

Report on Cross Compliance implementation in Italy

Environmental Effectiveness of GAEC Standards

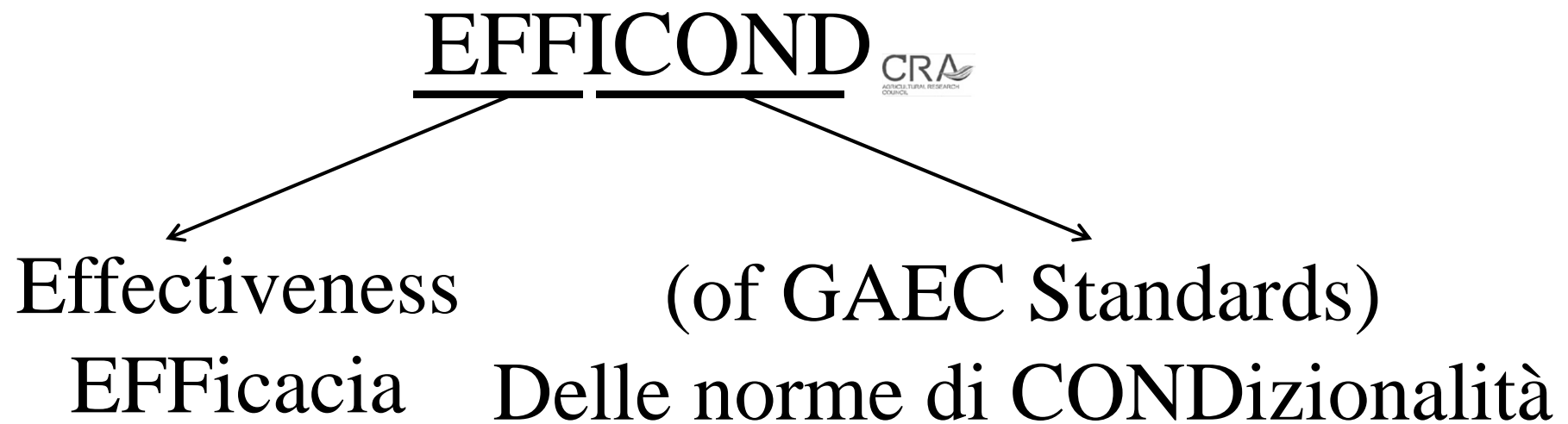
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The analysis of the environmental effectiveness of GAEC standards has been carried out through the findings of the EFFICOND project of the Agricultural Research Council (the project started in 2009)





The EFFICONDCRA project is being carried out in collaboration with the NRN-ISMEA (National Rural Network)

Role of the National Rural Network in the project :

- NRN has provided guidance in the formulation of the project.
- NRN continuously monitors the EFFICONDCRA project.
- NRN promotes collaboration between the project and Mipaaf (Ministry of Agriculture Food and Forestry Policies), AGEA (Agency for Agriculture Allocation), SIAN (Agricultural Information System).



The environmental evaluation of GAEC standards (a synthesis of the Efficond findings) is reported in Chapter 5 of the **Report of Cross Compliance Implementation in Italy.**

(download from the NRN website - in Italian)



