

## LUCAS use case: Topsoil uses - DG AGRI

DG AGRI

24/05/2013

### Policy Context

Launched in 1962, the EU's common agricultural policy (CAP) aims to:

- improve agricultural productivity, so that consumers have a stable supply of affordable food;
- ensure that EU farmers can make a reasonable living;

Now, 50 years later, the EU has to address more challenges:

- food security — at the global level, food production will have to double in order to feed a world population of 9 billion people in 2050;
- climate change and sustainable management of natural resources;
- looking after the countryside across the EU and keeping the rural economy alive;

The CAP is a common policy for all the Member States of the European Union. It is managed and funded at European level from the resources of the EU annual budget. Policy instruments are structured into **two complementary pillars**, with annual direct payments and market measures making up the first, multi-annual rural development measures making up the second pillar.

Since the introduction of the first agri-environmental measures in 1992, the environmental dimension has acquired an ever-increasing importance in the CAP, affirmed by the EU's commitment to sustainable development laid down in the Treaty of Amsterdam (1997).

The Agenda 2000 CAP reform (1999) is considered the first major step towards the integration of environmental requirements into the CAP. On the one hand, it required taking into account environmental aims in the implementation of first-pillar measures (market and income policy); on the other hand, it introduced agro-environmental schemes in the new second pillar (rural development). In this context, the new concepts of cross-compliance, good farming practice and modulation were introduced.

The 2003 CAP reform took forward the integration of environmental concerns into the CAP. It reinforced a number of measures that encourage land use and practices compatible with the protection of environmental resources. It introduced the decoupling of direct payments, thereby reducing production incentives, and made cross-compliance and modulation mandatory.

The proposal for the CAP post- 2013, which is expected to be approved by the end of 2013, aims to make the policy fairer, greener and more efficient. It identifies the "*Sustainable management of natural resources and climate action*" as one of three main objectives to which both pillars should contribute and against which CAP measures are to be evaluated.

The ever stronger integration of environmental concerns into agricultural policy requires appropriate indicators to assess progress and achievements. The future monitoring and evaluation system, laid down in Article 110 of the proposed regulation on financing, management and monitoring of the

CAP, will therefore include some of the established agri-environmental indicators with a view to measuring the performance of the policy.

Soil, as a key element of the agricultural resource base, is a particular focus area in which the impact of the policy shall be measured. Soil quality and soil erosion have been identified as indicators to be included in implementing acts, once the basic regulations have been adopted, within the Common Monitoring and Evaluation Framework post 2013. Both indicators depend on data obtained from the LUCAS soil survey.

- Soil organic matter (AEI 26: Soil quality – CMEF Impact and Context indicator)

- Soil erosion (AEI 21: Soil erosion – CMEF Impact and Context indicator)

The indicators on soil organic matter and soil erosion are the only indicators currently available to assess the impact of agricultural activities on soils. Both are crucial to evaluate the contribution of CAP measures to the sustainable management of natural resources and climate action and for both the LUCAS soil survey is considered the most appropriate source of information currently available. LUCAS in fact provides the detailed information needed and assures a consistent data quality throughout the EU 27, which is an essential requirement for allowing comparisons among Member States.

<b>Soil Organic Matter</b> (AEI 26: Soil quality - CMEF Impact and Context indicator)	
<b>Description</b>	<p>The indicator measures the organic carbon content in soils.</p> <p>For the EU, organic carbon content in topsoil has been defined as the most appropriate indicator for soil quality. High organic carbon content corresponds to good soil conditions from an agro-environmental point of view: limited soil erosion, high buffering and filtration capacity, rich habitat for soil organisms, enhanced sink for atmospheric carbon dioxide, etc.</p> <p>Soil Organic Carbon (SOC), the major component of soil organic matter, is extremely important in all soil processes. Organic material in the soil is essentially derived from residual plant and animal material, synthesised by microbes and decomposed under the influence of temperature, moisture and ambient soil conditions. The annual rate of loss of organic matter can vary greatly, depending on cultivation practices, the type of plant/crop cover, drainage status of the soil and weather conditions. There are two groups of factors that influence inherent organic matter content: natural factors (climate, soil parent material, land cover and/or vegetation and topography), and human-induced factors (land use, management and degradation). (Joint Research Center, European Soil Portal).</p> <p>The indicator measures the total amount of SOC in the topsoil of agricultural land (gigatons in 30 cm) in each Member State. A mean value of the SOC concentration (g/kg) is associated to the first.</p>
<b>LUCAS data</b>	LUCAS - Soil survey: Soil Organic Carbon content
<b>Impact of the indicator</b>	<p>Soil information is essential for agricultural and environmental planning and monitoring.</p> <p>Since agriculture highly influences SOC content and SOC loss is among the main effects of soil degradation, this indicator is needed to measure the contribution of CAP measures to the achievement of Objective 2: "sustainable management of natural resources and climate action".</p> <p>The indicator allows the measurement of trends and developments over time and can thus provide information about the influence that agricultural practices have on SOC content in each Member State.</p> <p>At present the data available are those collected in 2009. These constitute a useful baseline against which the impact of the CAP post-2013 could be measured. To this aim, the LUCAS -Soil module should be updated at regular intervals. It is important to note that the LUCAS Soil survey represents the only available EU-wide database on soil cover, based on standard sampling and analytical procedures. According to the study "Data requirements, availability and gaps in AEIs in Europe", issued by Eurostat in 2011, the availability of data that are of consistent quality throughout the EU 27 is an essential requirement for allowing comparison among Member States. On this ground LUCAS is considered to be the most appropriate source for this indicator.</p>

