CHAPTER 7. THE EVALUATION OF AGRI-ENVIRONMENTAL MEASURES: A SURVEY OF DIFFERENT METHODS USED BY ITALIAN REGIONS

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Abstract

Agri-environmental measures have been developed in Italy by the 21 regional authorities.[2] *These schemes offer farmers voluntary, multi-annual contracts where they are paid for delivering environmental goods and services which go beyond the "reference level" of good agricultural. Three measures account for 89% of total expenditure: integrated production, organic production, and active management of pastures and meadows. This paper analyses the evolution of agri-environmental measure evaluation since they began in 1994, considering the socio-economic, agricultural and environmental impacts. The paper concludes that the crucial point, whatever the methodology used to evaluate the socio-economic, agricultural or environmental impacts, is the availability of reference data and a local level monitoring system. The setting up of a detailed geographic information system is a precondition for the impact evaluation of any environmental policy. The Italian experience demonstrates that an indirect analysis of the environmental impact based on contextual indicators, administrative data and scientific data coming from literature or specific research, can provide good results at relative lower cost. The survey also shows that good evaluation results can be reached by combining different methods and different criteria (e.g. economic, social and environmental). Considering the costs and the analytical skills required the combination of state and pressure indicators seems to be a good alternative to the estimation of impact indicators in the case of large scale programmes.*

Introduction

Agri-environment measures (AEM) in the EU offer farmers voluntary, multi-annual contracts where they are paid for delivering environmental goods and services which go beyond the "reference level" of good agricultural practice in the country or region concerned. The earliest such schemes were established in the 1980s and first received European Community co-financing under Regulation 797/85, as part of EAGGF guidance funds for structural measures. As part of the 1992 MacSharry reforms (Regulation 2078/92), the schemes were made accompanying measures to the CAP, co-financed through the European Agricultural Guidance and Guarantee Fund (EAGGF) and compulsory for all member states. Under Agenda 2000, they were integrated within the broader framework of the Rural Development Regulation (RDR) 1257/1999, but their compulsory nature and their purpose and scope remained relatively unchanged from the 1992 situation. Co-financing rates for

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2. The phrase "agri-environmental measures" in this paper generally refers to payments provided to farmers for undertaking certain specified activities beneficial to the environment.

AEM are 75% in Objective 1 areas and 50% elsewhere. In Italy, application potentially covers nearly all farmed land. Currently, around 2.2 million hectares in Italy are enrolled in AEM, accounting for nearly 17% of UAA. In 2002, EUR 607 million was spent for financing AEM in Italy.

AEM have been developed by the 21 regional authorities in Italy ("Region"), which were given competence for agricultural policy at about the same time as AEM developed. In general each programme comprises a selection of the measures listed in the RDR applied throughout a Region. In most cases a Region is subdivided for the purposes of varying premia levels. In order to target the application of measures to specific environmental zones, priority is given in some Regions to areas selected according to the Habitat or Bird EC Directive or the Nitrate Directive, as well as to mountain areas. In Piemonte, areas that are vulnerable with respect to pesticides and desertification have been selected and priority has been accorded to them.

The several actions proposed in the RDR can be classified into the following categories: low impact production systems such as integrated production and organic agriculture; agronomic techniques for soil and water conservation; agronomic techniques for extensive forage production; agronomic techniques for biodiversity maintenance; and productive practices for landscape care and conservation. Three AEM account for 89% of total expenditure: integrated production, organic production, and active management of pastures and meadows. Other measures are extensive crop production including reducing output by reducing irrigation; extensive livestock production; other environmental farming practices such as maintenance of hedges, cultivation of rare species of plant and rearing of animals in danger of extinction; upkeep of abandoned land; long-term set aside of farmland in protected areas or water catchment areas; and maintenance of footpaths to encourage public access. Priority has been assigned to farms that apply together through a common project in order to reach a higher concentration of the intervention at space level, increasing its efficacy.

The amount of premia is a function of the foregone income, increased costs and a financial incentive that cannot be higher than the 20% of the two previous elements. Maximum amounts per hectare are fixed in the regulation.

The evaluation process

The evolution of AEM evaluation has followed the two main steps in the application represented by Regulations 2078/92 and 1257/99.

In the first period, the legal basis for evaluation was provided by Article 2 of Financial Regulation 2335/95, requiring that budget appropriations must be used in accordance with the principles of sound management, and in particular those of efficiency, economy and effectiveness, and by Article 16 of Implementing Regulation 746/96. Further guidance was provided by the STAR Committee and a definition for agri-environment evaluations was set out in Working Document VI/3872/97 on the state of application up to 1997.

Table 1 illustrates the organisation of the evaluation process by each region in the first period. It shows the leading role of public research bodies and universities, which kind of effects have been evaluated and how.