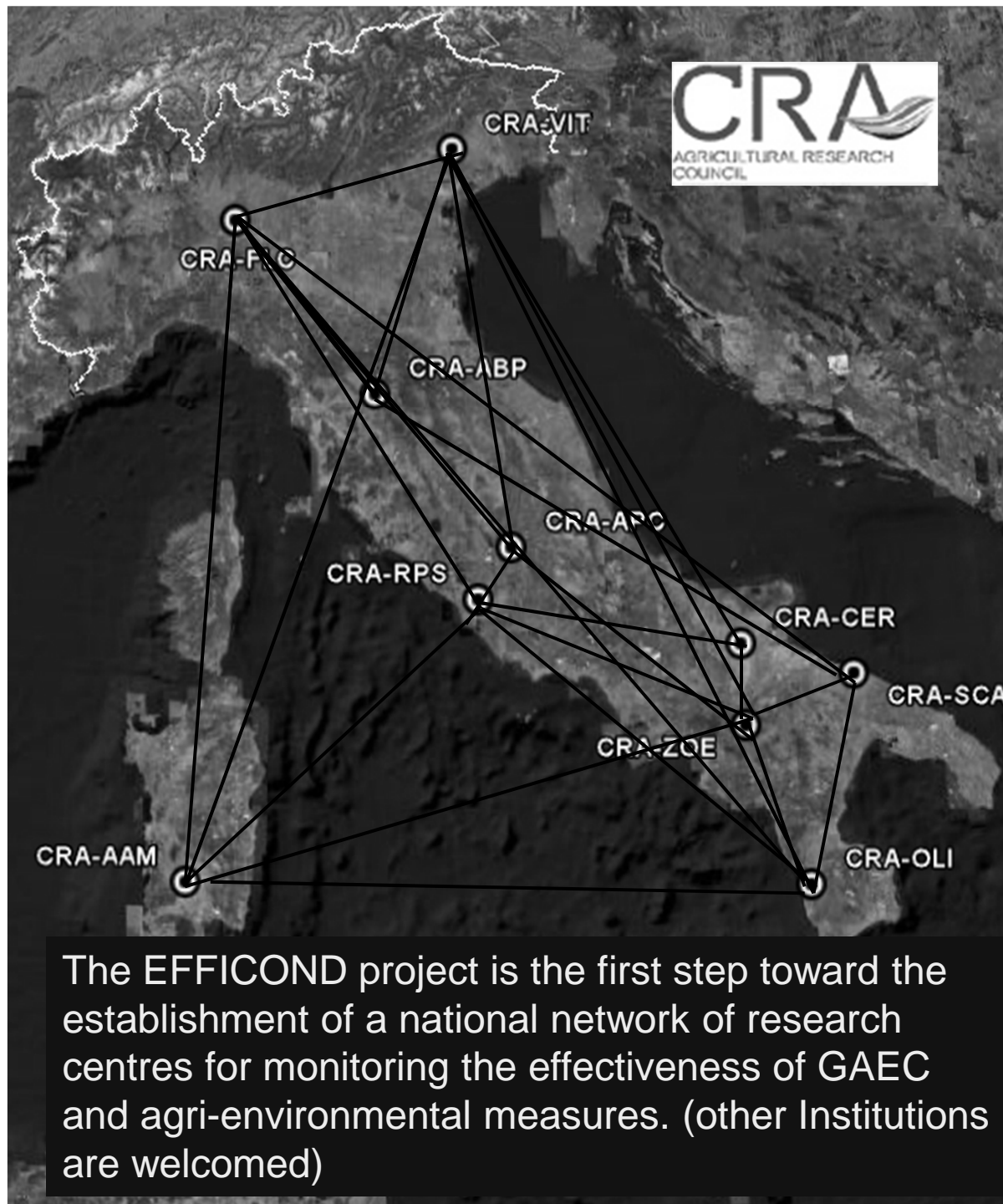
The project results were presented at the congress of the Italian Society for Agronomy (September 2010) to obtain the comments of the scientific community.



Complete results will be published in a special issue of the Italian Journal of Agronomy (*referred scientific papers*)

Location of the Research Centres of CRA that participate to the EFFICOND project

- The Res. Centres are well distributed on the Italian territory and represent different environmental conditions of Italy.
- The Res. Centres were selected (among all the Res. Centres of CRA) on the basis of scientific skill on GAEC Standards.
- Many Res. Centres have two or three experimental farms located in different provinces



Primary objective of the project

Evaluating the environmental Effectiveness of GAEC Standards through the experimental results of Italian case studies (only).

➤ **Through the data of new field researches started with the project EFFICOND**

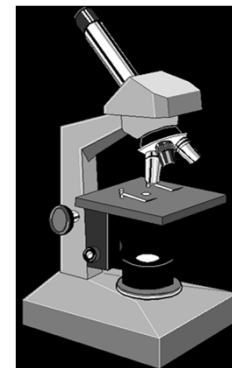
➤ **Through data collected from other national researches, carried out in the past (CRA, Universities, CNR etc.) in which the experimental design included the evaluation of the environmental effect of treatments similar to those of the GAEC standards (*Ex. past experiments on the effect of set aside on soil erosion*).**

Evaluation of GAEC Standards

The results of the project were delivered to the NRN in the form of answers to 13 Environmental Questions.

For each answer we produced a scientific document.

The answers are being constantly updated in relation to the increase of scientific knowledge.



Issue 1: Protection of soil from erosion through appropriate practices

Question 1.1: To what extent do temporary drainage ditches across the slope and grass strips exert positive contribution to the protection of soil against erosion? *Standard 1.1*

Question 1.2: To what extent do retention of stonewall terraces and earth terraces exert a positive contribution to the protection of soil against erosion? *Standard 4.4a*

Question 1.3: To what extent do prohibition of land leveling without permission exert a positive contribution to the protection of soil against erosion? *Standard 4.4b*

Question 1.4: To what extent do ensuring the presence of grass cover throughout the year on set aside exert a positive contribution to the protection of soil against erosion? *Standard 4.2a*

Issue 2: Maintain soil organic matter levels through appropriate practices

Question 2.1: to what extent do management of stubble and crop residues exert a positive contribution to maintenance of levels of soil organic matter? *Standard 2.1*

Question 2.2: To what extent do crop rotations exert a positive contribution to maintenance of levels of soil organic matter? *Standard 2.2*

Issue 3: Maintain soil structure through appropriate practices

Question 3.1: To what extent do ploughing in good soil moisture condition avoid the decay of soil structure? *Standard 3.1b*

Question 3.2: To what extent do maintenance in good efficiency of the farm network of permanent channels avoid the decay of soil structure? *Standard 3.1a*

Issue 4: Ensure a minimum level of maintenance of ecosystems and avoid the deterioration of habitats

Question 4.1: To what extent do prohibition to reduce the area of pasture or convert pasture to other uses avoid the deterioration of habitats? *Standard 4.1a and b*

Question 4.2: To what extent do optimal livestock Units per ha. (Min.0.2 and Max.4) avoid the deterioration of habitats? *Standard 4.1c*

Question 4.3: To what extent do weed control on set aside avoid the deterioration of habitats ? *Standard 4.2b*

Question 4.4: To what extent do maintenance of olive plants in good vegetative condition avoid the deterioration of habitats and land abandonment? *Standard 4.3a*

Question 4.5: To what extent do retention of characteristic landscape features (stone-wall terraces and earth terraces) avoid the deterioration of habitats? *Standard 4.4c*

When needed, new agronomic practices have been proposed to improve the effectiveness of the GAEC standards.

