('vlaai') and an introduction on the activities of the water board.

### **The activities of the water board Roer en Overmaas**

The water board is the oldest democratic governing body since the 12<sup>th</sup> century and is in general responsible for preventing floods and water shortages, delivering clean water, constructing and maintaining the embankments of the Maas and controlling the groundwater level. In the scope of the excursion, we're only focusing on their policy on preventing erosion.

The water board Roer en Overmaas is responsible for an area of 95.000 ha located in the south of Limburg. This area has about 750.000 inhabitants. The northern area is quite flat. Here control of the groundwater level is important. The southern part on the other hand, is hilly and here soil erosion and flooding are the most important issues dealt with.

It is of great importance that the water board is able to work together with different parties that are involved in water management. The water board needs to cooperate with the province, the municipalities and the farmers themselves. The province coordinates the main policy aspects, the municipalities deal with local problems, and the interests of the farmers are looked after by the Agri- and Horticulture Alliance. The water board only deals with the surface water. A large part of the area shares a border with Germany or Belgium, so measures often have to be taken across borders.

The soils in this area consist mostly of loess, which hasn't got a good infiltration capacity. As a result, water can flow over the land surface during heavy showers and takes soil particles with it on its way down. Such a mud stream can cause a lot of trouble when it enters a village. On its way down, the water may cause sheet or gully erosion. The water board takes action when the runoff is more than 500 l/sec.

There are some instruments used for preventing erosion. First of all there is the Erosion Ordinance, established by farmer's organizations in 1990 and responsible for the general measures. In 2003 the Erosion Ordinance came up with the Farm Erosion Management Plan (FEMP), which is an individual plan: farmers can choose the measures that they find most appropriate. There is a list of measures where they can choose from. The most chosen measures are green manure, winter wheat, contour ploughing and no turning ploughing. Constructing grass strips is not beloved, although it's a very good method to prevent erosion. When a farmer joins the FEMP, he gets dispensation of measures, which would otherwise be taken by the Erosion Ordinance. The FEMP doesn't work out well in practice, because it involves a lot of administrative work for the water board: the land property is often scattered, the used instruments are complex and there aren't enough people who can control the measures taken.

Another instrument is the Permanent Grassland Agreement. This agreement makes sure farmers don't turn their grassland into arable land. This is accomplished by buying parcels from the farmers (for a price of 5000 euros/ha). It's only applied for fields with slopes of more than 5%, located in stream ways, valley bottoms or upslope urban areas.

Focusing on prevention of erosion and flooding becomes more and more important because of the coming climate change. There will be more mild winters with more rainfall and warmer and dryer summers with intense thunderstorms. The peak discharges are expected to increase with 10 %. The National Agreement of Water says a higher level of protection is

needed. This means that more measures have to be taken. At this moment there are already about 220 rainwater basins in the area. They are located in the bottom of valleys/ above villages in order to collect the rainwater flowing overland. In order to increase the capacity of these basins, an amount of 40 million euros has to be spent in the coming ten years. But this measure wouldn't solve the problem: water basins only avoid flooding, they do not deal with the prevention of erosion. To reach one of the basins, the water still has to flow over fields, where it can cause erosion. Another problem is that it takes a lot of time and money to maintain these water basins. Not only water, but also sediments transported by the water enter these basins. In order to prevent the basin being filled up with sediments, it needs to be cleaned regularly.

Hence, the Erosion Ordinance needs to be revised, which has recently happened. In the new plans of the Erosion Ordinance the FEMP won't be used any more because it lacks efficiency. Instead of that, non-turning-ploughing will be stimulated on arable land with a slope of more than 2%. With non-turning-ploughing the machine lifts up the soil, but doesn't turn it around. In this way, the soil is not loosened up that much and is less vulnerable to erosion.

Another good way to prevent erosion is the application of grass strips. Grass strips are preferably installed along the slope contours. They can also be placed in arable fields, so the field is divided in strips of grassland and strips of arable land. Runoff that accumulates against such a barrier is gradually released to the field down slope. Sedimentation of soil particles and nutrients takes place in the grass strips or in basins which can be constructed upslope the grass strips. If the water reaches the strip, it will spread out and hence reduce the risk of gully erosion. These effects will also lead to an increase of infiltration. The application of grass strips would be most effective if they would be placed in the middle of fields. But in this way, the field will be split up and it will take the farmer more effort to cultivate the field. The farmers also are not pleased by the fact that the application of grass strips will require to give up a piece of their own land, which can't be used for production anymore. In order to meet the farmers' wishes, the grass strips will only be applied on the borders of fields or along roads.