At this stage, most evaluations were carried out by universities or public research institutes. In general, evaluation was a new experience, motivated by the lead given by the European Commission. Given that most AEM were only launched with farmers in 1995 or 1996, it was far too early to reach many conclusions on the impact, particularly the environmental impact, of programmes. However, Regions made an effort to evaluate their programmes and in some cases, evaluation, born as a mere administrative obligation, become a management tool with which to improve the application of the policy. A common problem encountered was the general lack of reference and monitoring data. Strong differences in evaluation methodology can also be noted.

Table 1. Regional evaluation reports of Reg. 2078/92 CE application by data and methodology adopted

Region	Evaluator	Socio-economic Impact	Agricultural Impact	Environmental Impact
Piemonte	INEA* /IPLA	FADN + Interviews	*Ad hoc* sample Interviews	n.a.
Valle d'Aosta	INEA / Univ. Turin	FADN + Interviews	FADN + Interviews	n.a.
Lombardia	Universities (Milan and Pavia)	*Ad hoc* sample Interviews	*Ad hoc* sample Interviews	Soil map biodiversity survey
Bolzano	INEA	Dati RICA		Descriptive analysis
Trento	INEA	Dati RICA		n.a.
Veneto	Region - Univ. Padua	n.a.	n.a.	Simulation on fertiliser and pesticides release
Friuli Ven. G.	Univ. Udine	*Ad hoc* sample	*Ad hoc* sample	energetic Balance Simulation on fertiliser release phitopatologic investigation
Liguria	INEA	FADN	*Ad hoc* sample Interviews	Descriptive analysis
Emilia Romagna	Region + Research Bodies	n.a.	*Ad hoc* sample	Research on chemicals and biodiversity
Toscana	Region + Univ. Pisa + INEA	FADN	FADN + experimental data	Descriptive analysis
Umbria	Univ. Perugia	n.a.	n.a.	Simulation on fertiliser and pesticides release
Marche	Univ. Ancona	FAD N	Sample	Water quality
Lazio	INEA	FADN	Data from literature	Simulation on fertiliser release soil erosion Input-Output balance
Abruzzo	INEA	FADN + *ad hoc* sample	*Ad hoc* sample	GIS
Molise	Consultant	*Ad hoc* sample	*Ad hoc* sample Interviews	n.a.
Campania	Consultant	*Ad hoc* sample	*Ad hoc* sample	n.a
Puglia	INEA	FADN	Sample Data from literature	Energetic Balance Simulation on fertiliser release
Basilicata	INEA	FADN	FADN Literature Interviews	Interviews
Calabria	INEA	FADN	n.a.	GIS
Sicilia	Region	Literature	n.a.	Descriptive analysis
Sardegna	INEA	FADN	n.a.	Descriptive analysis

Note:
* INEA = National Institute of Agricultural Economics.

The lack of a harmonised approach gave rise to difficulties of comparison not only at single country level but particularly at EU level. This induced the Commission to establish a common questionnaire and indicators in the second phase.

At present, evaluation reports have been provided in the context of the mid-term review. Following the common strategy proposed by the Commission, a monitoring and evaluation strategy has been designed in the programmes.

In this regard, Regions have set up a ***monitoring system*** considering financial and physical indicators such as:

- Number and kind of measures.
- Number of applications received from farmers.
- Number of farms enrolled in the programme.
- Agricultural area or number of animal heads enrolled.
- Data about utilised inputs.
- Total expenditure and average premia per hectare, animal head or farm.

Some Regions have defined result indicators such as:

- Use of chemicals.
- Nitrogen in soil.
- Erosion.
- Water use.
- Production with low-impact technologies.
- Number and diffusion of landscape features.
- Biodiversity indicators such as number and richness of species.

Reports available at this time, entitled as "intermediate (or mid-term) evaluation reports" try to respond to the common questionnaire set up by the European Commission. In comparison to the first period evaluation reports discussed above, it is observed that all Regions, through a tender process, have chosen their own evaluator that, in many case, is a private consultant company. In general not much effort has been devoted to the construction of databases containing reference data or to the monitoring of environmental impacts. Evaluation reports mainly analyse administrative data such as budget expenditure and hectares enrolled in order to assess the achievement of the objectives of the programme.

Evaluation of the socio-economic impact

The ***socio-economic impact*** at farm level has been evaluated by comparing samples of homogenous farms (with similar size, type of farming and agri-environmental conditions) which apply or do not apply the AEM. This has allowed the effects of the programme to be disentangled with respect to other factors. FADN (EU Farm accounting Data Network) data has been utilised in most cases, with *ad hoc* samples in others. One important data series available in FADN is the price of products: for AEM for integrated or organic farming it allows one to evaluate if the change towards more ecological technology is appreciated by consumers.

