

# **Application of agri-environmental indicators in Portugal**

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## **Executive Summary**

Agriculture, by relying on natural resources and biological processes, has a wide range of complex relations with the environment. Agricultural policies are one of the main driving forces in agricultural change and in the environmental performance of agriculture.

The goal of sustainability adopted in the multilateral agreements of the 1992 United Nations Conference on Environment and Development (UNCED), by linking development to the environment, was one of the important driving forces in the need to monitor and evaluate the way policies implement this strategic goal. Integration of environmental concerns in sectoral policies became one of the main principles of environmental policy since then, leading to the need of developing a systematic monitoring and evaluation system based on indicators. Different international organizations have been developing work on this issue, among which the OECD played an important leading role with respect to agri-environmental indicators.

Agricultural policy integration of environment considerations in Portugal takes place in the context of the European process, namely with respect to the Common Agricultural Policy. Agri-environmental indicators are being developed at national level on the base of intergovernmental working groups integrating departments from the agricultural, environmental and statistical sectors. Such indicators are being used in policy design, monitoring and evaluation. Several cases of use of agri-environmental indicators as a policy tool are described, with special relevance for the design of the present Rural Development Program (PRODER). The conclusions on the national experience are presented for consideration within further work on this issue.

## 1. Introduction: Background, scope, objectives

Agriculture has a large range of complex relations with the environment, relying on natural resources and biological processes for its activity. Agricultural policies are one of the main driving forces for agriculture change and its environmental performance.

Monitoring the environmental performance of agriculture and evaluating the effects of agricultural policies on the environment are essential for the integration of sustainable goals on sectoral activity. The development of agri-environmental indicators has been taking place for several years within international and national organizations within an on-going process whose outcome is increasingly important. The conclusions on the experience so far in using agri-environmental indicators are the purpose of this document for consideration within further work on this issue at different levels.

## 2. National development of agri-environmental indicators

The introduction of the concept of sustainability in the multilateral agreements of the 1992 United Nations Conference on Environment and Development (UNCED), by linking development to environment was one of the important driving forces in the need to monitor and evaluate the way policies implemented this strategic goal.

Integration of environmental concerns on sectoral policies became one of the main principles of environmental policy since then as a way to promote co-responsibility among the main actors for economic development including agriculture.

At the European Union level this evolution launched a process that mainly started with the decisions on integration taken by the European heads of state and government in 1998, at the Cardiff European Council, followed in 2001 by the adoption of the EU Sustainable Development Strategy at the Gothenburg Council. An exercise of evaluation of the integration of environment and sustainable development in the sectoral policies was carried out leading to the decisions on developing indicators to answer this new policy requirement. With respect to agri-environment indicators, the IRENA project carried out by the European Environment Agency was the base for the present set of indicators that are being developed by Eurostat.

