

STATISTICAL INDICATORS FOR MONITORING IMPLEMENTATION OF ENVIRONMENTAL MEASURES

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Abstract

Most agri-environmental indicators subscribe to the general principles of sustainable development, in which economic, social and environment are interrelated. Measuring sustainable development must be based on indicators that indicate: (i) the pressure of society on the environment, (ii) the resulting environmental conditions (particularly changes) and (iii) response to human activities, especially in terms of socio-economic decisions, respectively the agricultural and agri-environmental policies adopted. These indicators must be consensual and should provide a representative picture of the three dimensions of sustainable development: society, economy and environment. Equally, it is necessary that they should be very clear, robust and reliable in statistical terms and they should be derived from the best data sources, harmonized in terms of methodology with international standards. Agri-environmental indicators must guarantee comparability for EU Member States and provide the opportunity for comparability in accordance with the methodologies used by the United Nations and the OECD. At the same time, the selected indicators must be able to be collected timely and easily to be revised and updated further on. In Romania, the design of the system of indicators to monitor sustainable development is closely linked to the objectives and targets set out in: (i) National Strategy for Sustainable Development of Romania Horizons 2013-2020-2030 (ii) Reports on the millennium development goals (iii) Development Strategy of Romania "Horizon 2025". The paper aims both at defining statistical indicators for monitoring implementation of agri-environmental measures and identifying possible sources of data for quantifying them.

Key words: *agri-environmental indicators, agricultural policy, rural development*

INTRODUCTION

The Common Agricultural Policy (CAP) serves many purposes: it helps farmers not just to produce food, but also to protect the **environment**, improve **animal welfare** and sustain **viable rural communities**. Agri-environmental indicators are a useful tool for analyzing the relationship between agriculture and the environment and for tracking the integration of environmental concerns into the Common Agricultural Policy (CAP) at EU, national and regional levels.

Covering about 40 % of the EU's farmed land area, agriculture has a substantial impact on the natural environment, on one side *favorable*, as farming activity, over time, has created and maintained a variety of semi-natural habitats on which a wide range of wildlife depend for their survival, and on the other side *critical*, having in view the potential adverse impact of the farming

practices on natural resources, such as pollution of soil, water and air, fragmentation of habitats, and a loss of wildlife. This relationship between agriculture and the environment has to be taken into account when integrating environmental concerns and safety measures into the CAP, which emphasises: (i) reducing the risks of environmental degradation and (ii) enhancing the sustainability of agro-ecosystems through: -Cross-compliance criteria on agricultural market measures – as a condition of receiving direct payments, farmers must comply with certain requirements, including some related to environmental protection -Targeted agri-environmental measures – as part of Rural Development programmes, agri-environmental payments are available to farmers who commit to agri-environmental management schemes for a minimum 5-year period.

MATERIALS AND METHODS

The study is based on the assessment of agri-environment indicators and their data sets, by considering the basic issues that are important for their usefulness and future development. Indicator-based environmental analysis needs to be complemented by further background information and scientific studies. General limited resources for data collection and analysis resulted in the selection of a limited set of indicators, relevant from the methodological and agri-environment policy perspective. Agri-environment indicators have to cover positive and negative effects of agriculture and should be sufficiently differentiated to be able to capture regional differences in environmental conditions. A streamlined set of 28 basic indicators were developed, in close cooperation with the Member States. In the context of the Renewed EU Sustainable Development Strategy, these indicators serve to:

- provide information on the farmed environment and track the impact of agriculture on the environment;
- assess the impact of agricultural and environmental policies on environmental management of farms;
- inform agricultural and environmental policy decisions and illustrate agri-environmental relationships to the broader public.

The set of agri-environmental indicators serves the following purposes:

- provide information on the state of the environment in agriculture,
- understand and monitor the linkages between agricultural practices and their effects on environment,
- assess the extent to which agricultural and rural development policies promote environment friendly farming activities and sustainable agriculture,
- inform the global assessment process of agricultural sustainability.

In the Commission Communication, indicators are identified under the DPSIR (Driving forces - Pressures and benefits - State/Impact - Responses) analytical framework:

Table 1. Driving forces - Pressures and benefits - State/Impact - Responses

Domain	Sub-domain	Nr	Title
Responses	Public policy	1	Agri-environmental commitments
		2	Agricultural areas under Natura 2000
	Technology and skills	3	Farmers' training level and use of environmental farm advisory services
	Market signals and attitudes	4	Area under organic farming
Driving forces	Input use	5	Mineral fertiliser consumption
		6	Consumption of pesticides
		7	Irrigation
		8	Energy use
	Land use	9	Land use change
		10.1	Cropping patterns
		10.2	Livestock patterns
	Farm management	11.1	Soil cover
		11.2	Tillage practices
		11.3	Manure storage
	Trends	12	Intensification/extensification
		13	Specialisation
		14	Risk of land abandonment
	Pressures and benefits	Pollution	15
16			Risk of pollution by phosphorus
17			Pesticide risk
18			Ammonia emissions
19			Greenhouse gas emissions
Resource depletion		20	Water abstraction
		21	Soil erosion
		22	Genetic diversity
Benefits		23	High Nature Value farmland
		24	Renewable energy production
State/Impact	Biodiversity and habitats	25	Population trends of farmland birds
	Natural resources	26	Soil quality
		27.1	Water quality - Nitrate pollution
		27.2	Water quality - Pesticide pollution
	Landscape	28	Landscape - state and diversity

In the DPSIR, the components are:

- Driving Force - human activities, processes and patterns that impact on sustainable development

-State - the "state" of sustainable development
-Response - policy options and other responses to changes in sustainable development

The potential application of agri-environmental indicators for assessing progress in the integration of environmental concerns into the CAP is more limited. This limitation is due to the complex links between policy measures, changes in farming practices and environmental improvements, and other numerous other intervening factors.

