Chapter 11

Application of the Agri-Environmental Footprint Index to assess agri-environmental policies in Greece

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The Agri-environmental Footprint Index (AFI) aims to assess the environmental performance of farms under agri-environmental schemes (AESs) by combining existing agri-environmental indicators and multi-criterion decision analysis. A variant of the AFI approach, developed to address AESs in Greece, was applied to two different farming systems under AES regimes (organic farming in extensive olive groves and nitrate pollution reduction in intensive arable crop cultivation), to compare the environmental performance of participating and non-participating farms. No significant differences in environmental performance between the two groups of farms were found. Moreover, the AESs in both cases appear to lack full additionality. When AES outcomes are assessed against the environmental objectives pursued, outcomes are in line with the policy aims in the case of organic farming, whereas for the arable farms, any benefits accruing seem to be mainly collateral.

11.1 Evaluation of agri-environmental schemes

The first attempts to introduce incentives for environmental friendly farming in EU Member States (MS) coincided with the first concise version of rural development policy (RDP) measures under Reg. EEC/797/85. Since then, a number of milestones in the evolution of agri-environmental schemes (AESs) in the European Union can be identified. The establishment of an obligation for MS to implement AESs as accompanying measures in the 1992 CAP reform, drawing the relevant resources from the core of the CAP financing instrument, was one of these milestones (Baldock and Lowe, 1996; Buller, 2000; EEA, 2006) since by the end of the first implementation period 18% of the EU-15 agricultural area was under an AE agreement (EC, 1998). The incorporation of AESs as an integral part of the second pillar of the CAP, as RDP came to be known after the 1999 reform, marked the start of the second period of implementation of AESs (2000-2006). By the end of this period, 54% of the Utilised Agricultural Area (UAA) of EU25 was covered by an AE agreement (EC, 2009). The third implementation period for AESs, currently underway as part of the 2007-2013 Rural Development framework, will complete two decades of formal implementation of AESs in the European Union.

During these two decades, many attempts to evaluate the performance of AESs have been made. As part of the RDP, these policies are required to comply with a medium-term programming procedure as well as undergo a formal evaluation process. MS must perform evaluations *ex ante* (currently in the form of Strategic Environmental Assessment), at mid-term, and *ex post* at the end of the implementation period. Within these evaluations, environmental assessment of AESs, which is the main focus of the present contribution, has been an increasingly important issue. EU-level evaluation exercises within the EU policy evaluation procedures have also been undertaken, based mainly on formal national AE programmes evaluations.

A goal of these EU-level assessments was to compile national reports into a single document (EC, 1998, 1999, 2006; Oréade Brèche, 2005). This task proved to be quite difficult to achieve, not least because the reporting frameworks used by MS were not always harmonised. Recognising these difficulties and the resulting lack of clarity, a great effort has been made over a number of years to formulate a common evaluation framework for all national RDPs (EC, 2000a, 200b, 2006). These successive frameworks have become increasingly elaborate and detailed (Primdahl *et al*., 2010). Environmental evaluation of *all* RDP measures as an omnipresent criterion, but also the need for a more efficient evaluation specifically of AESs, have led several EU services to focus their interest on agri-environmental indicator systems in order to facilitate the process. Hence, based on work done at OECD (see OECD, 1997, 1998, 1999, 2000, 2003; Peschard *et al.*, 2004) and since 2000 in European institutions (see EC, 2000c, 2001; EEA,1999, 2005a, 2005b, 2006,) much effort has been dedicated to these issues.

The evaluation of AESs in environmental terms has also been a high priority in the academic research agenda during these two decades (see, for example, Damianos and Giannakopoulos, 1999; Peco *et al.*, 2000; Louloudis *et al*., 2000; Kleijn and Sutherland, 2003; Primdahl *et al*., 2003; Kleijn *et al*., 2006; Finn *et al.*, 2007, 2008, 2009).

11.2 Challenges in environmental evaluation of AESs

The problems identified during the above-mentioned exercises can be classified into three main categories. The first has to do with problems inherent in environmental evaluation *per se*, the second category consists of the problems created by the approach selected for the implementation of EU agri-environmental measures, and the third category relates to the specific situation at the MS level.