These measures are supposed to decrease runoff with 40% and erosion with ca. 60%. When the measures work out, the water board will not have to make more water basins or enlarge the existing ones. The realization of the measures will need the province, the water board, the municipalities and the farmers to work together.

## **Etzenrade catchment**

After this explanation, we went into the field to see for ourselves how these measures are applied in practice. The first location we visited was the catchment of the Etzenrade. This is located to the southeast of Sittard. The landscape is undulating because it consists of terraces of the river Maas. These river terraces have been formed by incision of the Maas during uplifting in the Pleistocene and covered by loess in the Saalien and Weichselien. On this location a lot of research on erosion prevention has been done, from which an erosion model for South Limburg, the LISEM, came into being.

On the bottom of the slopes a rainwater retention reservoir with a capacity of 20.000 m<sup>3</sup> has been installed by the water board. The water basin is intended to be filled up completely once every 25 years. The basin fills up during winter, after a long period of rain or during summer, when heavy rain showers can produce a lot of runoff in a small amount of time. In order to maintain the basin, it will be emptied every 5 years. The grass will be maintained by sheep. During a heavy shower, the water will flow from the fields to one of the hollow roads, which will transport the water to the basin. In this area it is tried to convince the farmers to take proper measurement against erosion. Non-turning-ploughing and grass strips are promoted here. The farmers get paid if they will take these measures. The payment will stop after six years; by then the farmers should be convinced of the positive effects of these measures. Some grass strips can already be seen at this location. They collect the water and lead it to one of the outlet points.

## **St. Gillisstraat catchment**

After our stomachs were filled with a good lunch at Bernardushoeve, we proceeded to the next location, the catchment of St. Gillisstraat, located in a valley near the river Geul. Because of the re-allotment, which took place 30 years ago, the parcels here are very big. Although they have a moderate slope, erosion is a big issue here. On the steeper parts of the landscape there are only forest and meadows, so no erosion occurs there.

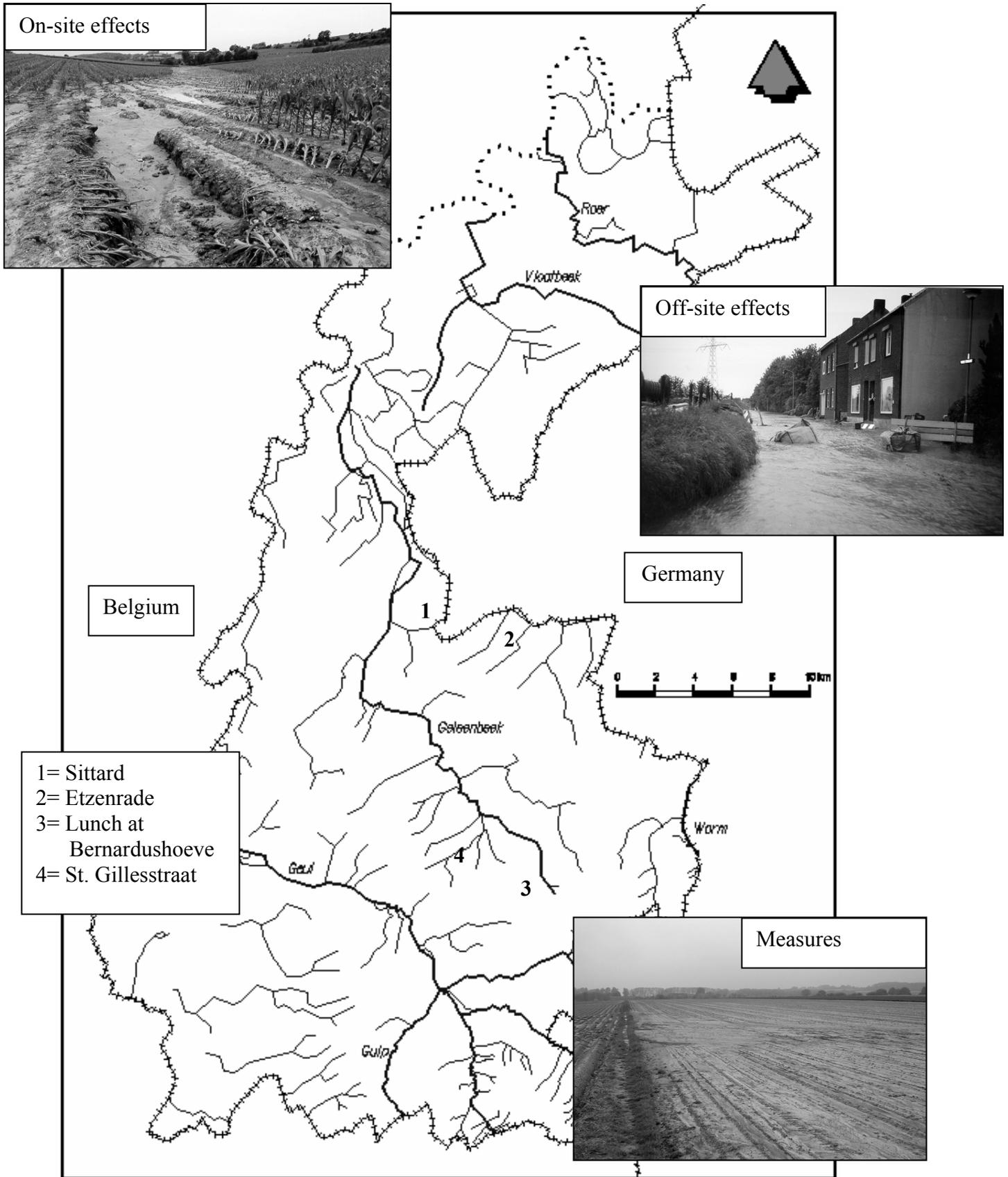
We visited an orchard, located at the top of a hill, and a sugar beet field, located down slope of the orchard. Underneath the trees in the orchard, grass is growing. But because of the use of heavy machinery, the soil gets compacted and the water hardly infiltrates into the soil. Instead of infiltrating, the water flows to the sugar beet field. Here it causes erosion, which is also enhanced by the huge size of the field.