Some of them can be added to the actual GAEC standards, others should be implemented in the agri-environmental measures.

Implementation of Regulation before the Health Check

GAEC Standards		Effectiveness of Standards vs. Issues			
		Issue 1 Soil erosion	Issue 2 Soil organic matter	Issue 3 Soil structure	Issue 4 Minimum level of habitat maintenance
standard 1.1	Temporary runoff control measures in sloping land <i>(Temporary drainage ditches across the slope or alternate grass strips)</i>	High			
standard 3.1a	Protection of soil structure through efficient drainage of surface water. <i>(Shaping the surface of fields convex to avoid water logging. Maintenance in good efficiency of the farm network of permanent channels) letter a</i>			High	
standard 4.4b	Retention of characteristic landscape features <i>(Retain stonewall terraces and earth terraces. Prohibition of unauthorized land leveling) letter b</i>	Low			Low
standard 4.2a	Rational management of Set-aside <i>(Ensure the presence of grass cover throughout the year on set aside) letter a</i>	High			High
standard 4.4a	Retention of characteristic landscape features <i>(Retain stonewall terraces and earth terraces) letter a</i>	High			High
standard 2.1	Management of stubble and crop residues <i>(Prohibition of burning of stubble and crop residues)</i>		Low		
standard 2.2	Crop rotation		Low		
standard 3.1b	Soil structure protection through appropriate machinery use <i>(Ploughing in good soil moisture conditions.) letter b</i>			High	
standard 4.1a, b	Protection of permanent pasture <i>(Prohibition to reduce the area of pasture) letter a</i> <i>Prohibition to convert pasture to other land use) letter b</i>				High
standard 4.1c	Protection of permanent pasture <i>(Optimal livestock Units per ha. Min. and Max. values allowed) letter c</i>				High
standard 4.2b	Rational management of Set-aside <i>(Weed control through mowing) letter b</i>				Low
standard 4.3b	Maintenance of olive groves in good vegetative condition <i>(Frequency of pruning. Frequency of cleaning the soil from brambles and shrubs) letter b</i>				High
standard 4.4c d	Retention of characteristic landscape features <i>(Landscape protection) letter c-d</i>				High

Effectiveness of GAEC standards (before the Health Check) with respect to the four environmental issues.

Issue 1: SOIL EROSION

**Why Soil erosion
is an important
issue in Cross
Compliance ?**

Soil is not a renewable resource

In general (with some exceptions) it takes hundreds to thousands years to form soil.

On the contrary, permanent soil degradation and desertification due to erosion can occur in a few years.

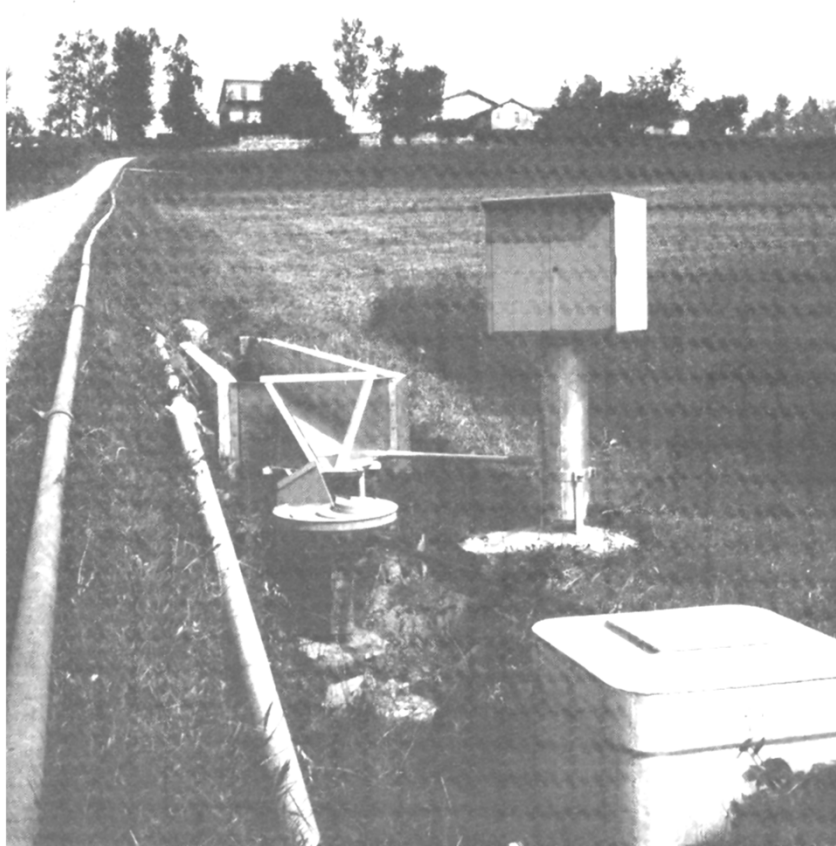
soil

EVALUATION OF GAEC STANDARDS

Issue 1: SOIL EROSION

Standard 1.1: Temporary drainage ditches across the slope or alternate grass strips