One of the major difficulties is due to the complexity of the interface between agricultural activities and the environment. Land use and management practices are diffuse and variable, both in spatial terms and time scale. In a relatively small area, a number of farmers and farm operators, i.e. farm-level decision makers, can interact with the environment through individual decisions such as fertiliser application or biocide use. These decisions are normally taken independently of each other, and yet they all contribute to the combined environmental impact of farming in that area. Moreover, farming interactions with the environment vary in intensity as well as in the very nature of the impacts, which can have a seasonal[2] or sequential dimension. For example, tree farmers in Mediterranean regions apply fertilisers during late winter-early spring and the possible impact of erroneous use is mainly nutrient loss and water pollution. The same farmers use insecticides during late spring, over the summer and sometimes well into autumn. In that case, the focus of an impact assessment should be on biodiversity effects as well as on product safety rather than on water quality. At the same time, the timing of insecticide application is crucial, since spraying at the correct time can minimise adverse biodiversity effects while earlier or later application may result to both a damaged crop and a degraded environment.

Another important challenge facing an environmental evaluation is the variety and heterogeneity of causal mechanisms involved in environmental issues, particularly with respect to their local or regional relevance and type of impact (Stoate *et al*., 2009; Primdahl *et al*., 2010; Cooper *et al*., 2010). For example, a specific farming practice, grazing, and the main pressure associated with this practice, namely an excessive number of animals grazing an area (*overgrazing*), expressed as livestock units per hectare, can have entirely different impacts depending on the agro-ecosystem concerned. In northern or north-western Europe, overgrazing of bovine animals typically affects water quality, whereas in the case of most Mediterranean pastures, overgrazing of sheep and goats is a principal cause of soil erosion.

The second group of issues identified in AES assessments is due to complexities raised by the implementation approach adopted at EU level. The multiple and often inter-related rural development objectives enshrined in Pillar 2 of the CAP can be summarised under the three pillars of sustainability, namely economic, social and environmental (Buller, 2000; Huylenbroeck and Whitby, 1999; Lowe *et al*., 1997; Park *et al*., 2004).The rationale for including AESs as part of rural development policy has been their potential for promoting simultaneously, or at least not acting against, the a multiplicity of these objectives. Furthermore, within the environmental domain, most of the implementing authorities have chosen to apply broad and shallow types of schemes instead of an approach where each specific environmental objective is separately targeted (Andersen *et al*., 1999; European Parliament, 1998; European Commission, 1998). This choice, of striving to achieve multiple objectives with one (or several) measures, has added considerable complexity to the assessment exercises.

The RD regulations place an obligation on both the national authorities and the European Commission to evaluate RD measures. Nevertheless, despite the two decades of RD implementation in the European Union, the problem of the time-frame for the evaluations remains, rendering all official evaluations of limited scope within the implementation period examined. Given that there is always a delay in setting up the measures, since all RDPs have to be negotiated and approved by the Commission services, there is only limited data available for mid-term evaluations – indeed, in most cases, only monitoring data are available. Going back to previous implementation periods of the same measure is not within the terms of reference of the mid-term evaluation, hence a discontinuity is created in assessments. Furthermore, *ex post* evaluations are usually made available only long after the policy following the one evaluated has been formulated. As a consequence, the design and implementation of AESs, and of RDP in general, are based on a very poor evaluation input, even as regards each MS's own implementation experience, let alone the experience of other

MS, since the EU-wide compilations of the national evaluation reports are issued even later. In that sense, it is no surprise that AE policy formulation does not benefit from a learning process (Finn *et al*., 2009; Primdahl *et al*., 2010).

A further complexity has been caused by the approach adopted for calculating AE payments. This can be clarified using the terminology suggested by Oñate *et al*. (2000) that divides the effects of AESs into performance and outcome effects. Performance effects concern the impacts on land use or management practices triggered by the AES under examination. Performance effects in turn influence the pressures exerted on agro-ecosystems. Measuring the way these pressures are modified by performance effects provides estimates of outcome effects. The WTO Agreement on Agriculture allows AESs to be classified as 'green box' payments as long as the farmer's compensation does not exceed income forgone and the implementation costs incurred (WTO, 1994). The amount of AE payments is, thus, based on the performance effects of AES and evaluations focus strongly on these effects. As a consequence, there is little incentive for evaluators to focus on outcome effects, nor for policy makers to facilitate the provision of information on outcome effects, since these are not decisive for calculating the budget cost of the measure.