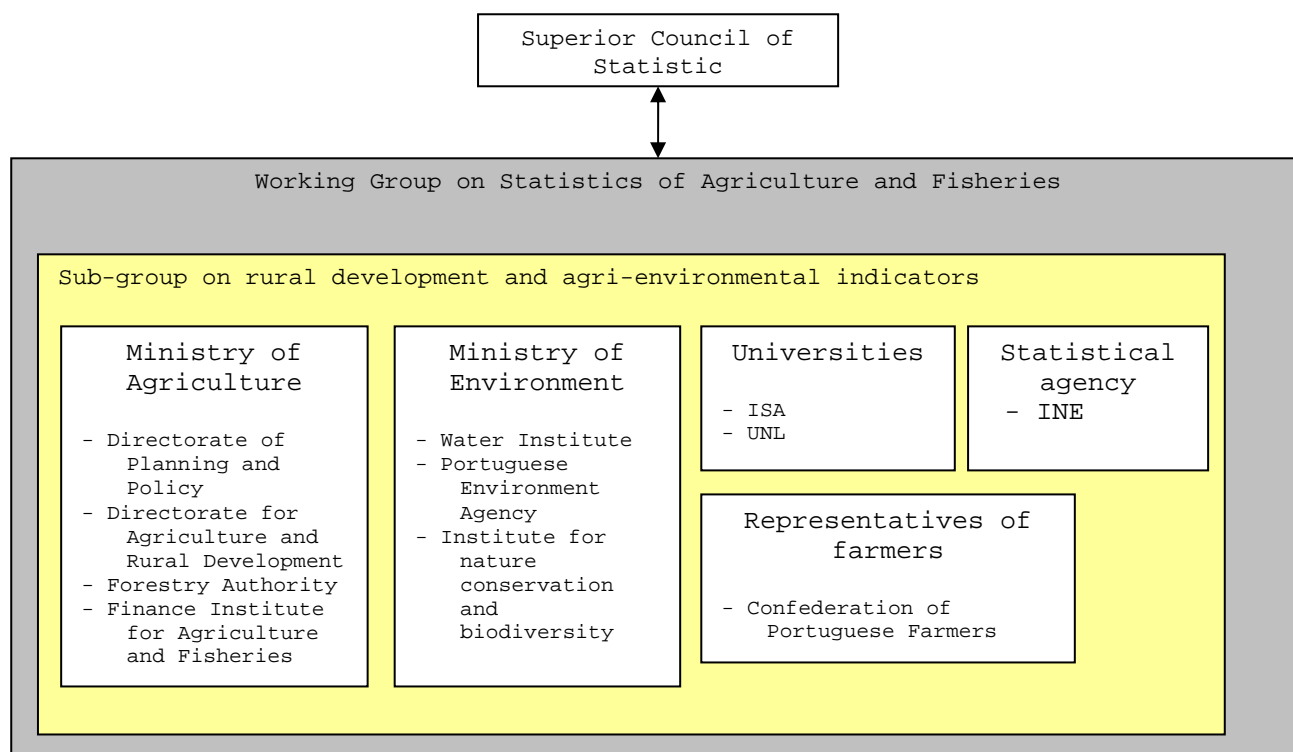
A substantial leading work in this subject was carried out by OECD through its Joint Working Party on Agriculture and Environment representing a huge contribution to the process of agri-environment indicators development. The development of a solid conceptual and methodological basis to support the analysis of agri-environmental linkages and the identification of a set of indicators with consistent definitions and methods of measurement among Member countries to assist policy makers was incorporated on a number of publications ranging from the first report published in 1999, on concepts and framework, to the 2008 report on the environmental performance of agriculture in OECD countries since 1990.

Agriculture policy integration of environmental considerations in Portugal took place in the context of the European process, namely with respect to the Common Agricultural Policy.

A first exercise for the national development of agri-environmental indicators was made in 2000 in the context of the preparation of an agri-environmental plan of action by an inter-ministerial working group joining 10 technical departments of both ministries of agriculture and environment coordinated by the Environment Auditor of the Ministry of Agriculture, Rural Development and Fisheries. In the context of this working group a new report was prepared in 2002 under the coordination of GPPAA with the participation of the departments responsible for rural development, plant protection, agricultural research, irrigation, nature and biodiversity conservation, forestry and air and state of the environment, by analysing 38 indicators mainly related to agriculture but incorporating also forestry, because of the importance of this activity within Portuguese farms. An update of this report was produced in 2004 by the same institution.

In 2004, the National Superior Council of Statistics, responsible for orienting and coordinating the National Statistical System, created a structure for the development of agri-environmental and rural development indicators within the Working Group on Statistics of Agriculture and Fisheries, coordinated by the GPP of the Ministry of Agriculture, Rural Development and Fisheries and integrating public authorities, universities, environmental NGO and farmers representing 11 organisations. The activity of this working group contributed to the first publication by the National Institute of Statistics, in 2009, of a report on agri-environmental indicators.

**Figure 1: Statistical Organisation Chart for the development of agri-environmental indicators**



### 3. Agri-environmental indicators as a policy tool

#### 3.1 Examples on the use of AEI

##### Reports on the state of the environment

According to the national Environment Framework Law, approved in 1987, a report on the state of the environment must be delivered by the government when presenting the Planning Options for each year.

Starting in 1987, these documents are an important instrument of support for the definition, monitoring and evaluation of the environmental policy, as well as for the communication of the country environmental performance.

Having began by long and "academic" descriptive reports on the state and trends of the environment, pressures and policy responses, their structure has evolved along the years in line with the evolution that took place internationally and in the EU in order to become more synthetic and focused documents and include specific relevant subjects like climate change or renewable energy.