Implementation of Regulation before the Health Check					
GAEC Standards		Effectiveness of Standards vs. Issues			
		Issue 1 Soil erosion	Issue 2 Soil organic matter	Issue 3 Soil structure	Issue 4 Minimum level of habitat maintenance
standard 1.1	Temporary runoff control measures in sloping land <i>(temporary drainage ditches across the slope or alternate grass strips)</i>	High			



Effectiveness of temporary drainage ditches across the slope

Case study: Experimental plots at

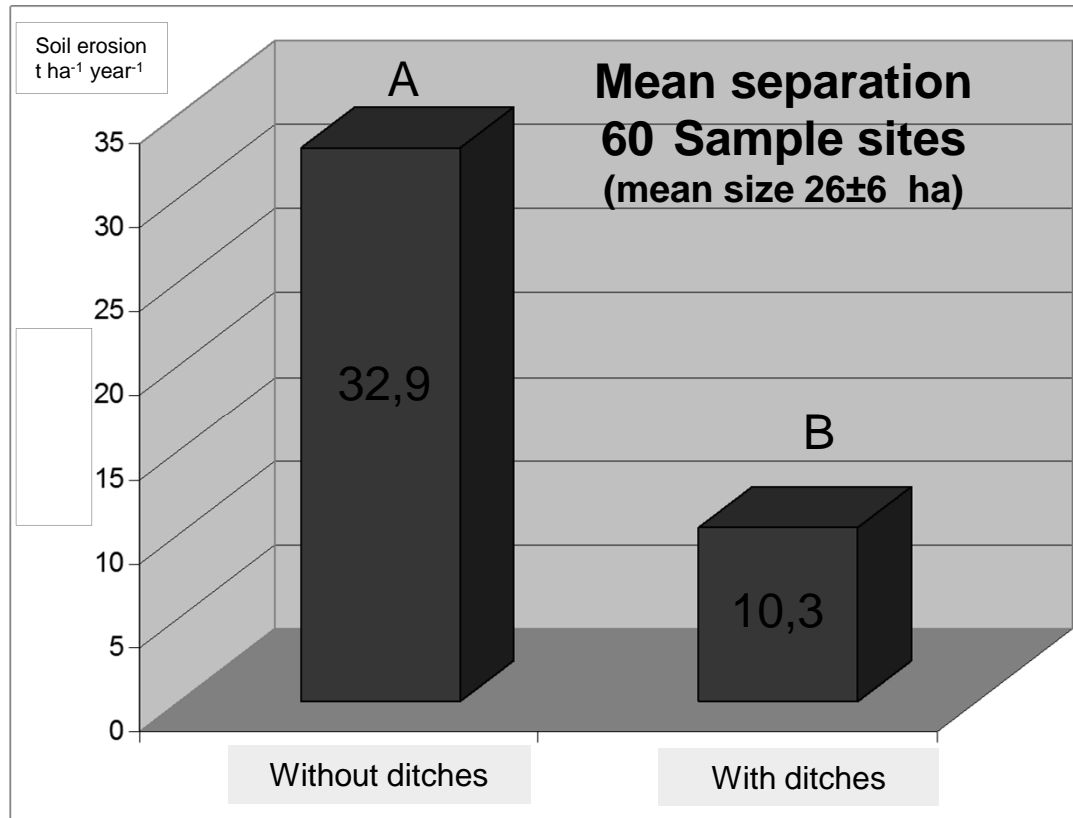
Guiglia (Modena, Emilia Romagna)

13% slope (Corn)

(data from Chisci and Boschi, 1988)

GAEC Standard 1.1 reduced soil erosion of about 14 times (below the tolerance threshold of $11,2 \text{ t ha}^{-1}\text{year}^{-1}$ according to USDA and $6 \text{ t ha}^{-1}\text{year}^{-1}$ according to OCSE)

The effectiveness of temporary ditches was also evaluated by applying the RUSLE model (Revised Universal soil loss Equation, Foster et al 1999) on cereal-growing sample sites chosen among the AGEA control sites of the year 2009. It was simulated the presence and the absence of temporary ditches (spaced 80 m, Standard 1.1)



By applying the model, GAEC Standard 1.1 reduced soil erosion of about 3 times (below the tolerance threshold of 11,2 t ha⁻¹year⁻¹ according to USDA)

GAEC standard 1.1 is just a baseline.