Agri-environmental indicators (AEIs) can make a valuable contribution to policy evaluation, but they have to be supplemented, on a case-by-case basis, by additional policy-relevant information. With the help of agri-environmental indicators it is possible to show developments over time and to provide quantitative information.

Still a number of limitations need to be overcome to arrive at a fully operational set of agri-environmental indicators. Further work is needed with respect to:

-conceptual and methodological improvement,
-deficiencies in the data sets,
-extension of the system of indicators among all Member States.

However, the level of development of these indicators differs. Some are already operational, their concepts and measurement are well-defined and data are available at national and, where appropriate, at regional level. Other indicators are well-defined but they lack regional or harmonised data or their modelling approaches are weak. There are also indicators that still need substantial improvements in order to become fully operational. Therefore, not all indicators can be disseminated for the time being.

RESULTS AND DISCUSSIONS

Indicators are a key-tool in agri-environmental reporting by offering a broad picture of the complex agri-environmental relationships and facilitating the communication of the research results. Initially many approaches to describing the environment were limited to information

describing environmental quality and quality change, in terms of pollutant load or some other biochemical or biophysical indicator. By providing a meaningful contribution to agri-environmental reporting they contribute to the following objectives:

- Simplified description of a complex reality
- Better communication with non-specialist
- Analysis of environmental trends in longer time series
- Building a common basis for discussions and
- Identifying priorities in political decision making.

The DPSIR framework is a useful analytical framework for developing an overall picture of the environmental circumstances and particularly helpful for explaining agri-environmental links. However, differences in data reliability and spatial resolution (precise spatial referencing of relevant data sets in a geographical information system) between indicators limit the possibilities for cross-referencing that is needed for a regional environmental analysis.

The analysis of the data requirements for calculating the AEIs has identified a total of 97 different types of data, of which 25 are related to area. Twenty types of data can be obtained from the Farm Structure Survey (FSS) and 12 from the Survey on Agricultural Production Methods (SAPM). The relatively high number of data available from SAPM indicates that the AEI data collection system could be improved considerably if SAPM were carried out at regular intervals rather than as a one-off survey. In addition to FSS and SAPM, 43 other different data sources have been identified. The results of the review are presented in uniform factsheets for each of the 28 AEIs. Finally, the 28 AEIs capture the main agri-environmental interactions. They are of extreme importance for the EU agri-environmental policy reporting, but the AEIs are not yet institutionalized in agri-environmental policy.

Environmental statistics collected and processed by the Romanian National Institute of Statistics is covering the following:

-Statistical data on investment and current expenditure on environmental protection, by activities of the national economy and by development regions, statistics on environmental factors, by types of producers of environmental services;

-Statistical data on the volume of collected wastewater, statistical data on the capacity of treatment spaces, statistical data on the volume and quality of treated wastewater and the quality of the discharged water;

-Statistical data on industrial waste generated, recovered and disposed, by economic activities and development regions, statistical data on the amount of municipal waste collected, recycled and disposed, at national level and by region, statistical data on the composition of municipal waste, statistical data on the number of special facilities for composting, thermic treatment and waste disposal, by economic activities and development regions.

There are many challenges ahead in terms of improving data sets, spatial referencing and insure the timely delivery of indicators to policy makers. The farm typology approach could be further explored as a means to relate indicators to different sectors of agricultural production and to integrate this information with other indicators. This would facilitate the interpretation of indicator results and may allow decision makers to focus on particular farm types.

CONCLUSIONS

Indicators are selected to provide information about the functioning of a specific system, for a specific purpose - to support decision making and management. An indicator quantifies and aggregates data that can be measured and monitored to determine whether change is taking place. But in order to understand the process of change, the indicator needs to help decision makers understand why change is taking place. For time-series to be useful for environmental analysis, they have to be comparable through

years, For instance the change in unit of observation and land use categories starting with carrying out the Farm Structure Surveys data collection in Romania since 2002 has diminished the comparability of 1990 and years after 2002 data. It would make data series analysis much easier if data prior to the change in statistical system could be adapted to the new definitions and methodologies.

Geo-referenced statistical farm registers are a good tool for further work, as attributes relevant to rural development issues and environmental analysis, such as information on production methods, started to be collected since the 2010 Farm Structure Survey.

Administrative data sets can fill important gaps, but efforts should be done to improve such data sets in line with statistical and geo-referencing principles to obtain more added value. However, administrative data are by their nature not as stable as official statistical data sets.

Incorporating the Common Agricultural Policy requirements within the Romanian agriculture development programs, according to the sustainable development principles should be complemented by a comprehensive quantitative and qualitative evaluation of the phases crossed, so that to enable monitoring and analysis of development process of agriculture.

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