Following the main international trends they started in the last decade to analyse the environmental integration in the different sectors of economic activity, identifying objectives and targets in line with the growing concerns regarding sustainable development. This change from 1998 onwards was accompanied by the use of indicators that improved the efficacy of the reports and their communication, being the base of their structure.

The incorporation of agri-environmental indicators was gradual and had different objectives: to evaluate the pressures and impacts on the environment as well as the level of environment integration on the sectoral policies.

The set of indicators used followed the evolution of the environmental concerns with respect to agricultural activity, responding to the new relevant needs of evaluation as organic farming, the biotechnological risks associated with the use of GMO or the agricultural area under certified production systems.

Given its importance as a natural resource and its spatial occupation Forestry is also incorporated. Its analysis described the different relationships of this activity with Portuguese farms, namely regarding the particular agro forestry system called "montado".

Indicator selection for the reports as well as data collection is made on the basis of a close and permanent collaboration between the ministries of environment and agriculture, presently through the technical department of the environment responsible for the publication of the reports, APA, and the planning department of agriculture, GPP.

**Table 1. Agri-environmental indicators in the State of the Environment Reports**

<b>Indicators</b>	<b>1998</b>	<b>1999</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>
Agricultural sectoral analysis	x	x				x				x
Sectoral eco-efficiency				x	x	x	x	x	x	x
Fertilizers use	x	x		x		x				x
N Balance										x
Pesticide use	x	x		x		x				x
N° of pesticide substances				x						
CO2 eq emissions			x	x	x	x	x	x	x	x
CH4 emissions	x	x				x	x			
N2O emissions	x	x				x	x			
NH3 emissions	x	x	x	x		x	x			x
Energy consumption	x	x	x	x	x	x				x
Land use	x	x	x		x	x	x			x
Irrigated area	x	x				x				
Soil characteristics		x								
Erosion		x								
Convention on desertification	x	x			x	x				
Nitrate vulnerable areas		x				x				x
Water use in irrigation schemes		x	x			x				x
Source of water use						x				
Water quality			x	x		x	x	x	x	x
Soil contamination						x				
Agricultural production		x				x				x
Animal pressure										x
Support to requalification		x								
Support under CAP		x								
Agro-environmental measures						x				
Local species and breeds		x								x
Forest use	x	x	x		x	x	x		x	x
Forest fires	x	x			x		x	x	x	x
Burned area	x	x			x		x	x	x	x
Burned area in protected areas	x	x				x	x	x		x
Forest production	x	x	x							
Use of forest resources			x							
Protected areas forest use	x	x								
Forest use under protected areas	x									
Protected areas land use					x	x				
Investment fire prev/combat		x								
Common birds in farmland									x	
Rural tourism overnights				x	x					x
Organic farming		x			x	x	x	x		x
Certified agricultural land									x	x
Biotechnological risks - GMO						x			x	x
Waste										x
Landscape		x								

## National Action Programme to Combat Desertification

The United Nations Conference on Environment and Development (UNCED), which was held in Rio de Janeiro in 1992, recognized the need for action to tackle the growing problem of land degradation in arid, semi-arid and dry sub-humid areas, launching the process for the negotiation of the multilateral agreement on this subject that was adopted in Paris on 17 June 1994 and entered into force on 26 December 1996.

The objective of the United Nations Convention to Combat Desertification in Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa is defined on its article 2 by:

1. The objective of this Convention is to combat desertification and mitigate the effects of drought in countries experiencing serious drought and/or desertification, particularly in Africa, through effective action at all levels, supported by international cooperation and partnership arrangements, in the framework of an integrated approach which is consistent with Agenda 21, with a view to contributing to the achievement of sustainable development in affected areas.
2. Achieving this objective will involve long-term integrated strategies that focus simultaneously, in affected areas, on improved productivity of land, and the rehabilitation, conservation and sustainable management of land and water resources, leading to improved living conditions, in particular at the community level.

As one of the countries of the Northern Mediterranean Region, Portugal ratified the convention in 1994 taking into account the important area of the continental territory subject to semi-arid and dry sub-humid conditions with significant susceptibility to desertification.