The standard alone cannot effectively counteract the erosion that occurs in extreme events of rainfall (the frequency of extreme events is being increased by climatic change). The standard 1.1 needs to be integrated by agrienvironmental measures (ex. Conservation tillage, cover crops, ..)

Effectiveness of standard 1.1

Derogation: grass strips across the slope instead of temporary ditches

CRA-ABP Experimental plots (Volterra Tuscany) on 25% slope (winter wheat)

**Grass strips across the slope reduced soil erosion of about 8 times
(below the tolerance threshold of 11,2 t ha⁻¹year⁻¹ according to USDA
and 6 t ha⁻¹year⁻¹ according to OCSE)**

Issue 1: SOIL EROSION

Standard 4.2: Presence of grass cover throughout the year on set aside

Implementation of Regulation before the Health Check					
GAEC Standards		Effectiveness of Standards vs. Issues			
		Issue 1 Soil erosion	Issue 2 Soil organic matter	Issue 3 Soil structure	Issue 4 Minimum level of habitat
standard 4.2a	Rational management of Set-aside <i>(Ensure the presence of grass cover throughout the year on set aside)</i> letter a	High			High

Issue 1: SOIL EROSION

Standard 4.2: Presence of grass cover throughout the year on set aside

- The case studies have demonstrated the high efficacy of the standard 4.2.
- Soil erosion is being greatly reduced both because of the highly protective effect of vegetation cover throughout the year and because of the effect of no-tillage (plowing was mandatory for set aside prior to 2005 and caused erosion).

Issue 1: SOIL EROSION

Standard 4.4a: Retain stonewall and earth terraces

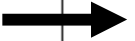
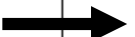
Implementation of Regulation before the Health Check					
GAEC Standards		Effectiveness of Standards vs. Issues			
		Issue 1 Soil erosion	Issue 2 Soil organic matter	Issue 3 Soil structure	Issue 4 Minimum level of habitat maintenance
standard 4.4a	Retention of characteristic landscape features (Retain stonewall terraces and earth terraces) letter a	High			High

Issue 1: SOIL EROSION

Standard 4.4a: Retain stonewall and earth terraces

The effectiveness of terraces against soil erosion was assessed by applying the RUSLE model in sample areas (Lamole, Toscana and Costaviola, Calabria)

Soil use: Vineyard

<i>Case study</i>	<u>Soil erosion t ha⁻¹ year⁻¹</u>	
	<u>Terraces removed</u>	<u>Terraces retained</u>
<u>Costaviola</u>	47 	9
<u>Lamole</u>	28 	6

Issue 1: SOIL EROSION

Standard 4.4a: Retain stonewall and earth terraces

In relation to increasing levels of degradation it was simulated a gradual return to the natural morphology of the slope. Accordingly the SlopeLength factor of the RUSLE model was increased.

Issue 1: SOIL EROSION Standard 4.4a: Retain stonewall and earth terraces

Habitat: Stonewalls are arid micro-environments suitable for many species. (Research in progress)



Issue 1: SOIL EROSION

Standard 4.4b: Prohibition of unauthorized land leveling

Implementation of Regulation before the Health Check					
GAEC Standards		Effectiveness of Standards vs. Issues			
		Issue 1 Soil erosion	Issue 2 Soil organic matter	Issue 3 Soil structure	Issue 4 Minimum level of habitat maintenance
standard 4.4b	Retention of characteristic landscape features <i>(Retain stonewall terraces and earth terraces. Prohibition of unauthorized land leveling), letter b</i>	Low			Low

Issue 1: SOIL EROSION

Standard 4.4b: Prohibition of unauthorized land leveling

This standard is considered adequate but it is not effective enough, because in Italy only a few municipalities take land leveling into consideration in their territorial governance legislation. Municipal “Authorization” should be granted on condition that strict rules of soil conservation are adhered.

The lack of specific soil conservation measures leads to such environmental disasters!

From aerial pictures (helicopter)
and field measurements

Case study	Rill volume (m ³ ha ⁻¹) ± 95%	Total rill erosion (t ha ⁻¹) ± 95%
San Gimignano	115 ± 26	184 ± 41
Cesena	223 ± 52	357 ± 83

Derogation to the standard 4.4a is admitted when reshaping of terraces is performed to allow mechanization and make terraces economically sustainable. On condition: The erosion control function must be guaranteed after reshaping.

Old terraces in many cases are too narrow and without connectivity

Issue 2: SOIL ORGANIC MATTER

Standard 2.1: Management of stubble and crop residues (Prohibition of burning stubble and crop residues)

Implementation of Regulation before the Health Check					
GAEC Standards		Effectiveness of Standards vs. Issues			
		Issue 1 Soil erosion	Issue 2 Soil organic matter	Issue 3 Soil structure	Issue 4 Minimum level of habitat maintenance
standard 2.1	Management of stubble and crop residues (<i>Prohibition of burning stubble and crop residues</i>)		Low		

Issue 2: SOIL ORGANIC MATTER

Standard 2.1 managing stubble and crop residues

The Standard 2.1 was of limited effectiveness in the maintenance of the quantities of Organic Matter and its qualitative improvement.