<b>Soil Erosion</b> (AEI 21: Soil erosion - CMEF Impact and Context indicator)	
<b>Description</b>	<p>The main indicator is defined as:</p> <ul style="list-style-type: none"> <li>· Areas with a certain level of erosion risk (ha; %)</li> </ul> <p>The supporting indicator is defined as:</p> <ul style="list-style-type: none"> <li>· Estimated soil loss by water erosion (T/ha/year)</li> </ul> <p>The indicator represents estimated soil erosion levels for NUTS 3 areas that range from very low values (&lt; 0.5 t/ha/year) to very high values (&gt; 50 t/ha/year) for the EU-27. It gives indications of the agricultural areas affected by a certain rate of soil erosion.</p> <p>Results for both indicators are the outputs of a modelling exercise; they have been produced by the JRC on the basis of an empirical computer model (RUSLE model) which was developed to evaluate soil erosion rates by water at a regional scale. The model provides estimates of possible erosion rates and estimates sediment delivery, on the basis of accepted scientific knowledge, technical judgement and input datasets.</p> <p>The model considers seven main factors controlling soil erosion: the rainfall erosivity, the erodibility of the soil, the slope steepness and the slope length of the land, the land cover, the stoniness and the human practices designed to control erosion.</p> <p>Only soil erosion resulting from rainsplash, overland flow (also known as sheetwash) and rill formation are considered. These are some of the most effective processes to detach and remove soil by water. In most situations, erosion by concentrated flow is the main agent of erosion by water.</p>
<b>LUCAS data</b>	<p>Erosion is a combination of 4 parameters: land use, topography, soil and climate.</p> <p>Work carried out at the JRC suggest that the following types of data are needed:</p> <ul style="list-style-type: none"> <li>- <u>Soil data</u> – texture, organic carbon content, structure, permeability,</li> <li>- <u>Climate data</u> – precipitation (high temporal resolution), temperature</li> <li>- <u>Land cover</u> – as provided by CORINE, leaf area index or NDVI data</li> <li>- <u>Topography</u> – as provided by the topographic model Shuttle Radar Topography Mission</li> <li>- <u>Management</u> – human and agricultural practices</li> </ul> <p>LUCAS - Soil survey could improve the reliability of the indicator providing periodical updates about: soil texture; organic carbon content; structure; permeability.</p>
<b>Impact of the indicator</b>	<p>The EU thematic strategy on soil protection (European Commission, 2002, 2006) distinguishes 8 possible soil threats, including soil erosion. The vulnerability of these soil threats mainly depends on specific environmental conditions and human activities (mainly land use practices), must be identified and preventive measures must be taken.</p> <p>Within the framework of the CAP, preventing soil erosion is linked to direct payments to farmers. In this case, these Cross Compliance conditions mean that a farmer receiving direct payments will be required among others to maintain the land in Good Agricultural and Environmental Condition (GAEC) and to prevent soil erosion.</p> <p>Areas at risk of soil erosion at a national level are a baseline indicator of rural development policy and will continue to be in the future policy framework. Ideally, data should be updated at regular intervals throughout the programming period. The Sustainable Development Indicator 'percentage of total land area at risk of soil erosion' is currently under development, but will be required to be updated every 2 years.</p>