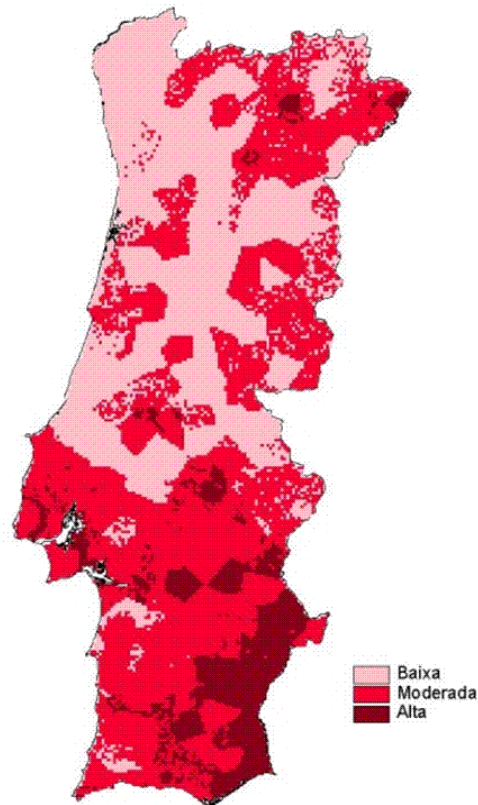
The Convention establishes the implementation of national action programmes as the central element of the strategy to combat desertification and mitigate the effects of drought, with the purpose to identify the factors contributing to desertification and the practical measures necessary to deal with it. Where appropriate, these programmes can be complemented by regional and sub regional programmes to harmonize, complement and increase the efficiency of national programmes.

Within the preparation process of the National Action Programme an indicator was developed to identify the spatial distribution of the degree of susceptibility to desertification throughout the Portuguese mainland. This indicator was based on three indices related to climate, soil loss and drought, respectively, using Geographic Information Systems, as shown in figure 2.

The spatial distribution of this indicator was taken into account since 2000 on the design of the policy measures considered relevant to face desertification problems under the five strategic objectives set on the National Action Programme: (1) soil and water conservation, (2) maintaining working people in rural areas, (3) recovery of affected areas, (4) research, experimentation and dissemination, (5) integration of desertification in development policy. Within rural development policy, this was the case of the higher incentive diffusion to the afforestation of agricultural land in the areas with moderate and high susceptibility to desertification in order to improve soil protection and the adoption

of a measure to promote no-tillage on annual crops to reduce soil erosion by water.

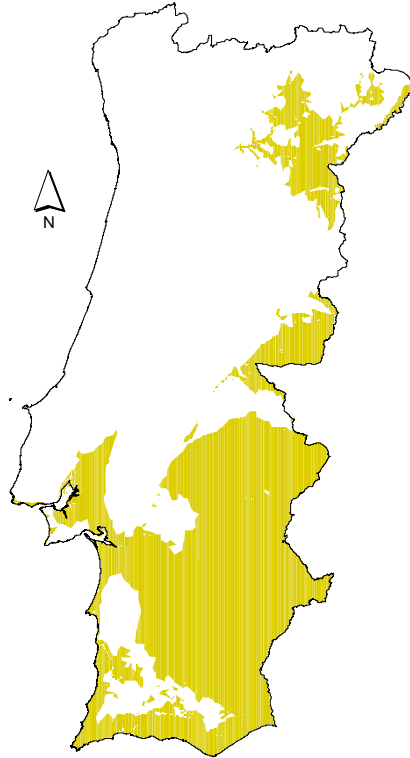
**Figure 2 - Susceptibility to desertification - initial mapping**



Source: INAG/PANCD 1998, in DGRF (2004)

Within the inter-regional cooperation established among the Annex IV - Northern Mediterranean countries of the Convention, a project to create a Desertification Information System for the Mediterranean (DISMED) was developed in 2001/2003, promoted by the Secretariat of the Convention. In this context, Portugal has made the refinement of this indicator for the mainland incorporating new geo-referenced information that became available in the meantime, by updating the mapping of susceptibility to desertification in Fig.3. It gives more accurate and useful information to support the design of policy measures which is being considered in the development of the criteria for the identification of priority areas needing specific support for rural development. The harmonization of the methodology also allows for comparing information between countries.