Suggested agri-environmental measure: addition of small amounts of Nitrogen on crop residue before ploughing.

The standard should be focused on the habitat issue, due to its importance in reducing wildfires.

Issue 2: SOIL ORGANIC MATTER

Standard 2.2: Crop rotation

Implementation of Regulation before the Health Check					
GAEC Standards		Effectiveness of Standards vs. Issues			
		Issue 1 Soil erosion	Issue 2 Soil organic matter	Issue 3 Soil structure	Issue 4 Minimum level of habitat maintenance
standard 2.2	Crop rotation		Low		

The Standard 2.2 (crop rotation) was of limited effectiveness in the maintenance of the quantities of Organic Matter.

Suggested agri-environmental measures: inclusion of forage crops in rotation, crop residue management and minimum tillage

Issue 3: Soil structure protection through appropriate machinery use

Standard 3.1b: Ploughing in good soil moisture conditions

Implementation of Regulation before the Health Check		Effectiveness of Standards vs. Issues			
GAEC Standards		Issue 1 Soil erosion	Issue 2 Soil organic matter	Issue 3 Soil structure	Issue 4 Minimum level of habitat maintenance
standard 3.1b	Soil structure protection through appropriate machinery use (<i>Ploughing in good soil moisture conditions.</i>) letter b			High	

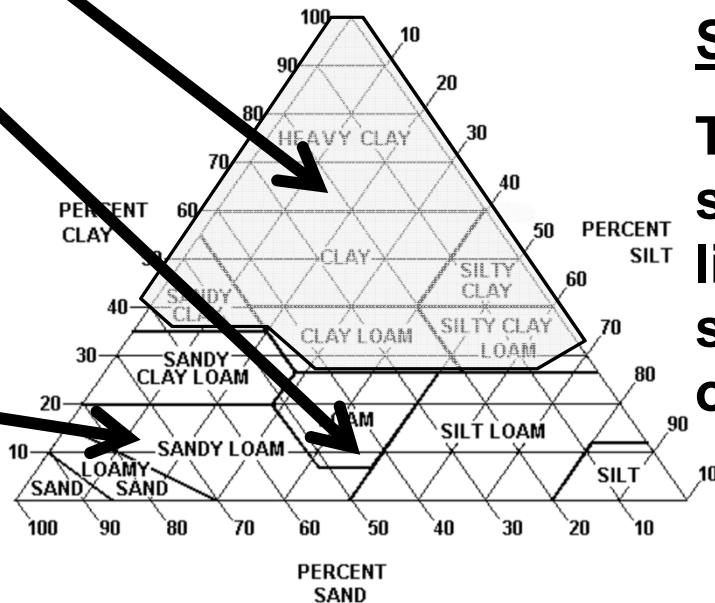
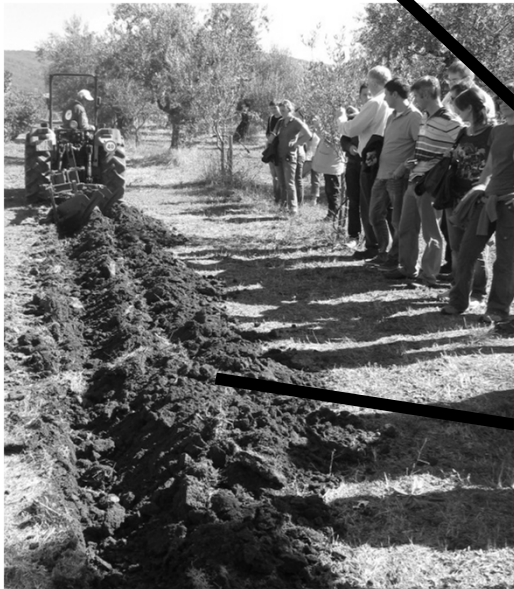
Standard 3.1b: Ploughing in good soil moisture conditions

In the experimental plots ploughing in good soil moisture condition determined higher crop production and less weed infestation than ploughing in bad soil moisture condition.

Issue 3: Soil structure protection through appropriate machinery use

Standard 3.1b: Ploughing in good soil moisture conditions

Soil texture	Results (decay of soil structure)
Clay, Clay loam, Silty clay, Silty clay loam	Ploughing in good soil moisture condition led to less soil compaction than ploughing in high moisture condition.
Silt, Sand, Loamy sand, Loam, Silt loam, Sandy loam	no significant differences between treatments



Simplification !!