In order to solve these kinds of erosion problems, the province, the municipality, the water board and the farmers need to cooperate, which wasn't a great success till so far. The following solutions have been proposed. First of all attempts have been made to buy the land from its owner. But this plan didn't succeed because the owner demanded a too high price. Another solution was to place grass strips with basins in between fields. This plan also failed because the field owners weren't willing to give up pieces of their land. At this moment there's a proposal to place a basin at the bottom of the field and grass strips on top of it (between the orchard and the sugar beet field).

On the bottom of the valley there's a flume, which measures the discharge of the water stream coming from the slopes. During a moderate rainstorm in September a discharge of ca. 600 m<sup>3</sup> is measured.

After this we had to cope with one of the erosion agents: rain. So we returned to the bus, which brought us back to Wageningen.

# Day 1 (Sunday 1 October) Excursion to Southern Limburg: an impression of the area, its erosion problems and control measures



# First day plenary sessions and poster session

## ***Monday 2 October: Plenary sessions on Farm level adoption of SWC (WG2)***

Introduction on Working Group 2 by Preben Olsen

### **Keynote: Lahmar, R: Adoption of conservation agriculture in Europe**

Rabah Lahmar from CIRAD (France) gave an overview of problems encountered in adoption of Conservation Agriculture (CA) in Europe. Farmers will go for it, because of reduction of machinery and labour costs and not because of reduced soil erosion. He distinguished three types of risk farmers may face in adoption: technical risk, that there is no adequately adapted machinery available; economic risk, that the machinery is too costly, that yields do not increase and that costs may not be reduced (due to costs of chemicals); and sociological risk, that farmers see ploughing as part of normal practices, and the fear of marginalization.

In the discussion it was pointed out that the northern part of Europe would be less suitable for CA, because of the wetter conditions, whereby e.g. mulch would be less effective and could be conducive for diseases subject. Tillage should not be applied in autumn but in spring. Direct drilling would be possible on some soil types.

### **Session 1: Stakeholders perceptions influencing adoption (Moderator: Anne Mathieu)**

During this session five papers were presented. They dealt with perceptions and knowledge of other stakeholders than scientists on runoff and erosion, or conservation measures.

A first major issue concerns farmers' acceptance of conservation measures. Two approaches are taken into account. Firstly, the fact that knowledge is different for farmers and scientists (Ingram and al): in that case recommendations have to be adapted to farmers' knowledge. Also, farmers' reasoning and perceptions can be brought forward and used to design recommendations (Schneider and al). To solve this gap, Fry proposes a social learning process, whereby it is up to the farmers to speak to the others to promote soil conservation, through films and local discussions. Secondly, Sattler proposes criteria for assessment of different measures. For the farmers involved, the place where measures will be installed depends on the criteria. An aggregation is proposed to lead to an index of acceptance, and the different measures are classified.