The socio-economic impact has been evaluated for almost all the programmes using variables such as productivity indexes, production costs analysis and comparison on technologies, as well as analysis on structural data like average farm size, labour units and farm localisation *i.e.* altitude. It has provided useful information about economic efficiency, sometimes showing over-payment in areas where the measures represent less effort on the part of the farmer and at other times showing under-payment in more profitable areas, with a correspondingly lower take up. As a result of the economic evaluation of AEM introduced under Regulation 2078/92 (*i.e.* the first period), per-hectare payments were better tuned for AEM established under the RDR with the objective of avoiding overcompensation.

Tables 2 to 4 represent some examples of comparison between farms enrolled in the organic agri-environmental programme and conventional farms. Similar results can be disaggregated by farm size or age of the farmer or other variables that might give interesting information on the application and potential of the programme.

In the second stage of the evaluation process, corresponding to the application of Regulation 1257/1999, the emphasis on economic impacts has been lost even though it had provided relevant information to administrators, allowing a better targeting of the programmes. This can be considered a mistake as the analysis of economic data can increase awareness about the effects of an AEM on revenues and structural changes at farm level, and therefore on the sustainability of the change in the methods of production besides the economic incentive provided by the agri-environmental payment itself.

Table 2. Structural data comparison between organic and conventional farms in Italy

Type of farm	UAA (ha)		UTL (units)		UAA/ULT (ha)	
	Organic	Conventional	Organic	Conventional	Organic	Conventional
Arable crops	46.0	25.7	1.9	1.5	23.8	17.3
Horticulture	5.3	2.3	2.2	2.1	2.4	1.1
Permanent tree crops	15.0	10.1	2.2	1.7	6.9	6.0
Herbivorous livestock	43.1	36.4	2.2	2.0	19.6	18.6
Granivorous livestock	6.9	10.6	1.9	2.0	3.7	5.2
Mixed crops	33.0	17.9	2.1	1.7	15.6	10.6
Mixed livestock	29.4	20.0	2.4	2.0	12.2	9.9
Crops/livestock	29.2	27.3	2.3	1.9	12.5	14.8
Total	33.1	22.4	2.2	1.8	15.2	12.8

Source: INEA, Le misure agroambientali in Italia, 1999.

Table 3. Comparison between organic and conventional farms

Type of farm	HP/ha		Irrigable land/UAA (ha)	
	Organic	Conventional	Organic	Conventional
Arable crops	5.0	3.0	38.8	44.4
Horticulture	16.0	24.0	57.4	77.1
Permanent tree crops	6.0	10.0	30.8	47.5
Herbivorous livestock	1.0	3.0	-	23.3
Granivorous livestock	12.0	12.0	-	54.2
Mixed crops	5.0	7.0	5.4	34.5
Mixed livestock	4.0	7.0	-	30.5
Crops/livestock	3.0	6.0	8.9	24.7
Total	3.0	5.0	10.0	33.5

Source: INEA, Le misure agroambientali in Italia, 1999.

Table 4. Comparison between organic and conventional farms economic data in Piemonte
(% change)

	Arable crops	Permanent fruit crops	Herbivorous livestock	Mixed crops	Mixed farms
			(%)		
Hectares	2	13	62	25	10
Animal units	-24	96	-11	-12	-11
Labour units	17	0	-25	-22	-25
Value of production	- 1	26	-14	-2	-28
Gross income	20	27	-12	16	-20
Net income	84	35	-7	69	-15
Variable costs	-33	24	-20	-30	-37
Fixed costs	-15	9	-20	-16	-25
Premiums	49	673	59	106	65

Source: INEA, Evaluation report for Regulation 2078/92 in Piemonte, 1999.

Evaluation of the impact on agriculture

The ***impact on agriculture*** is usually evaluated through the collection of farm level data. Some data are collected through FADN as in the economic evaluation: this is the case for yields (Table 5). Sometimes surveys are performed through interviews and questionnaires. These represent a useful method for collecting data, but there is a high risk that the data obtained are unreliable because of the bias determined by subjective views. Some evaluations utilise expert opinions. Experts are chosen on the basis of their qualifications, knowledge and experience in a given area.

These types of evaluations are frequent for measures such as integrated production or organic farming. Integrated production has had a wide application in Italy, accounting for about 40% of total agri-environmental expenditure. Application has been concentrated on perennial crops, such as vineyards, fruit orchards and olive groves. In Tuscany, a significant reduction in chemical use, both fertiliser and pesticides, is recorded on farms in the agri-environment programme (Table 6). Results are obtained by comparing farms in the FADN database that are part of the programme with control farms where measures are not applied. It also found that products with higher toxicity were substituted by less toxic products. Analysis of pesticide residues on fruit shows the absence of products with residues higher than threshold levels and a majority of samples with the total absence of residues — 60% for fruit and 80% for vegetables.