By contrast, the performance effects of the measure would give a better idea of the value society gets from the AES. Following this line of reasoning, performance effect indicators *could* provide satisfactory estimates for the actual outcome effects, if a very well established, quantitative impact model were available. However, this is not the case for the majority of the AESs implemented across the European Union. In a study of 60 AESs, only 15% of the 93 management packages comprising these measures were found to be based on quantitative impact models while more than half of them seem to have been based on intuitive models (Primdahl *et al*., 2010).

Finally, we can describe some of the problems arising from the specific MS implementation approaches and procedures in the local context. The most immediate problem is the lack of sufficient appropriate data, i.e. data measured at the required spatial levels, with appropriate frequency, and at the necessary points in time. In some respects, these deficiencies may be somewhat alleviated when the evaluation is performed within a research context, but here there is always the problem of limited resources. When resources are limited, sample sizes and numbers of case studies are small, and the specificities already described render generalisations based on relatively few observed cases potentially spurious. The result is that the formulation of general, scientifically-based conclusions and proposals for policy improvement are not feasible (Carey *et al*., 2002, 2003; Finn *et al*., 2008, 2009).

One should also observe that, from the definition of AE policy objectives negotiated with the commission by regional or MS authorities down to policy-induced changes in farming practices, there are many factors and actors that influence farmers' performance and hence the outcome of the measures. In fact, one could argue that the greater the distance between the design and the implementation levels, the more likely one is to find differentiations and distortions due to different policy agendas at different levels of the policy complex (Paniagua, 2001; Juntti and Potter, 2002; Juntti and Wilson, 2004). Differing degrees of administrative efficiency, deficient knowledge of local conditions as well as the existence of individual farm and farming household perceptions, needs and strategies are some of these factors (Damianos and Giannakopoulos, 2002).

11.3. Methodology

General introduction to the AFI

The Agri-environmental Footprint Index (AFI) was developed in 2005-2008 as a tool to quantify and evaluate the environmental performance of farms under AES, and to evaluate the effectiveness of those policy schemes in terms of environmental benefits. The AFI can measure the outcomes of agri-environmental policies at farm level in the form of a customisable index with the potential to quantify the environmental status of individual production units (Knickel and Kasperczyk, 2009; Mauchline *et al*., 2007; Purvis *et al*., 2009, Vesterager *et al*., 2010). The methodology combines the use of agri-environmental indicators and multi-criterion decision analysis (MCDA) in a way that enables it to address any environmental issue via the involvement of local stakeholders and agricultural or environmental experts.

The study reported below was designed to test a variant of the methodology on two different farming systems under two AES regimes, chosen to represent the reality of AESs in the Greek context. Through this chapter we intend to address the following questions as a means of testing the usefulness of the AFI:

- Is the AFI methodology appropriate for evaluating the environmental performance of farms in a Greek context?
- Does the AFI methodology have good potential for evaluating AESs against the three dimensions of the evaluation of AESs (i.e. general, administrative, and scientific)?
- Can the AFI provide relevant information not only for *ex post* policy evaluation, but also at the stage of designing AESs?
- If so, what does it reveal about the extent to which the policy design was appropriate for the stated environmental objectives of the two schemes?

AFI variant for application in the Greek context

The AFI approach is based on a selection of environmental issues related to the application of the AES in question. Stakeholder groups are selected to be appropriate to the specific scheme, whereas the issues represented in the evaluation cover all the environmental aspects expected to be affected by the application of the AES and the farming practices in the case study areas. This set of environmental issues, hereafter called “sub-issues”, can result in a wide assessment of a farm’s environmental performance. Sub-issues consist of two categories. The first category contains the sub-issues related to the environmental objectives explicitly set by the scheme during its design phase, and they are used in such a way that each sub-issue is linked to one clear policy objective. The second category includes the sub-issues perceived by the stakeholders as relevant to the AES’s application despite their not being explicitly linked to the scheme’s stated objectives. These two complementary categories result in a wide assessment of a farm’s environmental performance. The comparison contrasts the environmental performances of farms under an AES regime and non-AES farms.

The current AFI approach can be divided into two distinct levels of evaluation. The first level looks at the environmental problems related to agricultural activities at regional or local level. Local stakeholders including scientists identify and prioritise the agriculturally-related environmental problems of the area in question, enabling the evaluators to check the relevance of the overall programme objectives to the problems identified. This identification process enables a comparison of the specific environmental problems at local level against the objectives of the AES in question. Hence, this participatory process facilitates an assessment of the extent to which the specific policy measures and the issues they address are relevant to the actual environmental issues of the area concerned. In this way, the current approach,

through a simple but precise participatory procedure can provide a preliminary evaluation of the design of the policy measure before the development stage of the AFI.