A second issue concerns the risk perception of muddy flows by different stakeholders, inhabitants, local councillors and farmers (Heitz and al). Each type of stakeholder has different perceptions of factors influencing risks.

1. Ingram , J., Fry, P. and A. Mathieu  
Revealing different forms of knowledge held by agricultural scientists and farmers in the context of soil protection and management
2. Schneider, F., Ledermann, T., Fry, P., and S. Rist  
Farmers' perceptions and reasoning in soil protection
3. Heitz, C., Glatron, S., Auzet, A. and S. Spaeter  
Analysis of the risk perception of natural disasters due to muddy flows by the stakeholders of periurban areas.
4. C. Sattler  
Factors affecting farmers' acceptance of conservation measures
5. Fry, P.  
From farmer to farmer – Enhancing social learning processes for soil and water conservation in Switzerland

Discussion

### **Session 2: Adoption of SWC (Moderator: Preben Olsen)**

During this session five papers were presented, that discuss the adoption of SWC measures, theories that can help to understand farmers' behaviour, and various obstacles to and policy incentives for increased adoption.

6. Wauters, E.  
The adoption of soil conservation practices in Belgium. An application of the Theory of Planned Behaviour
7. Mathieu, A.  
Toward the notion of social functioning of a catchment
8. Meerkerk, A.L. and B. van Wesemael  
Adoption of cover crops and farmer's perception in rainfed orchards in southeast Spain
9. Lundekvam, H.E.  
Effects economic factors on the adoption of SWC measures on community level, South of Oslo and the effect on soil loss (measured and modelled)
10. Spaan, W.P., Geelen P.M.T.M. and H.J. Winteraeken  
Adoption of soil and water conservation measures in Southern Limburg, the Netherlands

Discussion

## Poster session

Eight posters were presented and discussed. Most posters dealt with physical factors in erosion and soil and water conservation, such as the issue of nutrient losses, the application of erosion and run-off models, etc. One poster focussed on costs of terraces and EU policies, and one discussed WOCAT (World Overview of Conservation Approaches and Technologies), and its link with Google Earth.

1. Jakubiková, A and T. Dostál  
Impact of seasonal vegetation development on soil loss decrease in various conservation management conditions
2. Martínez-Casasnovas, J.A., Concepción Ramos, M. and Roser Cots-Folch  
Soil conservation measures in vineyards of NE Spain Mediterranean areas by farmers in the framework of the EU Common Agricultural Policy
3. Bechmann, M.  
Estimating uncertainty in mitigation strategies for phosphorus using Bayesian network
4. Wisniowska-Kielian, B. and K. Klima  
Estimation of fertilizer elements losses with surface run-off in mountain region dependent on kind of arable land
5. Ronfort, C., Martin, P., Souchère, V., Joannon, A. and J.M. Meynard  
Towards a time and space runoff assessment at farm and catchment level: a method for fostering dialogue with farmers
6. Lynden, G. van  
Mapping the unknown? The extent of Sustainable Land Management
7. Centeri, Cs., Penksza, K., Barczy, A., Gronas, V., Malatinsky A. and M. Vona  
Reasons for nutrient losses and possible solutions for farmers on selected hillsides of Hungary
8. Lima, J.L.M.P. de  
Physical factors in adoption

## Discussion at poster stands

## Second day plenary sessions and discussion groups

### ***Tuesday 3 October: Plenary sessions on Policies for SWC (WG1)***

Introduction of Working Group 1 by Johannes Schuler

**Keynote: Swerts, M.            Soil protection policy in an EC context: the case of erosion control in Flanders (Belgium)**

Martien Swerts gave a comprehensive overview of EU policies, directly or indirectly aimed at soil protection, including the recently established European Soil Strategy, the recently modified Common Agricultural Policy, etc. She subsequently gave an overview of the various policies and subsidies for erosion control in Flanders

### **Session 3: Impact assessment & tools for SWC policies (Moderator: John Boardman)**

During this session five papers were presented, that dealt with the costs and impacts of soil erosion, the benefits of SWC activities and the implications of and consequences for EU policies.

11. Evrard, O., M. Liégeois, K. Vandaele, B. van Wesemael and C. Bielders  
Towards an integrated management of muddy floods in the European loess belt. Case studies in central Belgium and Northern France
12. Posthumus, H. and J. Morris  
CAP-reform and runoff from farmland in England and Wales
13. Ledermann, T., F. Schneider, K. Herweg, H. Liniger, V. Prasuhn  
Ecological, economic and social impacts of SWC activities on arable farm land in the Swiss Midland
14. Kuhlman, T.  
Estimating the costs and benefits of soil conservation
15. Martínez-Casasnovas, J.A., Roser Cots-Folch, M. and M. Concepción Ramos  
Changes in vineyard cultivation in the Priorat region (NE Spain) as consequence of the EU Common Agriculture Policy for vineyards' restructuring

Discussion

#### **Session 4: EU Policies on SWC (Moderator: Leo Stroosnijder)**

During this session four papers were presented, that dealt with various aspects related to EU policies for soil and water conservation.