Table 5. Comparison between farms in the agri-environmental programme and conventional farms

Average yield from main crops (tonne/ha) in Tuscany

Crop	Farm in agri-environmental programme	Conventional farm	Total
Oats	2.39	3.46	3.21
Durum wheat	2.91	3.77	3.57
Tender wheat	3.42	4.46	4.04
Maize	5.96	8.38	7.50
Barley	3.67	3.31	3.42
Sunflower	1.25	2.01	1.86
Peaches	9.13	15.24	13.57
Wine grapes (DOC)	7.06	6.98	7.03
Wine grapes (common wine)	8.30	6.81	7.62
Olives for olive oil	1.41	1.52	1.44

Source: Region Tuscany, Evaluation Report.

Table 6. Use of main chemicals in FADN sample (kg) in Tuscany

Chemical	Crop in agri-environmental programme	Conventional farms
Methyl Bromide	0	7 952
Sulphur	11 083	2 730
Copper + sulphur	1 300	1 406
Copper sulphate	1 628	1 239
Copper Oxychlorides	1 476	373
Barium polysulphides	0	270
Dinocap	0	257
Benfuracarb	0	236
Copper Idroxydes	285	201
Cymoxanil + Mancozeb + Copper	602	201
Carbofuran	0	160
Mineral Oils	7	102
Myclobutanil	32	87
Methomyl	0	60
Chlorpyrifos-methyl + Cypermethrin	0	50
Triadimenol + Sulfur	317	37
Fenitrothion	44	29
Metalaxil + Mancozeb	217	28
Penconazole	43	9
Dodina	53	2

Source: Region Tuscany, Evaluation Report.

In some cases data about quantities and type of chemicals are collected through farm samples, allowing a comparison to be made between farms in the programme and conventional ones. Results showed a slight decrease in quantities especially for the more toxic products.

Similar results show a decrease in pesticide use in Emilia Romagna, varying from a minimum of 7% for vines up to 35% for apple orchards, 43% for pear orchards and 55% for peach orchards. Reduction in fertiliser use is estimated to be between 37% and 48%. The level of production is shown to be reasonably stable. Data for annual crops shows a decrease in pesticide use varying from 6% for maize to 38% for wheat and 37% for tomatoes. Fertiliser use has decreased by between 30% and 48%. Data on production shows higher yield losses for wheat and sunflower, mainly due to reduced fertilisation.

Evaluation of the impact on the environment

Environmental evaluation has been conducted with different methods, depending on the type of measure, the reference data available at the regional level, and the real interest of the regional administration in the evaluation results. A relevant problem in evaluating the environmental effectiveness of AEM is the fact that the regional programmes did not specify their objectives in quantitative terms with regard to the environmental output. Rather, the usual objective of an AEM concerns a change in farm level technology and consequently evaluations have mainly dealt with measuring this change. Nevertheless, there have been some cases in which the environmental impact has been estimated.

Reduction of chemicals in water and soils

In the case of AEM whose objective was the reduction in the use of chemical inputs, evaluation has sometimes been based on indicators of ***energy balance and/or chemical balance*** (nitrates, active ingredients). Results show a decline or negative balance for nitrate and active ingredients, while there is an increase or positive balance for energy use. Monitoring has been conducted on soil and water samples to test for nitrate, phosphate and active ingredients. Results show a positive trend towards target values.

Umbria is the only region where a ***simulation model*** has been utilised in order to evaluate the environmental impact of the programme. The *Planetor* model has been developed by the University of Minnesota and it is composed by several economic and environmental sub-models:

- The economic budget at farm level (with budgets by culture).
- The revised Universal Soil Loss Equation (RUSLE) for the erosion.
- The Nitrogen Leaching Equation (NLEAP).
- The Phosphorus Index for phosphorus leaching.
- The Ground Water Hazard Index (GWHI) for pesticides leaching risk.
- The Surface Water Hazard Index for pesticides in surface water risk.

The model requires several databases about plant physiology, soil typology, pesticides and fertilisers (number of treatments, concentration etc.), machinery, climate, input and output prices. The indicators that have been estimated by the model are:

- Erosion as tonnes of eroded soil per year as a function of soil type, climate, crop, technology.
- Surface Water Hazard Index (ranging between 1 and 2000).
- Pesticides leaching risk Surface Water Hazard Index.
- Nitrogen leaching expressed in Kg/ha and calculated on the basis of soil, climate, technology.
- Phosphorus run off ranging between 1 and 20 and calculated by pondering several factors that act on phosphorus run off.