The second level of evaluation looks at the appropriateness of the agri-environmental indicators used to address the pre-selected agri-environmental issues, and of the harmonised quantification of the outcomes in order to render the environmental issues comparable to each other. At this stage, the stakeholders again have a crucial role in validating that the overall outcome is relevant to the current state of environmental affairs of the area in question. Thus, the second level aims to evaluate what has actually been done by AES participants in terms of environmental change at farm level. Hence, in principle, while the first level addresses the subject at the macro or regional level in terms of policy design, the second level deals with the actual implementation of the policy at the micro or farm level. In that sense, the two different levels of evaluation facilitate not only the assessment of the appropriateness of the policy design to address certain necessary environmental issues, but also assemble the information required for judging whether the policy objectives were actually served.

Addressing the problems of AES evaluation

General issues

As shown in previous work on AFI development, the major advantage of the methodology is that it can address an increased number of environmental issues taking into account their local relevance and priority (Purvis *et al*., 2009, Vesterager *et al*., 2010). Moreover, if developed appropriately, it could address policy measures with multiple objectives, like those addressed in the current chapter, while also investigating the complex interface between agricultural activities and the natural environment in their spatial and temporal reality (Mauchline *et al.*, 2011). The AFI, if suitably designed, can also be applied in diverse administrative structures including those with questionable effectiveness.

Administrative issues

The problem created when the mid-term reviews of the programmes are being prepared in the very early stages of AESs implementation might be mitigated by the AFI's two-level structure of evaluation and the relatively quick results produced by the first level. Hence, the first level evaluation (FLE) could help to build a more concise mid-term review.

As shown by previous research conducted by Primdahl *et al*. (2010), the design of most AESs is based on intuitive and common sense impact models that do not incorporate relevant indicators, thus increasing the distance between the design phase and the actual implementation of the policy. The AFI method could facilitate the development of impact models with the help of indicators that could enhance AES efficiency. Moreover, limited knowledge of local specificities in the design phase of top-down AESs, could be increased through the participatory dimension of the approach, by engaging local stakeholders to contribute their knowledge to the process.

Research or scientific issues

Previous applications of the AFI approach, in different national contexts, have shown that there are huge insufficiencies in terms of necessary data (Mauchline *et al*., 2011, Purvis *et al*., 2009). Most previous attempts at AES evaluations were based on case studies of particular areas or single measures, with only a few trying to apply a more holistic or harmonised approach that could evaluate whole sets of measures. The AFI could be used in order to reveal specific needs in data or other informational gaps. Therefore, it could be used to identify necessary information or to stimulate further data collection. It can be argued that increasing development and use of this tool would facilitate a harmonised approach to data collection systems across Europe (Purvis *et al.*, 2009).

11.4 Results

First case study: Messinian Mani

The Organic Plant Production Scheme is very widely implemented in Greece, with organic olive holdings accounting for over 50% of the total area under organic farming. Messinia has the fourth largest area under organic oleiculture (8% of the total organic olives) among 54 prefectures in Greece. Moreover, Mani is one of the first areas in Greece were olive farmers have converted to organic, making this area ideal for testing the ability of the AFI methodology to determine whether the environmental performance of olive farms participating in the Organic Plant Production scheme differs from that of non-participating farms. The AFI was used to assess environmental performance corresponding to objectives directly targeted by the scheme as well as other impacts related to non-stated objectives.

The farm survey took place during 2007 in the area of Mani that lies in the Messinia Prefecture (NUTS3) around 300 km from Athens. The Messinian part of Mani is considered to be an area of natural beauty, attracting many tourists, with Mount Taygetos dominating its east and the Messinian Gulf the west. Above the olive zone (more than 700 m in altitude), the area belongs to the Natura 2000 network, since it hosts a large variety of biotopes providing habitat for indigenous Greek animal species. Mani is mainly characterised by oleiculture, which accounts for 1 270 out of 3 550 ha (36%) of UAA in the area. The 130 olive farms in the organic scheme cover an area of 280 ha (22% of the oleicultural area).