16. Schuler, J. and C. Sattler

The estimation of Agricultural Policy effects on Soil Erosion – an application for the bio-economic model MODAM

17. Stolte, J.

Implications of the EU Soil Strategy for Dutch policy

18. Barkarson, B.H. and A. Arnalds

Farmers' role in soil conservation in Iceland

19 Graaff, J. De, Duarte, F., Fleskens, L. and T. de Figueiredo

Cross-compliance for erosion control in olive orchards on sloping land

Discussion

#### **Future activities**

1. Suggestion for joint EU project proposal by Leo Stroosnijder (see appendix 2)
2. Announcements by Anne-Véronique Auzet about COST 634 :
  - Overview of WGs meetings and SC Management committee
  - Next meetings in Firenze (7-9 May 2007) and Prague (September 2007)
  - Meeting on Muddy Floods (4-5 December 2006, Louvain)
  - Training School (1-10 July 2007; Strasbourg, Enschede)
3. Publication of papers from this workshop
  - Anne-Véronique Auzet has contacted the EU COST office about the possibility to publish papers of this workshop in a special EU publication. This request has been honoured and in the coming months authors will be asked to further improve their papers, after which these will be reviewed and decisions will be made about which papers would qualify for this publication.

#### **Groups discussions on Future research and project collaboration**

Discussion in 4 groups on:

- a. Adoption and Farmer Participation
- b. European Soil Strategy
- c. Policies for soil and water conservation
- d. Economic aspects of on and off-site impacts

# Reports of discussion groups

## Report of Discussion Group A: Adoption and Farmer participation

Report by Aad Kessler

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The group discussion focused attention on the following subjects:

- Problems with adoption of soil conservation measures are widespread in Europe (e.g. Limburg, the Netherlands). The EU Policy with excessive use of subsidies does not enhance adoption. But what are the alternatives? Is there anything else than the carrot & stick method, and if so, can it replace subsidies?
- As a first step it would be interesting to compare the adoption of measures in different countries and determine influencing factors. Differences between in adoption between for example nearby regions in the Netherlands and Belgium can probably be explained by different implementing policies.
- Regarding the alternatives, it is necessary to investigate and analyse lessons from other countries and regions, with the objective to strive towards better land husbandry / land care, by means of increasing farmers' participation. Positive experiences come for example from Switzerland and Bolivia, where use was made of Farmer-to-Farmer training methods.
- Another example comes from England, where a long-term process of awareness-raising and farmer involvement has showed to be successful. In this case ample usage was made of the media and debates. A limitation of the England experience is that the process has been quite slow. The challenge would therefore be how to speed up such bottom-up processes of adoption.
- For long-term success, more farmer involvement is required and less subsidies. This would definitely work for on-site effects of erosion, however, for off-site impact of erosion this should be investigated.
- Within the coming call of the 7<sup>th</sup> Framework Programme a proposal should be formulated concerning the above mentioned topics and challenges. Most group members are interested to participate and agree that other partners (particularly from south Europe) should be involved.

Final decision of the group: Aad Kessler will write a first draft of the proposal and send it to all interested parties, aiming at a Small group Meeting (SMG) with COST 634 by the end of the year to elaborate a final proposal.

## Report of Discussion Group B: European Soil Strategy

Report by Maarten Nijssen

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The group discussion focused attention on the following aspects of the European Soil Strategy:

- Is there a need of such strategy? Main back draw: nitrate problems caused by farmers.
- All components have to be considered.
- Recovery of degraded soils.
- Isn't it time to relate soil to the landscape? To raise more public awareness is perhaps the key point. If investment companies own more land, then what is happening with it? Not only to focus on technical issues, social aspects and communication are also very important. How to make soil more popular? Indicators are needed to raise more public awareness. A monitoring system is needed once indicators are identified.
- Landscape is an aspect of soils, the most visible one.
- Conservation credits: downstream beneficiaries pay for upstream farmers. Society vs. farmer.
- Farmers are responsible up to a certain threshold. Society is not prepared to take care of soils; in the Netherlands is a growing trend towards responsibility.
- Are new methods needed? In reality it is very difficult, short term and long term goals are mostly reached. But in between?
- Risk maps can be made to advice farmers.
- EU should provide tools and each country should pick out the aspects they want to use. No blanket/targeted land solutions.
- There is no scientific knowledge transferred to farmers. Show profiles and let them feel the soil and the effect different tools have on the soil.
- The trend of bigger farms.
- How to make the regulations operational.
- Protection of functional soils.
- Soils are not directly related to farmers. It is not only agricultural land, but that's not in the heads of people.
- Changing ownership of land, who pays? Land owner, land user or society.