Results have shown that considering an average reduction in nitrogen use of 55 kg/ha, nitrogen leaching has fallen by 23.8 kg/ha (Table 7).

In Piemonte, ***indicators of soil contamination*** have been used to evaluate the environmental effect of integrated production methods: farms in the programme have been compared with farm not in the programme but adopting the "good agricultural practice". The indicators are:

- The average load per unit of land ratio between the sum of all active principles administered and the relative agricultural area.
- The Environmental Impact Quotient developed by the New York State Integrated Pest Management Programme together with Cornell University scientists that measures the environmental impact of any active principle on the basis of its toxicity with respect to several factors.
- Macroelements in plant nutrition (N, P, K) that are responsible for water eutrophication.

The indicators have been calculated for the most representative crops in the Region. As they measure soil pollution, higher values indicate higher levels of pollution. Results are shown in the Tables 8 and 9.

Table 7. Reduction in nitrogen use and leaching

Farm size (ha)	Reduction in nitrogen use (kg)					
UAA	1995	1996	1997	1998	1999	Total
0-5	-1 178.6	-5 111.4	-8 721.1	-8 678.2	-182 920.7	-206 610.0
5-10	-2 703.7	-14 242.1	-16 191.3	-15 023.4	-294 718.5	-342 879.1
10-20	-8 561.6	-23 701.2	-29 537.4	-30 057.5	-417 234.8	-509 092.5
20-30	-3 614.1	-10 248.4	-24 225.7	-30 175.6	-274 074.1	-342 337.9
30-50	-9 922.3	-13 769.3	-14 686.7	-55 540.3	-324 983.9	-418 902.6
50-100	-5 005.9	-7 108.1	-28 936.0	-31 286.6	-572 762.4	-645 099.1
>100	0.0	-5 626.5	-41 138.7	-51 404.9	-624 256.0	-722 426.2
Total	-30 986.3	-79 806.9	-163 437.1	-222 166.7	-2 690 950.4	-3 187 347.3

Farm size (ha)	Reduction in nitrogen use (%)					
UAA	1995	1996	1997	1998	1999	Total
0-5	-54.2	-45.9	-58.2	-59.3	-47.6	-48.3
5-10	-23.5	-49.4	-55.8	-58.1	-50.5	-50.5
10-20	-29.6	-51.2	-52.9	-60.5	-51.6	-51.4
20-30	-24.7	-44.6	-62.9	-72.5	-53.6	-54.4
30-50	-32.4	-68.2	-63.9	-66.0	-56.0	-56.7
50-100	-47.1	-26.0	-72.0	-56.1	-59.0	-58.4
>100		-36.2	-59.1	-57.7	-59.5	-59.0
Total	-31.5	-46.3	-60.3	-61.6	-55.0	-55.0

Farm size (ha)	Reduction in nitrogen leaching (kg)					
UAA	1995	1996	1997	1998	1999	Total
0-5	-331.4	-2 156.5	-3 706.7	-3 203.7	-77 711.3	-87 109.5
5-10	-861.4	-6 054.2	-6 127.3	-6 149.1	-132 607.9	-151 799.9
10-20	-3 660.3	-8 298.3	-11 251.9	-10 184.7	-180 842.0	-214 237.2
20-30	-1 676.3	-4 591.8	-8 890.8	-8 805.1	-116 737.3	-140 701.3
30-50	-4 757.3	-5 603.9	-5 896.9	-16 654.1	-135 135.2	-168 047.4
50-100	-2 056.0	-3 044.8	-10 379.7	-13 627.3	-244 185.8	-273 293.5
>100	0.0	-2 454.6	-18 732.7	-22 080.5	-274 018.9	-317 286.7
Total	-13 342.7	-32 204.0	-64 986.0	-80 704.5	-1 161 238.4	-1 352 475.6

Farm size (ha)	Reduction in nitrogen leaching (%)					
UAA	1995	1996	1997	1998	1999	Total
0-5	-15.2	-19.3	-24.7	-21.9	-20.2	-20.4
5-10	-7.5	-21.0	-21.1	-23.8	-22.7	-22.4
10-20	-12.7	-17.9	-20.1	-20.5	-22.4	-21.7
20-30	-11.5	-20.0	-23.1	-21.2	-22.8	-22.4
30-50	-15.6	-27.7	-25.7	-19.8	-23.3	-22.8
50-100	-19.3	-11.1	-25.8	-24.4	-25.1	-24.7
>100		-15.8	-26.9	-24.8	-26.1	-25.9
Total	-13.6	-18.7	-24.0	-22.4	-23.8	-23.4