Figure 3 - Susceptibility to desertification



Source: AFN, 2009

### National Strategy of Sustainable Development

The National Strategy of Sustainable Development is another Portuguese policy instrument that uses agri-environmental indicators as a way of monitoring and evaluating.

This strategy follows the guiding principles of the European Strategy for Sustainable Development adopted in the European Council in Gothenburg in 2001 and revised in 2006, responding to the pointed out key objectives and challenges: "Climate change and clean energy", "Sustainable transport", "Sustainable Consumption and Production", "Conservation and management of natural resources", "Public health", "Social inclusion, demography and migration, "Poverty and global challenges sustainable development", not to mention policies such as education and training or research and development, as well as economic instruments and financing, which are also mentioned in the revised Strategy.

Seven macro objectives were defined at national level: "Prepare Portugal for the "Knowledge Society", "Sustainable Growth, Global Scale Competitiveness, and Energetic Efficiency", "Better Environment and Heritage Recovery", "More Equity, Equal Opportunities and Social Cohesion", "Better international connectivity of the country and a Balanced Valorisation of the territory", "An active role of Portugal in

European Integration and International Cooperation” and “A more efficient and modernized public administration”.

In order to evaluate the implementation of this strategy and its transversal impact in all sectors, a set of indicators was defined related to these objectives and to their correspondent strategic priorities. Some agri-environmental indicators are used to evaluate two important priorities of the third objective mentioned, “Better Environment and Heritage Recovery”: the priority named “Agricultural and forestry activities undertaken on a sustainable basis, and made compatible with nature conservation and enhancement of the landscape” and the one named “Nature conservation and biodiversity linked to sectoral policies and to combat desertification”.

**Figure 4- List of Agri-environmental Indicators used to monitor the implementation progress of the National Strategy of Sustainable Development**

Obj.	NSSD Priority	Agri-environmental indicator
3rd - Better Environment and Heritage Recovery	Agricultural and forestry activities undertaken on a sustainable basis, and made compatible with nature conservation and enhancement of the landscape	Changes of land use - forests, arable land, urban
		Consumption of Pesticides
		Certified Agricultural production (% of AAU)
		Forest area integrated in Forestry Intervention Areas (% of total forested areas)
		Area of land affected by desertification
	Nature conservation and biodiversity linked to sectoral policies and to combat desertification	Population trends of farmland birds
		Rural Tourism (% of the total housing)

### Rural Development Policies

In the European Common Agricultural Policy it was earmarked a budget of almost 90 billion Euros under the European Agriculture Fund for Rural Development (EAFRD) for the support of rural development policies in the present programming period (2007-2013.)

For this programming framework it is envisaged to adopt a simpler, more strategic and coherent rural development policy within the EU as a whole than in previous programmes.

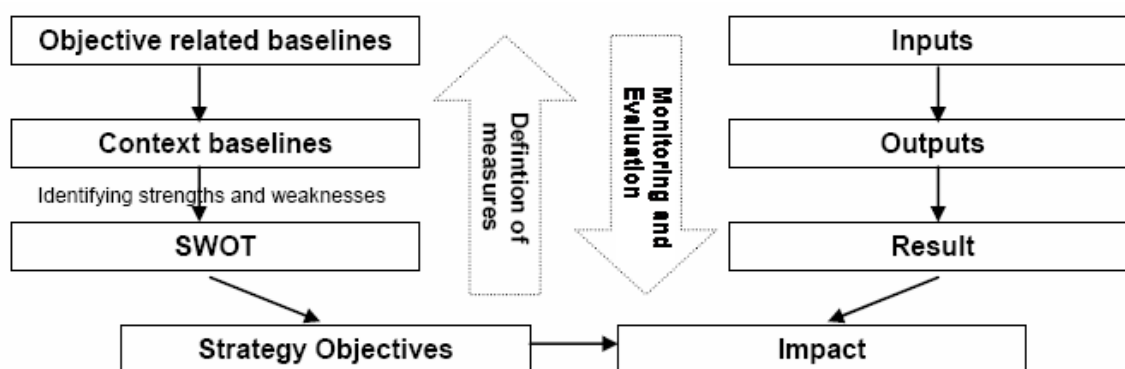
This logic stems from the concern to ensure greater accountability on the definition and implementation of rural development policies, leading to a progressive increase in the role of monitoring and evaluation.