## Report of discussion group C: Policies for soil and water conservation

Report by Helena Posthumus and Preben Olsen

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## Points of discussion on policy issues

1. Targeting: We have general knowledge of soil erosion processes, but often site-specific knowledge is lacking. In order to target problems in a catchment, maps and local knowledge can be used to acquire the necessary site-specific knowledge. Farmers and residents should be involved from an early stage to define the problems and possible solutions for the specific catchment.
2. Requirements for subsidies: Should we require farmers to work together on a (sub-) catchment scale to solve runoff related problems? If they fail to tackle the problems together, there will be a cut in the subsidies. However, if we require farmers to collaborate, proper support should also be given to them to facilitate the collaboration. (This point was discussed as a result of the excursion to Limburg where we heard about the runoff from the orchard causing soil erosion in the downstream arable field)
3. Need for holistic view: A holistic view is needed to develop a successful intervention. Farmers also require a holistic view. A remark made by farmers in Limburg: “you don’t listen to us, you only talk about soil erosion”.
4. What should be responsibilities EU?: Should the EU set the targets (and not the policy such as CAP – cross-compliance) and monitor countries whether they achieve these targets? Should individual countries (regions?) have more to say on how to achieve these targets and develop their own policies?
5. Off-site effects: Can be positive (river flow dynamics, enrichment) and negative (contamination, nuisance). Off-site effects can be avoided by preventing soil erosion to happen. But how much erosion can you allow? You need to find a balance. It is sometimes difficult to know the exact effect of a measure on the risk of soil erosion, but it should reduce the problem in any case.
6. Erosion is generally not the farmer’s problem: What to do if soil erosion does not have any negative impact for the farmer? (Example: the olive orchards in Spain where soil erosion does not effect production.) If the farmer is forced to prevent soil erosion, whereas it is not for his own benefit, society should pay for the environmental services the farmer provides.<sup>1</sup>
7. Control and inspection: How the control the implementation of SWC by farmers? Should a farmer make his environmental management plan accessible for the general public in order to facilitate social control? This is probably socially and morally not acceptable (it would be against the right of privacy).

<sup>1</sup> Added comments by Helge Lundekvam: Even so, farmers often want to be on good terms with society, and goodwill may be a reason to do something, especially since EU agriculture is heavily subsidised. There is now an opportunity, as subsidies are now more linked with environmental impacts of practices. Thus, a more holistic view of production, environmental problems and the farmers’ situation should be used on EU-level and country level down to catchment / community level.

## Report on discussion group D: Economic aspects of on and off-site impacts

Report by Johannes Schuler and Sandrine Spaeter

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### Incentives, monitoring and evaluation - Future research topics

#### 1) Subsidies

- Local **subsidies** versus EU subsidies
- Legal part (is it confirm with EU legislation that local subsidies/compensations are given to farmers)
- Contradiction between what is done by local authorities and what is authorized by Brussels

#### Taxes or subsidies ?

The question is asked whether a tax on a environmental damaging activity is really so impossible in the EU agriculture.

- Taxes : less accepted socially
- Subsidies : issue of its financing.

Discussion about the type of a subsidy is needed.

→ High subsidy at the beginning, but it should decline through time in order to eliminate the threshold.

#### 2) Control

Not enough taken into account in our studies. Should we build instruments with respect to what people are able to accept or should we build them without additional constraints and, then, adapt it if we think that we do not loose a lot of efficiency. Another aspect is the issue of the control: who controls and how are activities controlled?

#### 3) Evaluation of On and off-site effects

On-site costs and benefits are not equal to private ones, i.e. the often mentioned argument that on site costs are only affecting the farmer is not true. A reduced fertility of land has effects on society that go beyond a farmer's perspective. (long term interest rates, the problem of discounting future costs and benefits)

A difficulty arises from taking into account all the aspects: environmental, ecological, economic. Economic aspects should not be separated from ecological aspects: economics can also help to evaluate some non monetary goods.

