Organisation for Economic Co-operation and Development
Organisation de Coopération et de Développement Économiques

ENVIRONMENTAL PERFORMANCE OF AGRICULTURE IN OECD COUNTRIES SINCE 1990:

Other Agri-Environmental Indicators

Other Agri-Environmental Indicators are related to the OECD publication (2008) ***Environmental Performance of Agriculture in OECD countries since 1990*** which is available at: http://www.oecd.org/tad/env/indicators

ANNEX 2.A1

*Agri-environmental Indicators of Regional Importance and/or under Development**

Theme	Indicator title	Indicator definition (trends over time for all indicators)
I. Soil	***i.* Soil erosion**	1. Area and share of agricultural land affected by tillage erosion in terms of different classes of erosion, *i.e.* tolerable, low, moderate, high and severe.
		2. Contribution (as a share or physical quantity) of agriculture to off-farm sediment flows into the landscape and water bodies (from water, wind and other erosion sources).
		3. Gross on-farm soil erosion, measured through integrating models of wind, water and tillage erosion.
		4. On-farm and off-farm economic costs from soil erosion.
	***ii.* Soil organic carbon**	5. Total soil organic carbon in agricultural land.
II. Water	***iii.* Water use**	6. A net agricultural groundwater balance, where information is available, to take into account both agricultural withdrawals and recharge of groundwater.
		7. The annual share of rivers/lakes where agricultural water extraction results in rivers/lakes falling below a (seasonal) minimum reference level.
		8. The impact of agricultural water use on ecosystem health (*e.g.* wild species and wetlands).
		9. Average value of irrigated agricultural product(s) per unit of irrigation water consumed (or alternatively water withdrawn or licensed water allocation, where the water withdrawn could be the *gross* value of total water withdrawn or the *net* value of total water withdrawn minus the value of water returned to rivers and lakes and recharged to groundwater).
		10. Charges for water supplies to farmers relative to water supply charges for other major users (industry and urban).
	***iv.* Water quality**	11. Salt concentrations in surface waters and groundwater in excess of national water threshold values in representative agricultural areas.
		12. Pathogen (faecal indicator or pathogenic bacteria) concentrations in surface waters and groundwater in excess of national water threshold values in representative agricultural areas.
		13. Share of pathogen contamination derived from agriculture in surface waters and groundwater.
III. Climate change	***v.* Greenhouse[1] gases**	14. Net agricultural greenhouse gas emission balance (*i.e.* emissions less sinks).
IV. Biodiversity	***vi.* Genetic resource diversity**	15. Number and share of national native crop varieties (*i.e.* cereals, oil crops, root crops, fruit and vegetables) that are considered to be at risk of extinction (*i.e.* critical or endangered risk status).
	***vii.* Wild species diversity**	16. Number of ecologically indicative wild species using agricultural land.

* All of the indicators listed in this annex are those for which either methodologies and/or data sets are not yet at a stage that allows for representative comparative OECD country coverage or in certain cases (*e.g.* cultural landscape indicators and water retaining capacity) are only policy-relevant to some OECD countries, as shown in this chapter.

Theme	Indicator title	Indicator definition (trends over time for all indicators)
	viii. **Ecosystem (habitat) diversity**	17. Quality and quantity of habitat features (*e.g.* patch size, linear features and networks,) and their spatial composition (*e.g.* fragmentation, vertical structures, mosaics) across agricultural land.
	ix. **Linkages between habitats and species**	18. *Habitat-Species Matrix*, linking changes in the area and management of all agricultural habitat types on wild species (flora and fauna) through data from either explicit field observation or indirect information (*e.g.* expert knowledge).
		19. *Natural Capital Index*, the product of the quantity of agricultural habitat types and their quality in terms of wild species abundance, richness, habitat structure and management, measured between the current state of the agro-ecosystem and a baseline state.
V. Landscape and land ecosystem functions	***x.*** **Landscape**	20. Landscape Structure: land use, cover, patterns and cultural features (*e.g.* hedges and historic farm buildings).
		21. Landscape Functions: recreation (*e.g.* accessibility; cultural identity, tranquillity, and ecosystems (see biodiversity).
		22. Landscape Values: monetary value of agricultural landscapes (*e.g.* calculated through methods such as contingent valuation).
	xi. **Land ecosystem functions**	23. Water retaining capacity, quantity of water that can be retained in the short term, in agricultural soil, as well as on agricultural land where applicable (*e.g.* flood storage basins) and by agricultural irrigation or drainage facilities.
		24. Water retaining capacity by agricultural irrigation or drainage facility, to reveal extent to which on-farm water storage facilities retain water (*e.g.* on farm dams, dykes, canals, etc.).
		25. Landslide mitigation index, proportion of managed agricultural land within the agricultural land area subject to landslide risk.
VI. Farm management	***xii.*** **Environmental farm management plans**	26. Number (area) and share of farms (agricultural land area) under environmental farm management plans.
	xiii. **Nutrient management**	27. Number and share of farms (agricultural land area) using nutrient balances.
	xiv. **Pest management**	28. Number and share (agricultural land area) of farms with appropriate storage/handling/cleaning and disposal facilities for treatment of pesticide wastes (*i.e.* packaging and unused pesticides).
	xv. **Soil management**	29. Number and share of farms where soil biophysical properties are monitored as part of the soil test programme and/or used as land management decision support tool.
	xvi. **Water management**	30. Area and share of agricultural land that is drained.
	xvii. **Landscape management**	31. Number (area) and share of farms (agricultural land area) under public and private schemes committed to natural and cultural landscape maintenance and enhancement.
	xviii. **Farm management capacity**	32. Number and share of farmers participating in agri-environmental education programmes.
		33. Expenditure on agri-environmental management research and extension as share of total agricultural budgetary expenditures on research and extension.
VII. Agricultural inputs	***xix.*** **Energy**[2]	34. Total amount of energy contained in key agricultural inputs.
		35. The energy efficiency of agricultural production is the monetary value of annual agricultural production per unit of energy directly consumed by agriculture to produce that annual agricultural production.
		36. Production and use of renewable energy by agriculture.