Table 8. Load per hectare and EIQ in on-programme and off-programme soil

	Number of farms		Load per hectare			EIQ		
	Agri-env	GAP	Agri-env	GAP	% Variation	Agri-env	GAP	% Variation
Vine	54	25	24.92	31.07	-20%	1 056.23	1 475.42	-28%
Rice	22	20	4.38	5.26	-17%	140.5	151.14	-7%
Maize	43	45	0.61	2.39	-74%	11.91	56.24	-79%
Apple	124	47	34.75	42.31	-18%	1 185.69	1 471.21	-19%
Peach	230	76	23.32	19.06	+22%	438.66	350.44	+25%
Onion	40	40	1.27	1.5	-15%	40.7	50.06	-19%
Potato	32	26	1.29	1.82	-29%	34.21	55.38	-38%
Tomato	24	25	1.33	2.03	-34%	30.85	87.07	-65%

Source: Regione Piemonte, Valutazione intermedia del Piano di Sviluppo Rurale, 2003.

Table 9. Quantities of fertiliser in on-programme and off-programme soil

	Nitrogen			Phosphorus			Potassium		
	Agri-env	GAP	% Variation	Agri-env	GAP	% Variation	Agri-env	GAP	% Variation
Vine	11.64	24.82	-53%	8.9	15.95	-44%	25.62	36.32	-29%
Rice	41.17	91.54	-55%	11.75	11.32	+4%	73.9	121.43	-39%
Maize	144.74	267.28	-46%	38.3	70.81	-46%	95.48	162.94	-41%
Apple	21.07	36.69	-43%	9.79	2.77	+253%	38.99	24.72	+58%
Peach	39.64	62.61	-37%	14.11	25.02	-44%	96.76	55.53	+74%
Onion	77.85	87.13	-11%	14.33	22.17	-35%	89.21	88.7	+1%
Potato	90.32	111.86	-19%	15.72	28.98	-46%	111.88	135.49	-17%
Tomato	88.95	116.11	-23%	38.5	38.23	+1%	100.23	133.26	-25%

Source: Regione Piemonte, Valutazione intermedia del Piano di Sviluppo Rurale, 2003.

The protection of biodiversity

Agri-environment measures have been used to persuade farmers to sustain cattle rearing in the high nature conservation value zones. One example is the programme applied in Valle d'Aosta, where prescriptions regarding the maximum animal density and the eco-compatible management of pastures situated at high altitude are set in order to protect wild flora and fauna, and to reduce erosion and the risk of avalanches. A specific study conducted by the Institute Agricole Regional based on a ***census of flora species in samples*** of pasture has demonstrated higher biodiversity and better forage quality. The quality of forage for the production of the typical cheese Fontina is strongly influenced by the richness of flora in the forage. The farms in the samples have been chosen on the basis of their altitude (over or below 2 000 metres), the number or days of permanence of the cattle in high quota pastures (over or below 100) and the animal density (UBA/ha) in zones that were homogenous with respect to several variable as soil type, ph, presence of carbonate, organic matter, carbon/nitrogen ratio, activity of the microbic biomass, structural stability and other parameters. Results show an increase in organic matter and a lower level of potential erosion.

A specific AEM encourages the upkeep of abandoned farmland and woodland. The implementing regulation defines abandoned farmland as that which has not been the subject of any agricultural use for 3 years. For woodland the period is 10 years. This measure has been used to stimulate the active management of pastures and meadows in order to conserve forms of land use which allow for a balanced and diversified of intended uses of the land and landscape while guaranteeing a rational and effective hydrological protection. The Emilia Romagna report shows that the measure has a level of importance for the management and conservation of certain species of deer and for species of wild fauna which thrive in the areas of transition between woodland and meadow (such as golden eagle, hares and goshawk). The implementation of the measure in abandoned woodlands characterised by the presence of infestations of shrubs and brambles has shown protective effects for arboreal species and improved spontaneous regeneration of trees. According to the report, monitoring of biodiversity has demonstrated an increase in the population of many species of invertebrates both for the measures organic production and integrated production although if at a lower level in the last case. The evaluation of the effect of specific measures on biodiversity has been conducted through **sample investigation of target species** that have been compared with reference data of the annual census organised by the International Wetland Conservation, the National Institute for wild fauna and other organisations.

Landscape

The Friuli Region has set up an interesting monitoring system for ***landscape***. The Region's landscape has been classified into seven typologies of general landscape units that are comprehensive of 33 homogenous landscape units. Landscape elements include altitude, floods, canyon streams, torrents in wide valleys, conifers, black pine, beech tree, broadleaf shrubs and cut stable meadows. Features that characterise these landscape units are compared with those that are introduced or maintained by a specific agri-environmental measure. In this way the coherence between a specific measure and the peculiar elements of a landscape unit is analysed.