This standard should be limited to some soil textures only

Issue 3: Soil structure protection through effective surface water drainage interventions
Standard 3.1a: Maintenance in good efficiency of the farm network of permanent channels

Implementation of Regulation before the Health Check					
GAEC Standards		Effectiveness of Standards vs. Issues			
		Issue 1 Soil erosion	Issue 2 Soil organic matter	Issue 3 Soil structure	Issue 4 Minimum level of habitat maintenance
standard 3.1a	Protection of soil structure through efficient drainage of surface water. <i>(Shaping the surface of fields convex to avoid waterlogging. Maintenance in good efficiency of the farm network of permanent channels) letter a</i>			High	

Issue 3: Soil structure protection through effective surface water drainage interventions

- Old data: A severe decay of soil structural stability was found under the combined effect of waterlogging and freezing-thawing (common condition in winter time on flatland).
- A new experiment is being started on the effect of different times (from 8 hours to 30 days) of continuous waterlogging on soil structure decay.

Issue 4: MINIMUM LEVEL OF HABITAT MAINTENANCE

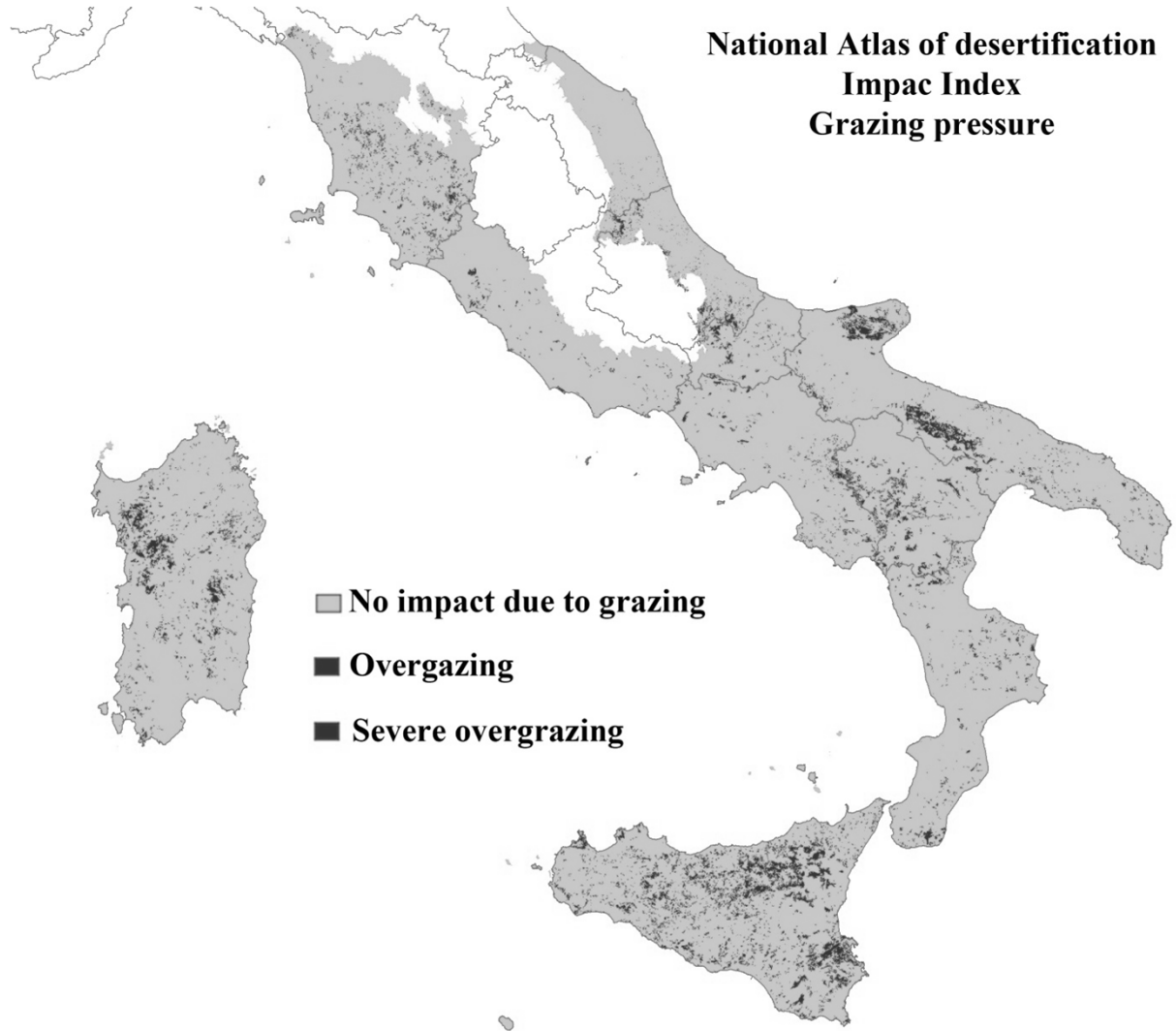
Issue 4: MINIMUM LEVEL OF HABITAT MAINTENANCE

Standard 4.1 a,b,c. Prohibition to reduce or convert the area of pasture to other uses. Optimal Livestock Units per ha

Implementation of Regulation before the Health Check					
GAEC Standards		Effectiveness of Standards vs. Issues			
		Issue 1 Soil erosion	Issue 2 Soil organic matter	Issue 3 Soil structure	Issue 4 Minimum level of habitat maintenance
standard 4.1a, b	Protection of permanent pasture <i>(Prohibition to reduce the area of pasture) letter a</i> <i>Prohibition to convert pasture to other land use) letter b</i>				High
standard 4.1c	Protection of permanent pasture <i>(Optimal livestock Units per ha. Min. and Max. values allowed)</i> letter c				High

Issue 4: MINIMUM LEVEL OF HABITAT MAINTENANCE

Standard 4.1 a and B: Prohibition to reduce or convert the area of pasture



Researches found that in Italy undergrazing is the major menace for the maintenance of a good plant composition of permanent pastures.