The explicit definition of objectives at various levels also increases the need for clear and solid evaluation systems. For this reason, the functions of analysis and evaluation, both in defining the strategy and in its implementation through the programmes, are

significantly increased. For this purpose a common framework was created for monitoring and evaluating all rural development interventions under the CAP. This common framework has as its main tool a system of indicators common to all Member States that are used to support the programming approach, by following a series of steps (Fig 5):

- Baseline indicators are used to develop a SWOT analysis as the basis to define strategy objectives.
- Impact indicators are defined in order to evaluate the benefits of the programme beyond its immediate effects on direct beneficiaries.
- Measures are defined in the light of this strategy and the rural regulation framework.
- For each measure, financial input, output and result indicators are established.

**Figure 5 - Rural Development Programming Steps**



Source: GPP adapted from DGAGRI (2006)

Improving the environment and the countryside through farm and forest land management is one of the three core objectives of the rural development policy. In this context, agri-environmental indicators have an important role either in the initial task of defining the strategy or in monitoring and evaluating the impacts of this policy and the results of the different policy measures.




A large set of agri-environmental indicators was used to design the national strategy for rural development, by evaluating the environmental performance of agriculture on the basis of a SWOT analysis. For this purpose, it was necessary to extend the EU common set of indicators to additional national ones in order to cover all the important issues identified within the specific conditions present in the mainland, as it is the case for desertification problems or local breeds and crop varieties at risk of farming abandonment.

**Figure 6- Baseline Agri-environmental indicators used in designing national rural development strategy**

code		Common Baseline Objective Related	Development Portugal
B17*		Trends of index of population of farmland birds (2000 = 100)	
B18*		High Nature Value farmland and forestry (ha of UAA)	
B19		Area of forest by forest type (% of total FOWL)	
B20*		Water quality: Gross nutrient balances (kg/ha)	
B21		Water quality : pollution by nitrates and pesticides	
B22		Areas at risk of soil erosion (tons/ha)	
B23		Organic farming (ha)	
B24*		Climate change : Production of renewable energy	
B25		Climate change : UAA for renewable energy and biomass crops (ha)	
B26		Climate change/air quality : gas emissions from agriculture	
code		Common Baseline Context	Development Portugal
BC7		Land cover	
BC8		Less favoured areas	
BC9		Areas of extensive agriculture (% of UAA)	
BC10		Natura 2000 area	
BC11		Biodiversity, Protected forest, Protection of Landscapes and Special Natural Elements"	
BC12		Average annual increase of forest and other wooded land areas (Ha/year)	
BC13		Forest ecosystem health (% of trees in defoliation classes 2-4)	
BC14		% territory designated as Nitrate Vulnerable Zone	
BC15		% irrigated UAA	
BC16		Protective forests concerning primarily soil and water (% of forest area)	
		National Agri-environmental Indicators	Development Portugal
		Risk of Abandonment and Marginalization	
		Land use change	
		Livestock waste	
		Local breeds and crop varieties at risk	
		Area with moderate or high risk of erosion	
		UAA low in organic matter	
		Average annual area burned	
		Source of irrigation water	
		Susceptibility to desertification	

\* Mandatory

Legend:

	Stabilized
	Needs improvement
	Under development

The set of strengths and weaknesses, in Figure 7, were identified in the baseline analysis regarding each environmental issue considering the trend verified for the specific indicators on the previous period.

Subsequently, based on the strengths/weaknesses identified and complementary information, it was defined the set of needs/critical success factors and opportunities for rural development that could be anticipated at the time, related with Environmental and Land Management. As summarized in fig. 8 for the different critical success factors, the measure or measures were designed that could contribute to

their resolution, respecting the supporting framework established by the EU Regulation 1698/2005.