In this Region, mountain barns are found in a state of abandonment and mountain pastures have not been utilised for grazing for a long time. There has been great engagement in the agri-environmental measure "Maintenance of the pastures", with nearly 500 hectares of surface, corresponding to 15% of total farm land, receiving support. Since such action is undertaken to avoid the growth of bushes and forest on the existing meadows, and to stimulate the correct management of pastures, the measure is coherent with the landscape characteristics of the unit. The function of reduction of the hydro-geologic risks and of the risk of erosion and the control of rain waters through the management of meadows and pastures it is moreover particularly important in this area since turns out to be subordinate to an intense pluviometric regimen (3 metres) and flood phenomena are frequent. Moreover, the application of the AEM contributes to maintain the visual difference of the landscape and to enhance the tourist-environmental value of the Regional Park of Prealps Giulie, that it is located in this area.

The use of geo-referenced data

Where environmental data are present as soil maps and where sensitive sites are designated (*e.g.* as defined by the Nitrates Directive, Nature 2000 sites or the sites sensitive to erosion), **indicators** can be estimated as ratio between the area in the programme in the sensitive site and the total area in the programme. The system is supported, where available, by a geographic information system (GIS). These indicators are defined in the following way at communal level:

$$AEA_x = \sum_{i=0}^{n} \frac{SSVC_i \cdot AEA_i}{TA_i}$$

$$UAA_x = \sum_{i=0}^{n} \frac{SSVC_i \cdot UAA_i}{TA_i}$$

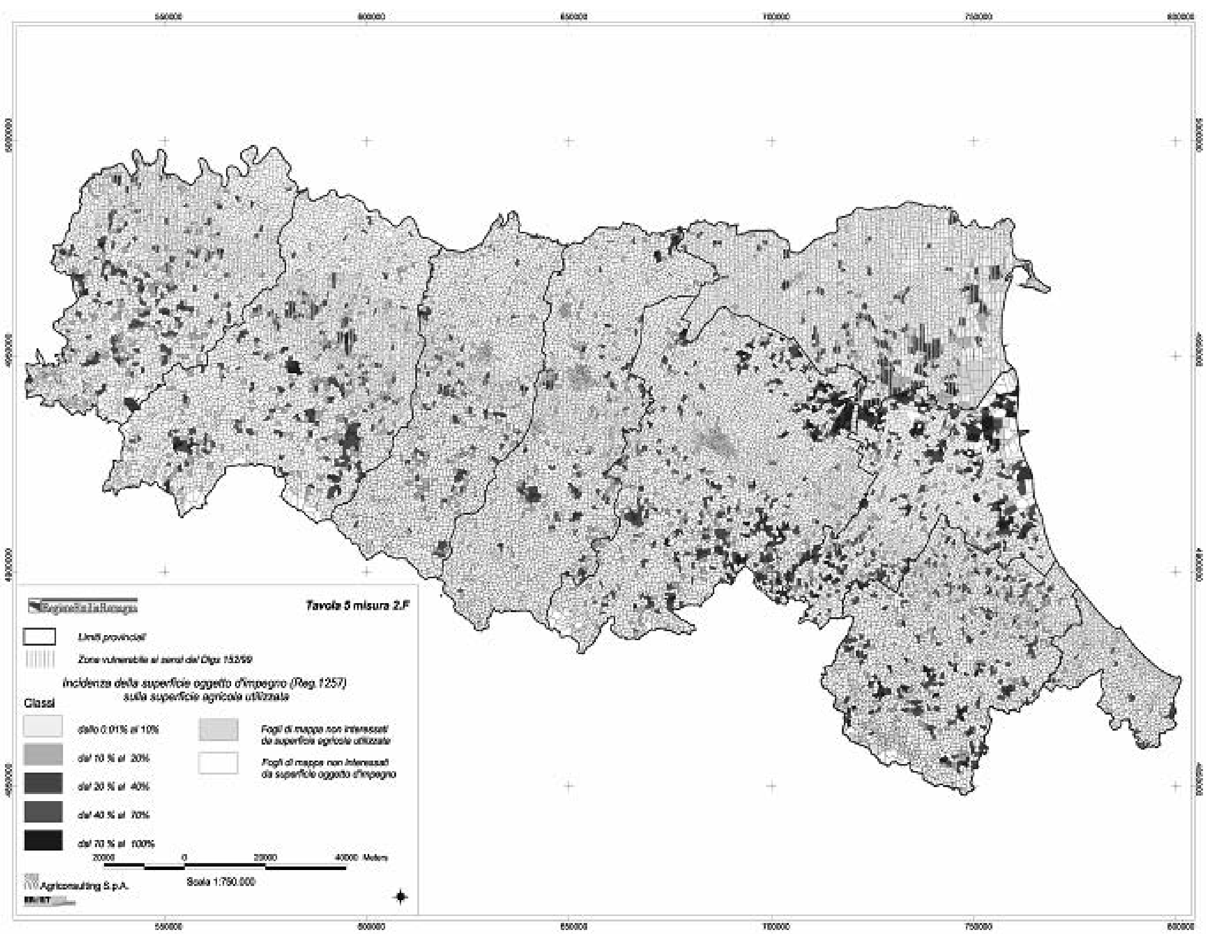
where:

