

## E-2: Area affected by erosion

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## 1) General description

### 1.1) *Brief definition*

This indicator presents **the** total agricultural area affected by soil erosion (separate for water and wind erosion) and the share of agricultural area affected by degradation through wind and water erosion.

### 1.2) *Units of measurement*

The affected area is measured in square kilometres; the share of agricultural area affected is expressed as a percentage.

### 1.3) *Context*

Relation to other indicators from the Guidelines - This indicator does not relate to other indicators.

## 2) Relevance for environmental policy

### 2.1) *Purpose*

The indicator provides a measure of the state of land in terms of the degree to which it is affected by soil erosion caused by wind and water.

### 2.2) *Issue*

Soil erosion can be caused by natural soil and landscape characteristics as well as meteorological parameters (steepness of hills, types of soil, amount of precipitation) which are difficult to change, as well as by land use, which can be mitigated by terracing, the creation of wind barriers (including forest plantations) and changes in factors such as the variety, thickness and age of vegetation. Land erosion is a natural phenomenon, which, however, tends to be greatly accelerated by human activity. In most cases, erosion results from unsustainable agricultural land use, large-scale farming and over-grazing, and inappropriate irrigation and water management. Agricultural management systems are a

primary factor affecting the quality of soil. In turn, erosion is an exemplary indicator of negative effects caused by unacceptable agricultural practices, which lead to declines in soil fertility and often to irreversible soil damage. The indicator estimates the total agricultural area affected by wind erosion and the total agricultural area affected by water erosion, the severity of erosion and erosion dynamics (where long time series are available), and it enables the planning and implementation of counter-erosion activities.

### **2.3) International agreements and targets**

#### *a) Global level:*

United Nations Convention to Combat Desertification (New York, 1994) and subsequent Ten-year strategic plan and framework to enhance the implementation of the Convention (2008–2018). The indicator reflects the progress achieved at the national level in fulfilling the requirements of Article 10 of the Convention. While no specific targets have been defined, the goal should be to reduce the area and percentage of land affected by erosion and/or to reduce the severity of erosion.

#### *b) Subregional level:*

In the European Union, a Thematic Strategy for Soil Protection has been adopted in 2006 followed by a proposal for a Soil Framework Directive.

## **3) Methodology and guidelines**

### **3.1) Data collection and calculations**

Data are collected for agricultural area, which is the sum of areas under (a) arable land; (b) permanent crops; and (c) permanent meadows and pastures. Detailed definitions can be found in the glossary to this indicator. Wind and water erosion (sheet, rill and gully) of soil can be measured as a net loss of soil (in tons per hectare or km<sup>2</sup> per year). It can be applied to one of five categories: no affect (tolerable affect), light affect, moderate affect, strong affect and extreme affect according to the following classification for both water and wind erosion:

- No affect (tolerable): Net loss lower than 6 tons/hectare/year
- Light affect: Net loss 6.0 – 10.9 tons/hectare/year
- Moderate affect: Net loss 11.0 – 21.9 tons/hectare/year
- Strong affect: Net loss 22.0 – 32.9 tons/hectare/year
- Extreme affect: Net loss higher than 33 tons/hectare/year

The total agricultural area affected by erosion (separate for water and wind erosion) is calculated as the sum (km<sup>2</sup>) of light affect + moderate affect + strong affect + very strong affect.

The share of agricultural area affected by erosion (%) = Agricultural area affected by erosion (wind or water erosion) / Total agricultural area

Alternatively, erosion can be measured visually or derived on the basis of reduced productivity. These alternatives can also be applied to the same five categories, which are mutually exclusive. The area falling under the five different categories should be supplemented by the total agricultural area affected.

This indicator does not take into account many important types of soil degradation, such as hardening, desertification, over-grazing, secondary salt pollution, and loss of fertility and biodiversity. It also does not take into account the effects of road construction and tourism. The indicator should be assessed at least every five years.

### ***3.2) Internationally agreed methodologies and standards***

The ECE has adopted the Standard International Statistical Classification for Land Use. The Global Assessment of Soil Degradation, developed by United Nations Environment Programme (UNEP) and Food and Agriculture Organization (FAO), provides definitions categorizing the extent of soil erosion. There is also a methodology for the creation of global and national soil databases (Soils and Terrain Digital Databases – SOTER). Wind and water erosion assessment methodologies developed in the United States (Universal Soil Loss Equation) and some other countries may be also helpful. The Committee on Science and Technology of the United Nations Convention to Combat Desertification is currently developing relevant international standards.

## **4) Data sources and reporting**

At the national level in countries of South-Eastern and Eastern Europe, Caucasus and Central Asia, data are collected by government bodies responsible for land cadastres, land-use planning and environmental protection as well as by statistical agencies. Data on land affected by erosion are published in annual state-of-the-environment reports and/or in statistical yearbooks in some countries. Statistical agencies of the countries report data to the UNSD Environment Statistics Database. FAO also collects data from its member countries.

## 5) References at the international level

- United Nations Convention to Combat Desertification:  
<http://www.unccd.int/en/Pages/default.aspx>;
- Ten-year strategic plan and framework to enhance the implementation of the Convention (2008–2018):  
<http://www.unccd.int/Lists/SiteDocumentLibrary/10YearStrategy/Decision%20COP8%20adoption%20of%20The%20Strategy.pdf>;
- Indicators of Sustainable Development: Guidelines and Methodologies, Third Edition, United Nations 2007:  
<http://sustainabledevelopment.un.org/content/documents/guidelines.pdf>;
- *Assessment and Reporting on Soil Erosion*. Technical report No. 94. (EEA, 2002);
- *Down to the Earth: Soil Degradation and Sustainable Development in Europe. A Challenge for the Twenty-First Century*. Environmental Issues Series No. 16. (EEA/UNEP, 2000);
- European Commission – soil: [http://ec.europa.eu/environment/soil/index\\_en.htm](http://ec.europa.eu/environment/soil/index_en.htm);
- (EU) Thematic Strategy for Soil Protection, COM(2006)231 final: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2006:0231:FIN:EN:PDF>;
- Assessment and reporting on soil erosion. (EEA, 2002);
- Land-use Classification (ECE):  
<http://www.unece.org/fileadmin/DAM/stats/documents/1999/10/env/13.e.pdf>;
- Grimm, M. et al. *Soil Erosion Risk in Europe*. (2002);
- SOTER: <http://eusoils.jrc.ec.europa.eu/projects/soter/>;
- Global Assessment of Human-induced Soil Degradation (GLASOD):  
<http://www.isric.org/projects/global-assessment-human-induced-soil-degradation-glasod>;
- Revised Universal Soil Loss Equation (RUSLE):  
<http://www.ars.usda.gov/Research/docs.htm?docid=5971>;
- Soil — SOER 2010 thematic assessment: <http://www.eea.europa.eu/soer/europe/soil>;
- EEA: <http://www.eea.europa.eu/themes/soil>;
- FAO: <http://www.fao.org/economic/ess/en/>;

- FAOSTAT: <http://faostat.fao.org/>;
- UNSD: <http://unstats.un.org/unsd/environment/>.