The optimal load of cattle for the maintenance of the pastures is between 0.3 and 3 LU /ha (Livestock Units/ha). Decision should be site-specific

Issue 4: MINIMUM LEVEL OF HABITAT MAINTENANCE
Standard 4.2 b Rational management of set-aside
Weed control through mowing

Implementation of Regulation before the Health Check					
GAEC Standards		Effectiveness of Standards vs. Issues			
		Issue 1 Soil erosion	Issue 2 Soil organic matter	Issue 3 Soil structure	Issue 4 Minimum level of habitat maintenance
standard 4.2b	Rational management of Set-aside <i>(weed control through mowing)</i> letter b				Low

Issue 4: MINIMUM LEVEL OF HABITAT MAINTENANCE

Standard 4.2 b Rational management of set-aside

Weed control through mowing

The Standard 4.2b appears to be ineffective and even harmful from the agronomic point of view. In fact, a single mowing can not control the spread of natural vegetation to nearby fields.

Residues left on soil surface after mowing determined an increase of soil biodiversity, due to a higher amount of available litter in decomposition that feeds the organisms in the soil that make humus.

CRA-ABP Exp.farm at Fagna (Florence)



Issue 4: HABITAT

Standard 4.2: Presence of grass cover throughout the year on set aside

- **Increase of soil biological quality index (QBS-Arthropoda)** due to set aside and alternate grass strips respect to ploughed soil.

Grass strips increased the biological quality of soil (and therefore grass strips are effective also toward the environmental issue 4 "habitat").

Riparian and buffer vegetation increased biodiversity



Issue 4: HABITAT

Standard 4.2: Presence of grass cover throughout the year on set aside

- **Increase of reptiles** due to set aside and alternate grass strips respect to ploughed soil.



Grass strips alternated to cereal-growing strips are very effective due to the margin effect (and therefore grass strips are effective also toward the environmental issue 4 "habitat")

Issue 1: SOIL EROSION

Standard 4.2: Presence of grass cover throughout the year on set aside

- **Increase of mammals** (Soricidae) due to set aside respect to ploughed soil.

Mowing should be performed on grass strips too !! (baseline:
one cut per year)

The standard needs to be integrated by this practice.

Issue 4: MINIMUM LEVEL OF HABITAT MAINTENANCE
Standard 4.3 b Frequency of pruning. Frequency of cleaning the soil from brambles and shrubs

Implementation of Regulation before the Health Check					
GAEC Standards		Effectiveness of Standards vs. Issues			
		Issue 1 Soil erosion	Issue 2 Soil organic matter	Issue 3 Soil structure	Issue 4 Minimum level of habitat maintenance
standard 4.3b	Maintenance of olive groves in good vegetative condition <i>(Frequency of pruning. Frequency of cleaning the soil from brambles and shrubs), letter b</i>				High

Standard 4.3 b Frequency of pruning.

- The effectiveness of the standard was demonstrated by the high vegetative growth of plants pruned every 3 years.



This standard is weak. It is focused more to avoid land abandonment rather than to habitat maintenance.

Issue 4: MINIMUM LEVEL OF HABITAT MAINTENANCE

Standard 4.4 c,d Retention of characteristic landscape features

Implementation of Regulation before the Health Check					
GAEC Standards		Effectiveness of Standards vs. Issues			
		Issue 1 Soil erosion	Issue 2 Soil organic matter	Issue 3 Soil structure	Issue 4 Minimum level of habitat maintenance
standard 4.4c d	Retention of characteristic landscape features <i>(landscape protection)</i> letter c-d				High



Issue 4: MINIMUM LEVEL OF HABITAT MAINTENANCE
Standard 4.4 c,d Retention of characteristic landscape features

- The standard 4.4 (retention of terraces) resulted very effective to preserve rural landscape
- The standard was evaluated through the historical-cultural analysis on some study areas (methodology by the working group lanscape of Mipaaf)



Final SUGGESTIONS

- A permanent European research platform focused on supporting the rural development should be constituted (ex. Revitalizing the working groups of researchers that cooperated to the European strategy of soil protection)

Let them do the same exercise we did during this workshop!!

- Researches should be performed by Research institutions in cooperation with regional research agencies (to focus on real and urgent objectives).
- A more effective link between research and rural development policy is needed.
- Policy makers should ask researchers precise questions on precise environmental issues, otherwise lot of interesting findings would be not suitable for practical purposes. The NRN-CRA cooperation is a precious experience how to harmonize different needs (researchers-rural policy).

Thank you for your attention

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