The survey was conducted on 39 organic farms and 11 conventional ones, selected by stratified random sampling. The stated objectives for the case of 'Organic Plant Production' scheme were *reduction in pollution* caused by agriculture, *biodiversity conservation* of agricultural ecosystems and *sustainable soil management*, focusing on soil fertility and organic matter.

The comparisons between AFIs for participating and non-participating farms were limited to the Total AFIs and "natural resources" (NR) AFIs for both cases, while "Biodiversity" (B) AFIs were compared only with respect to fulfilling stated objectives and "Landscape" AFIs for not-stated objectives (Table 11.1). As Table 11.2 shows, participating farms score better when it comes to environmental effects derived from the policy objectives in all comparisons. However, the differences in results in this category are statistically significant only when it comes to the biodiversity-related stated scheme objectives. On the other hand, in the second category, non-participating farms seem to score better when it comes to "natural resources" only, but none of the differences for the non-intended environmental effects are significant[3].

Table 11.1. Issues and sub-issues per category – Messinian Mani case study area

Issue	Sub-issue	Status in stated objectives Mentioned=S/Not mentioned=NS
Natural resources	Water quality	**S**
	Soil quality	**S**
	Erosion	**NS**
	CO2 emissions	**NS**
Biodiversity	Species	**S**
	Ecosystem	**S**
Landscape	Landscape	**NS**

Source: Christopoulos (2011).

Table 11.2. Messinian Mani case study area: AFIs for participants and non-participants, by effect category

	Overall effects				Mentioned in stated objectives				Not mentioned in stated objectives			
	Total	NR[1]	B[2]	L[3]	Total	NR	B	L	Total	NR	B	L
Participants	6.60	7.13	5.58	5.62	7.88	8.19	5.58	-	6.77	6.56	-	5.62
Non-participants	6.29	7.06	4.49	5.00	7.06	7.41	4.49	-	6.70	6.80	-	5.00

1. Natural resources. 2. Biodiversity. 3. Landscape.

Source: Christopoulos (2011).

Second case study: Larissa

Cotton cultivation is a leading example of intensive production in Greece. Furthermore, the Nitrate Reduction Scheme is one of the first AES implemented in Greece, targeted initially at Thessaly (a Nitrate Vulnerable Zone (NVZ) under the Nitrates Directive (EEC/91/676)), and then expanded to other areas. In the prefecture of Larissa alone there are approximately 50 000 ha under an AES agreement within the Nitrate Reduction Scheme, predominantly cotton farms.

In order to test the AFI methodology with this case study, we had to determine whether the agri-environmental performance of farms participating in the Nitrate Reduction Scheme differs from that of non-participating farms in the Larissa region. The AFI was used to assess environmental performance corresponding to objectives directly targeted by the scheme as well as other impacts related to non-stated objectives.

The scheme for reducing nitrate pollution from agricultural sources was targeted in a double way. It was targeted spatially, since for the 2000-06 period was implemented in three specific areas. These were the plains of Thessaly, the Lake Kopais area, and the Pineios river area in the prefecture of Ileia. It was also targeted in terms of the objectives set. The scheme was designed to introduce or maintain nitrate-reducing farming practices concerning irrigated arable crops in areas with high concentration of nitrates in their groundwater or in NVZs under Directive EEC/91/676. Payments were made to farmers in order to apply nitrate-reducing farming practices described in the scheme methodologies found in the Greek Rural Development Programme, and in a special set (Agri-environmental) Codes of Good Agricultural Practices (GAP).

The farm survey took place during 2007 in the prefecture of Larissa (a NUTS3 region) around 380 km north of Athens. Larissa is one of the four prefectures of Thessaly. The prefecture of Larissa is second (out of 54 Greek prefectures) in size and first in total Utilised Agricultural Area (UAA). It is mostly a plain area, where agriculture has been traditionally the main economic activity. The previous “coupled” CAP commodity support schemes led farmers to shift towards highly intensive cropping patterns, in which cotton predominated. Larissa retains 164 000 ha of arable land out of which 28% is under agreement within the Nitrate Reduction Scheme. The survey covered 40 farms participating in the Nitrate Reduction Scheme and ten non-participating farms, selected by a stratified random sampling procedure.

The stated objectives for the Nitrate Reduction Scheme are protection of water resources from over extraction, restoration of quality of ground water and improvement in soil fertility.