1. See Box 1.7.1, Section 1.7.3, Chapter 1.
2. See Section 1.4, Chapter 1.

Source: OECD (2007).

ANNEX 2.A2

A Qualitative Assessment of the Agri-environmental Indicators included in Annex 2.A1 according to the OECD Indicator Criteria

Indicator definition[1]	General criteria[2]				Expert meeting[3]	Countries[4]	
	Policy relevant	Analytically sound	Measurable	Easy to interpret		Coverage	Comparability
i. **Soil erosion** 1. Area and share of agricultural land affected by tillage erosion	+++	++	+	++	Soil erosion and soil biodiversity (OECD, 2003a)	Belgium, Canada, Norway, Switzerland, United Kingdom	+++
2. Contribution of agriculture to off-farm sediment flows	+++	+	+	+		Belgium, Czech Republic, Greece, Norway, Switzerland	+++
3. Gross on-farm soil erosion, measured through integrating models of wind, water and tillage erosion	++	+	+	+		Netherlands, Switzerland, United States	+
4. On-farm and off-farm economic costs from soil erosion	+++	++	+	+++		United States	+++
ii. **Soil organic carbon** 5. Change in total soil organic carbon in agricultural land over time	+++	+	+	+++	Soil organic carbon (OECD, 2003b)	Belgium, Canada, Finland, France, Ireland, New Zealand, Slovak Republic, Spain, Sweden, Switzerland, United Kingdom, United States	+++
iii. **Water use** 6. A net agricultural groundwater balance, where information is available, to take into account both agricultural withdrawals and recharge of groundwater					Water use and water quality (OECD, 2004b)		
7. The annual share of rivers/lakes below a minimum reference level	+++	+	+	+++		Japan, United Kingdom	++
8. The impact of agricultural water use on ecosystem health	+++	+	+	+		Japan, Korea, United Kingdom, United States	+

Indicator definition[1]	General criteria[2]				Expert meeting[3]	Countries[4]	
	Policy relevant	Analytically sound	Measurable	Easy to interpret		Coverage	Comparability
9. Trend in the average value of irrigated agricultural product(s) per unit of irrigation water consumed	++	+	+	+		Korea, Netherlands, United States	+++
10. Charges for water supplies to farmers relative to water supply charges for other major users (industry and urban)	+++	++	++	++		Australia, Austria, Canada, Finland, France, Greece, Hungary, Korea, Netherlands, Portugal, Slovak Republic, Spain, Turkey, United Kingdom	+++
***iv.* Water quality** 11. Salt concentrations in surface waters and groundwater in excess of national water threshold values	+++	++	+	+++	Water use and water quality (OECD, 2004b)	France, Greece, Netherlands, Slovak Republic, Turkey	+++
12. Pathogen concentrations in surface waters and groundwater in excess of national water threshold values in representative agricultural areas	+++	++	+	+++		Denmark, Finland, France, Ireland, Korea, Netherlands, New Zealand, Norway, Switzerland	+++
13. Share of pathogen contamination derived from agriculture in surface waters and groundwater	+++	++	+	+++		Canada, Denmark, Ireland, Netherlands, Switzerland	++
***v.* Greenhouse gases** 14. Net agricultural greenhouse gas emission balance	+++	+	+	+++	No expert meeting or questionnaire response	Canada, Switzerland	+++
***vi.* Genetic resource diversity** 15. Number and share of national native crop varieties that are considered to be at risk of extinction	+++	++	+	++	Biodiversity (OECD, 2003c)	Austria, Luxembourg, Slovak Republic, Switzerland	++
***vii.* Wild species diversity** 16. Number of ecologically indicative wild species using agricultural land	++	+	+	++	Biodiversity (OECD, 2003c)	Canada, Czech Republic, Denmark, Finland, Korea, Netherlands, Switzerland	+