→ Some studies already exist (Mali, Indonesia). We could learn from that.

## Appendix 1 Abstracts of keynotes

### Keynote 1. Potential of Conservation Agriculture for Conserving Soil and Water in Europe

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Conservation agriculture appeared historically as a response to soil erosion crises in USA, Brazil, Argentina and Australia where, currently, it spans over million hectares. The most famous success story is that of Brazil, where conservation agriculture has been initiated by farmers. Afterwards, research, policy, NGOs, public and private sectors joined their efforts to farmers and farmers' societies and networks which led to effective and dynamic innovation systems that have strongly contributed to disseminate the technology.

According to KASSA findings, conservation agriculture is less adopted in Europe and, reduced tillage is more common than no-tillage and cover crops; it is not popularised and it is less researched. The lack of knowledge on conservation agriculture systems and their management and, the absence of dynamic and effective innovation systems make it difficult for farmers to give up ploughing which is a paradigm rooted in their socio-cultural backgrounds. In Norway and Germany the adoption of conservation agriculture has been encouraged and subsidised in order to mitigate soil erosion. In the other European countries (France, Czech Republic, Ukraine, Spain) the adoption process is mainly farmers driven and the major driving force has been the cost reduction in machinery, fuel and labour saving. Time saving and the flexibility and improved timeliness in field operations allowed farmers in Spain, as in Brazil, to develop other agricultural or non-agricultural activities generating additional benefits. Soil and water conservation concerns did not appear as main drivers in the European farmers' decision to shift or not to conservation agriculture. After years of conservation agriculture practice, Spanish farmers perceive the effectiveness of conservation agriculture systems in reducing soil erosion and improving water productivity which reinforce their choice.

Conservation agriculture is not equally appropriate for all the agroecosystems. The development of conservation agriculture systems and their socio-economic and ecological sustainability are highly site specific. They depend on biophysical factors, socio-cultural and technological conditions as well as market, institutional and policy environments. Efficient conservation agriculture systems combine four practices: (i)- reduced tillage or no-tillage and (ii)- direct seeding for fewer disturbances of the soil and proper crop establishment; (iii)- cover crops to mitigate soil erosion and to improve soil fertility and functions and; (iv)- crop rotation to combat weeds, pests and diseases. Their development and fine tuning require a continual adjustment which calls for continual knowledge generation and sharing among the stakeholders within the innovation systems. In Europe, the use of cover crop and crop rotations is still hardly practiced due to climate and soil limitations, short length of growing period in northern latitudes, lack of adapted crop varieties, difficult management of crop residue in wet and dry conditions and, general market conditions. Farmers do not use cover crops and rotations when they do not generate direct economic benefit. As a result, the conservation agriculture is still relying mostly on the use of chemicals for the control of weed,

pests and diseases whose impact on the environment, soil, water, and health are less documented. Reducing soil erosion through increasing the use of pesticides is seen as a conflicting goal in Norway.

The conversion of European farmers to conservation agriculture is being achieved through a step by step attitude; and large scale farms are the most adopters, probably due to their ability to absorb the risk. The short term socio-economic benefits that conservation agriculture provides, the need to improve farms' competitiveness, market globalization and the steady increase of fuel cost... are likely to be sufficient to boost the ongoing slow adoption trend of conservation agriculture in Europe and to overcome the farmers' possible reluctance or socio-cultural barriers. Hence, the need of soil and water conservation in Europe requires anticipating the ongoing process in order to improve its ecological sustainability. Priorities would be: (i)- to define the recommendation domains for conservation agriculture within Europe taking into account climate and soil constraints, length of growing period; water availability and quality; erosion hazards and, farming conditions; (ii)- to encourage the use of cover crops and agronomically sound crop rotations as management strategies for weed, pest and diseases.

## Keynote 2. Soil protection policy in an EC context: the case of erosion control in Flanders (Belgium)

Martien Swerts

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As any environmental policy, soil protection policies in the member states will be largely influenced by the upcoming European Soil Strategy. This strategy has been postponed several times and has still not been presented at present. The most likely impacts of the strategy on soil conservation will be discussed.

The main ideas developed as part of the soil strategy have however already been integrated into the Common Agricultural Policy of the European Community. As a result of the Mid Term Review, to keep the soil in a Good Agricultural and Environmental Condition, has become a prerequisite to receive payments. This means that farmers have to pay attention to erosion, soil organic matter and soil structure and that the area of permanent pasture can no longer decline. What this means in practice, depends on the translation at the national or regional level, taking into account the specific characteristics of the area such as soil, climate, farming systems, and land use. Most of the measures to be taken in the different member states can be classified in some major groups. Examples will be given.