**Figure 7 - Example from the SWOT analysis for the Rural Development Program - strengths and weaknesses**

ENVIRONMENT AND MANAGEMENT OF THE RURAL AREA (AREAS)	Strengths	Weaknesses
Risk of Abandonment and Marginalization		Risk of marginalization in large areas by the fragility of economic systems and increasing trend. Strong natural limitations in certain areas.
Biodiversity and Countryside	Extensive production systems in significant areas. Agricultural and forestry systems of high natural value in large areas. Natural heritage, with significant biodiversity value. Sectoral Plan for Natura in an advanced stage of preparation.  Important landscape value crops, such as vines, olives, orchard or forest species such as chestnut or mounted in some areas of the country	Reduction in areas of permanent crops.  Increase artificialised territories and loss of agricultural areas.
Water	Gross nutrient balance, a low value. National Strategy for the livestock effluents in an advanced stage of preparation. Increasing adoption of irrigation systems more efficient use of water and nutrients. Decreased pressure on underground water resources. In operationalizing the National Plan for the Efficient Use of Water. Existence of economic-financial regime and a regime of water use. Option growing crops requiring less irrigation.	Poor management of agricultural and livestock waste. Existence of areas with high levels of nitrates.  Low levels of irrigation efficiency.
Soil	Marked tendency towards the use of good agricultural practices. Technological developments for precision agriculture to more intensive farming systems. Vast area of forest protective function. Low levels of use of fertilizers and pesticides. Increasing use of modes of production with less environmental impact.	High risk of soil erosion and desertification.  Low content of organic matter in soils. Increase of artificialised territories and loss of agricultural areas.
Climate change and air	Existence of agroforestry systems and extensive systems with potential for carbon sequestration. High potential of biomass for energy use  Positive trend of eco-efficiency.	Size and structure of ownership adverse agro-forestry for energy recovery in production Lack of adequate supply chains priate for the production of bioenergy Low investment in the bioenergy sector in R & D
Forestry	Existence of stands of high environmental value. The National Defense Forest Fire in an advanced stage of preparation. National Strategy for Forests in advanced stage of preparation. Existence of forest in large areas of territory.	Large forest areas at risk of fire. Forest management stages. Vast areas burned annually. Mismatch between forest species and territory.
Eco-efficiency	Positive overall eco-efficiency	

The agri-environmental indicators then available for the analysis were an important tool to support the decision on the policy measures to be adopted. Among the examples that can be described, four cases of indicators that were analysed and gave rise to a set of critical success factors considered relevant in this context are mentioned below.

The first is the indicator on the risk of marginalization and abandonment of agricultural land (IRENA methodology) that showed a high level for large farmland areas. This situation was considered as an important weakness having a huge negative impact on ecosystems depending on agriculture. For this reason, the need was identified of a strong support to farming activities in mountain areas and of

supporting and promoting the attractiveness of farming activity for young people.

**Figure 8 - Example of strategy and measures definition for the Rural Development Programme**

NEEDS	RURAL DEVELOPMENT POTENTIAL	EAFRD & NATIONAL OBJECTIVES	SPECIFIC OBJECTIVES	MEASURES/ ACTIONS
Compensation to producers for natural handicaps Agricultural activity more attractive to young people Sustain farm holdings in less-favoured areas Sustain nature and landscape values Sustain agricultural systems in Natura Framework areas Increase the number of local and regional breads and species Correct effluent related environmental problems Encourage a more efficient use of water Act from a land use planning perspective Guide producers towards a good use of natural resources Develop ways of adding value to products associated with production methods with less environmental Valorise agricultural and forest by-products through bioenergy production Reduce fire risks by reducing the fuel load Increase preventive action against fire Decrease GHG emissions Act primarily in areas associated with natural disaster risks Promote joint initiative and management in interventions	Increasing demand of leisure products and activities associated to the environment and rural landscapes Valorise holm oak and cork-oak plantations Agricultural landscape as UNESCO's world heritage Importance given to the sustainability of natural resources Valorise territories and products, by qualifying soil and water resources Need to fulfil the Kyoto agreements Increasing valorisation of renewable energies Increasing valorisation of the forestry multifunctional role	<b>Promoting the sustainability of the countryside and natural resources</b>	Preserving agricultural activity in less-favoured areas Encouraging the introduction or maintenance of production methods compatible with the protection of environmental values, and of water and soil within the framework of agricultural and forestry activity Improving the sustainability of forest stands Promoting the protection of biodiversity and high nature and landscape value systems associated with agricultural and forestry systems	2.1 Maintaining agricultural activity in less-favoured areas ACTION 2.1.1 – Maintaining agricultural activity outside the Natura Network ACTION 2.1.2 – Maintaining agricultural activity within the Natura Network 2.2 Valorisation of production methods ACTION 2.2.1 – Changes in agricultural production methods ACTION 2.2.2 – Protection of domestic biodiversity ACTION 2.2.3 – Conservation and improvement of genetic resources ACTION 2.2.4 – Soil Conservation 2.3 Forestry and agroforestry management ACTION 2.3.1 – Risk minimisation ACTION 2.3.2 – Forest stand planning and recovery ACTION 2.3.3 – Environmental valorisation of forest areas 2.4 Integrated territorial interventions