AEA_x = Acreage in the agri-environmental measure for the calculation of the indicator x
UAA_x = Utilised Agricultural area for the calculation of the indicator x
$SSVC_i$ = Area of the contextual vectorial layer in Municipality i
AEA_i = Acreage in the agri-environmental measure in Municipality i
TA_i = Total Acreage in Municipality i
UAA_i = Utilised Agricultural area in Municipality i

The final indicator is represented by the ratio between AEA/UAA. Information derived from this kind of indicator allows some conclusions on the environmental effect of the AEM to be drawn in an indirect way, based on the relation, derived from literature, between pressure (the modification in the technique) and state indicators (the environment).

The level of accuracy of this type of indicator depends very much on the availability of primary indicators on the state of environment and cartographic layers that allow data comparison at the very local level and the construction of maps. Figure 1 shows the impact of AEM in Emilia Romagna on reducing the use of fertilisers in vulnerable areas as defined by the Nitrates Directive.

Figure 1. Fertiliser use in Emilia Romagna



Conclusions

Evaluation of agri-environmental measures in Italy only started in 1997. Even if some progress has been made since then, the process of evaluation is still at a "learning by doing" stage.

The real crucial point, whatever methodology is used to evaluate the economic, agricultural or environmental impact of a specific AEM, is the availability of reference data and a monitoring system at the local level. If this information is missing, no independent evaluator can produce good results. The setting up of a detailed geographic information system is a precondition for evaluating the impact of any environmental policy and is a task that must be financed by public resources.

In the case of the Italian Regions, only some have set up a monitoring strategy that utilises a database on the state of environment (soil, water, landscape, biodiversity). In no cases is a time series of reference data available before agri-environmental payments began.

The common questionnaire set up by the European Commission for evaluating AEM established under Regulation 257/1999 has had the advantage of producing better organised and more readable evaluation reports that are comparable from the point of view of the Commission. However, at the level of the administration implementing the programme, it might have overloaded the evaluators with questions which where not relevant with respect to the specific case. Furthermore, no guidance was given on the methodology to adopt.

In addition, attention to the economic impacts has been lost even though this information has provided relevant information to administrators, allowing a better targeting of the programmes. The analysis of economic data can increase awareness about the effects of a policy instrument on revenues and structural changes at farm level, and therefore on the sustainability of the change in the methods of production in addition to the economic incentive provided by the agri-environmental payment. Economic evaluation should therefore always be associated with an evaluation of environmental effectiveness.

The indirect analysis of the environmental impact, based on the knowledge of the territory through the monitoring of the state of the main environmental variables (contextual indicators), on administrative data and on scientific data coming from literature or specific research, can give good results at relative lower cost.

Running simulation models requires the same kind of information but requires specialists such as statisticians or econometricians. It has the advantage of dealing with big quantities of data on several variables.

Direct investigation through soil or water tests at farm level is very costly and can only be performed at a low scale level. In any case, it does not disentangle the effect of the policy from other factors unless similar tests are performed on comparable farms.

Indirect analysis and simulation models appear to be more suitable for large-scale programmes, such as the majority of AEM that operate in Italy. The third method should be more feasible for measures that are highly concentrated at a special level.

In conclusion, having made a survey of many different tools that have been used by the Italian Regions, it is possible to say that the choice of the "ideal method" is a function of several variables that include the specific objective, the availability of data, a cost-benefit analysis that takes into account the costs of evaluation and the marginal benefit of higher accuracy in evaluation results. Considering the several aspects that must be considered in evaluating a policy, better results are reached when different methods are integrated. Considering the costs and the analytical skills required, when spatially distinct data are available, the combination of state and pressure indicators seems to be a good alternative to the estimation of impact indicators.

BIBLIOGRAPHY

European Commission (1998), State of application of regulation (EEC) No 2078/92: Evaluation of Agri-environment Programmes, Working Document VI/7655/98, Brussels.

INEA (1999), *Le misure agroambientali in Italia*, Rome.

Italian Regional Administrations (2003), Rapporti di valutazione intermedia dei Piani di sviluppo rurale.

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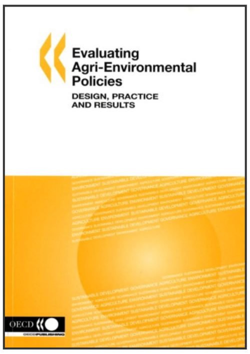

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