In Flanders the soil protection policy develops in interaction with the European soil protection and agricultural policies. The present Flemish soil protection policy will be discussed, with a focus on erosion control.

The main aim of the Flemish soil policy has been to protect the multiple soil functions as much as possible. The Flemish government recognises the main threats to soil as defined in the Soil Communication of the European Commission.

With respect to soil erosion, existing measures are stimulating rather than regulatory. A potential soil erosion map, based on RUSLE calculations for a 5\*5 m<sup>2</sup> grid, is used to focus the efforts.

Since April 2005, *individual farmers* can receive agri-environmental payments for measures that prevent or combat soil erosion at the field scale. These measures include grass buffer strips at field borders or in the field, grassed waterways, small dams (between 0.3 and 1 m high) with retention pond in arable land or in grassland, conservation tillage, and no till. In addition, other environmental measures with a wider scope than just soil erosion prevention can be applied. Examples are cover crops, afforestation and providing grass buffers strips along rivers and sunken lanes.

Since December 2002, *municipalities* can be subsidised to draw up a municipal soil erosion action plan, and/or to carry out small scale soil erosion control works. A municipal soil erosion action plan identifies both actual and potential problem areas, and proposes scenario's to prevent and combat soil erosion and related problems.

Besides these non-regulatory measures, Flanders has implemented the Good Agricultural and Environmental Conditions related to soil erosion, organic matter and soil structure, as imposed by the Mid Term Review of the CAP. For example, this involves the obligation to take certain measures on fields that are highly sensitive to soil erosion.

## **Appendix 2                      EU Project proposal suggestion**

**by Leo Stroosnijder.**

**For Kp7 call in 2007, within programme:**

### **6.2 SUSTAINABLE MANAGEMENT OF RESOURCES**

6.2.1 Conservation and sustainable management of natural and man-made resources

6.2.1.3 Soil research and desertification

#### **6.2.1.3.1. Transect Approach to Desertification**

##### **Suggested name and acronym of project:**

Adaptive Farming to Conserve European Soils & Landscapes (ADAPT)

##### **Content:**

Research should focus on development of protection and restoration methods, strategies and measures, as well as best practices, operational analytical methods to combat desertification and land degradation:

- 1) Furthering knowledge of processes (transect approach taking into account the links between physical and socioeconomic processes) in particular evaluating the costs and benefits of any measures that could be proposed and
- 2) Knowledge transfer, addressing the stakeholders, including the institutional level. International Cooperation, in particular with countries suffering from desertification must be encouraged.

##### **Expected impact:**

The research results will have to help EU stakeholders and the relevant organisations in partner countries for developing and/or improving their strategies, planning and implementation plans against desertification and thus contribute directly to the UNCCD Convention for desertification, to the EU Soil Thematic strategy and to the science programme of the

"Committee for Science and Technology (CST)" the mandate of which is to support scientifically COP (CONFERENCE OF THE PARTIES) with information and advice on scientific and technological matters relating to combating desertification and mitigating the effects of drought. It does fit with the implementation of common actions with other services of the Commission for supporting a EU common vision towards UNCCD for Desertification.

**Funding and time period:** 5 million € for 5 years?

Compare with : EU SUBSIDIES: 2.5 billion € per year !

## **Adaptive Farming to Conserve European Soils & Landscapes (ADAPT)** (An Holistic Interdisciplinary Land Husbandry Approach)

### **Adapt to:**

1. Climate Change (desertification)
2. Rural depopulation (rural vs urban)
3. Multiple land use
4. Extensification & abandonment
5. EU Thematic Soil Strategy
6. CAP policies
7. UNCCD / CST / COP

### **Work packages**

WP	Focus	Main discipline(s)
1	Operational Analytical Methods (Transect Approach) (MAS modeling) (Scenarios) (DPSIR) (Risk analysis)	Methodology (Interdisciplinary)
2	Role of social processes & networks in European Landscapes	Social Science
3	Costs & Benefits / Incentives Monitoring & Evaluation	Economic Science
4	Protection & restauration methods (against degradation / drought / desert)	Technical Science
5	Best practices / strategies / policies (Enhance adoption)	Interdisciplinary Socio-economics
6	Knowledge transfer (2-ways) Inventory (State-of-the-Art) Awareness / Stakeholders	Communication Science
7	Dissimination / Upscaling UNCCD / CST / COP Publications / web-site / conference	Communication Science Coordination
8	International Cooperation Exchange students / fellowships	Coordination

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