Another example that can be mentioned is the evaluation of the high level of susceptibility to desertification in a large part of the agricultural land. This conclusion leads to identify the need to guide producers towards the good use of natural resources and to measures on soil conservation and on forestry and agro forestry management.

The indicator on the area covered by the Natura 2000 network and those on its agricultural and forest land use showed the importance of these ecosystems to support the conservation of natural values. Targeted measures were designed in an integrated way for these areas to

promote the maintenance of agricultural and forest systems relevant for the protection of biodiversity.

Finally, the evaluation on the agri-environmental indicator on the number of local breeds and crop varieties, essential to maintain domestic biodiversity, showed the need to create a specific measure to promote the production systems based on them because of the high risk of being lost to farming as well as a measure to support the conservation of domestic genetic resources.

As already mentioned, this type of approach to agri-environmental policy design in the context of rural development programmes implies a greater need to monitor the trend of the indicators used to identify critical success factors. It also implies that the indicators selected for the monitoring and evaluation process are based in robust methodologies that allow a reliable assessment of policy outcomes.

### 3.2 Lessons learned and future needs

The framework under which the need for developing agri-environmental indicators was created may be foreseen as remaining valid or even being reinforced in the near future, leading to a greater importance of this outcome. Food security and climate change are two of the most important driving forces for the growing demand of agricultural production adapted to a new expected climatic pattern. The environmental sustainability of this evolution is a main challenge for agricultural policy, requiring monitoring of the complex impacts on natural resources and evaluation of the effectiveness of the measures undertaken.

In this context, the development of agri-environmental indicators will continue to be an on-going process, requiring substantial work on the methodological and data collection issues, while new areas for consideration will certainly appear.

Based on the national experience on using agri-environmental indicators a number of considerations can be drawn that are of importance to guide the work to be done at different levels.

The OECD set of indicators for which the methodological aspects are stabilized can only provide part of the overall picture on the future trend of the pressures of agriculture on the environment and of the responses at national level. Some important issues to fulfil the overall agri-environmental picture are still insufficiently covered as it is the case for soil and biodiversity. On the other hand, for comparability purposes between countries these indicators still need improvements in order to harmonize elements to be taken in account in calculations or in the methodology to collect data, as for example the type of products accounted as pesticides or the way to estimate water use in agriculture.

Measurability remains a major problem on indicator development, as the cost of data collection is substantial, requiring a permanent assessment of the cost-efficiency of the refinement of the indicators to tackle more detailed or local specific aspects. The indicators in use rely mostly on data already collected and available for other purposes rather than in new one obtained for agri-environmental purposes. Strategies must be developed to overcome this limitation.

When the variability of conditions throughout the country is important, the information at national level is insufficient to identify the differences in trends and the needs for policy action, requiring the regionalization of the indicators at the proper level. The case for the nitrogen balance is an example of how the national level can reveal a positive trend of reduction from a low absolute value, while local problems of water pollution with agricultural nitrates arise.

Specific national conditions require the development of particular indicators to complete the overall agri-environmental analysis, such as landscape and desertification in the national conditions.

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#### Acronyms

- APA - Agência Portuguesa de Ambiente/ Portuguese National Environment Agency
- GPP - Gabinete de Planeamento e Políticas/Directorate of Policy and Planning
- GPPAA - Gabinete de Planeamento e Política Agro-Alimentar/Directorate of Agri-food Planning and Policy
- INE - Instituto Nacional de Estatística/National Statistic Institute
- ISA - Instituto Superior de Agronomia/Superior Institute of Agronomy
- UNL - Universidade Nova de Lisboa