Indicator definition[1]	General criteria[2]				Expert meeting[3]	Countries[4]	
	Policy relevant	Analytically sound	Measurable	Easy to interpret		Coverage	Comparability
***viii.* Ecosystem (habitat) diversity** 17. Quality and quantity of habitat features and their spatial composition across agricultural land	++	++	+	++	Biodiversity (OECD, 2003c)	Denmark, Finland, Germany, Greece, Italy, France, Japan, Korea, Netherlands, Norway, Portugal, Sweden, Switzerland, United Kingdom	+
***ix.* Linkages between habitats and species** 18. Habitat – species matrix	+++	+	+	++	Biodiversity (OECD, 2003c)	Canada, Finland	+++
19. Natural capital index	++	++	+	+		Netherlands	+++
***x.* Landscape** 20. Landscape structure	+++	+	+	++	Landscape (OECD, 2003d)	Denmark, Finland, France, Germany, Greece, Italy, Japan, Korea, Netherlands, Norway, New Zealand, Portugal, Sweden, Switzerland, United Kingdom	
21. Landscape functions	++	+	+	+		Denmark, Finland, Korea, Netherlands, Switzerland	+
22. Landscape values	++	+	+	++		Denmark, Finland, France, Greece, Japan, Korea, Netherlands	++
***xi.* Land ecosystem functions** 23. Water retaining capacity (WRC)	++	++	+	++	Land conservation (OECD, 2004c)	Greece, Italy, Japan, Korea	++
24. Water retaining capacity by agricultural irrigation or drainage facility (WF)	++	++	++	++		Greece, Italy, Japan, Korea, Slovak Republic, United Kingdom	++
25. Landslide mitigation index (LMI)	++	+	+	++		Hungary, Japan	++

Indicator definition[1]	General criteria[2]				Expert meeting[3]	Countries[4]	
	Policy relevant	Analytically sound	Measurable	Easy to interpret		Coverage	Comparability
xii. **Environmental farm management plans** 26. Number (area) and share of farms (agricultural land area) under environmental farm management plans	+++	+++	++	+++	Farm management (OECD, 2004d)	Austria, Belgium, Canada, Czech Republic, Finland, Germany, Hungary, Ireland, Japan, Korea, Netherlands, New Zealand, Norway, Slovak Republic., Switzerland, United Kingdom	++
xiii. **Nutrient management** 27. Number and share of farms (agricultural land area) using nutrient budgets	+++	+++	+	+++	Farm management (OECD, 2004d)	Ireland, Japan, New Zealand, Norway, Switzerland	+++
xiv. **Pest management** 28. Number and share (agricultural land area) of farms with appropriate storage/handling/cleaning and disposal facilities for treatment of pesticide wastes	+++	+	+	++	Farm management (OECD, 2004d)	Belgium, Finland, Norway, New Zealand, Switzerland	++
xv. **Soil management** 29. Number and share of farms where soil biophysical properties are monitored as part of the soil test programme and/or used as land management decision support tool	++	+	+	+	Farm management (OECD, 2004d)	Austria, New Zealand, Switzerland	+
xvi. **Water management** 30. Area and share of agricultural land that is drained	+	+	+	+	Farm management (OECD, 2004d)	Belgium, Czech Republic, Finland, Germany, Greece, Hungary, Netherlands, Norway, Slovak Republic, Turkey	++
xvii. **Landscape management** 31. Number (area) and share of farms (agricultural land area) under public and private schemes committed to natural and cultural landscape maintenance and enhancement	++	++	++	++	Farm management (OECD, 2004d)	Austria, Belgium, Korea, Netherlands, Norway, Switzerland, United Kingdom	+++
xviii. **Farm management capacity** 32. Number and share of farmers participating in agri-environmental education programmes	++	+	+	++	Farm management (OECD, 2004d)	Austria, Finland, Ireland, Norway, Switzerland	++

Indicator definition[1]	General criteria[2]				Expert meeting[3]	Countries[4]	
	Policy relevant	Analytically sound	Measurable	Easy to interpret		Coverage	Comparability
33. Expenditure on agri-environmental management research and extension as share of total agricultural budgetary expenditures on research and extension	++	+	+	++		Korea, Norway, Sweden	+++
***xix.* Energy**[5] 34. Trends in the total amount of energy contained in key agricultural inputs	+	+	+	+		Switzerland	++
35. The energy efficiency of agricultural production is the physical (monetary) value of annual agricultural production per unit of energy directly consumed by agriculture to produce that annual agricultural production	++	+	+	++		Canada, Switzerland	++
36. Production and use of renewable energy by agriculture	+++	+++	++	+++		Many OECD countries	+++

The notation for each criterion is as follows: +++ = very good/strong; ++ = average; + = poor.

1. For a full definition of each indicator see Annex 2.A1.
2. For a discussion of each criterion see Section 2.3 of this chapter.
3. This column indicates at which OECD Agri-environmental Indicator Expert Meeting the indicator was discussed. see Bibliography for a list of these meetings.
4. This column shows which countries are developing the indicator, quantitatively and /or qualitatively, based on member country replies to the unpublished OECD Agri-environmental Indicator questionnaires The column also reveals the extent to which the indicator is comparable across countries.
5. Energy indicators are from an unpublished OECD consultant's paper.

Source: OECD (2007).