The composition of environmental issues in terms of sub-issues is shown in Table 11.3. For the case of Larissa, the “natural resources’ issue is the only one involved in the “intended

effects" category, while all other issues are represented in the 'non-intended' category. Table 11.4 shows the AFI scores for participants and non-participants for both environmental effects categories in the sample.

As far as the environmental effects of participants and non-participants derived from the stated objectives of the scheme are concerned, the first seem to score higher both in the total AFI and in the "natural resources" Issues, which solely represents this category, but these differences are not significant. For environmental effects not related to stated objectives, participants score better in the two issue level AFI and subsequently in the total AFI. All differences in the category of effects not directly targeted by the policy were significant.

Table 11.3. Larissa Case Study Area: Issues and sub-issues

Issue	Sub-issue	Status in stated objectives Mentioned=S/Not mentioned=NS
Natural resources	Water quality	**S**
	Water quantity	**S**
	Soil Quality/fertility	**S**
	Erosion /desertification	**NS**
	CO2 emissions	**NS**
Biodiversity	Species	**NS**
	Ecosystem	**NS**
Landscape	Landscape	**NS**

Source: Christopoulos (2011).

Table 11.4. Larissa Case Study Area: AFIs for participants and non-participants, by effect category

	Overall effects				Mentioned in stated objectives				Not mentioned in stated objectives			
	Total	**NR[1]**	**B[2]**	**L[3]**	**Total**	**NR**	**B**	**L**	**Total**	**NR**	**B**	**L**
Participants	4.91	5.45	4.88	1.56	5.46	5.46	-	-	4.89	5.41	4.88	1.56
Non-participants	4.11	5.00	3.61	0.15	4.99	4.99	-	-	4.13	5.04	3.61	0.15

1. Natural resources. 2. Biodiversity. 3. Landscape.

Source: Christopoulos (2011).

11.5 Discussion

The conventional olive groves in Mani were already managed in a very extensive way even before the implementation of the organic farming scheme, because of the steep and hilly terrain and the advanced age of the farmers due to outmigration of the younger population. Consequently, AES-induced changes in input use, especially in this area where irrigation is not a common practice, have not been significant.

In the case of Larissa, although the stated objectives of the AES were clearly targeted exclusively towards "natural resources," the differences in environmental performance between participant and non-participant farms, as measured by the AFI methodology, were *not* statistically significant in relation to these stated objectives, while they were significant in relation to other environmental impacts.

It may be that the stated objectives are not addressed with sufficient precision by this particular policy. The non-significant differences in the natural resources AFI may be due to the fact that the NR-related practices encouraged by the scheme (largely input reduction) were also followed by non-participants for other reasons. The survey took place during the second year of implementation of the new CAP decoupled payments, which removed the incentive for farmers to follow intensive production patterns. Thus, input reduction was a strategy followed by both groups of farms.

On the other hand, AFI comparison suggests that the AES under examination had a positive effect on biodiversity and landscape, although these outcomes were not directly targeted by the scheme's stated objectives. The conclusion that the AES is having beneficial effects on biodiversity and landscape coincides with stakeholder perceptions: "*the fields are greener now*" (wheat, barley and other autumn crops) "*in contrast to black*" (fallow during the winter sown to spring crops).

For most scheme evaluations, the participatory process provides a means of describing the hierarchy of environmental priorities in a transparent manner, information that is often lacking in scheme literature. The participatory element and stakeholder consultation lends credibility to an evaluation. However, the problems related to the selection of stakeholders for the consultation process and the possible bias associated with it are still a major unsolved problem of the methodology. Furthermore, the probability of strategic behaviour of the selected local stakeholders is increased, since they are asked to evaluate, even if indirectly, the application of an AES that could be a considerable financial support for the farming sector and the economy in their region, as was the case in Larissa. This could lead to results of limited reliability.

The first-level evaluation (FLE) can identify the level of relevance between the policy measure objectives and the local or regional environmental problems. The value added through the involvement of local stakeholders rather than, or as well as, national stakeholders could be seen in that the former are usually better placed to appreciate the effective implementation of a measure (Mauchline *et al*., 2011) and can identify geographical hot spots for action (Penker, 2009). Nevertheless, one should be cautious about the results of such an exercise, since in quite a few cases, some of the important environmental issues are either not perceived as such by local stakeholders or, although their importance is admitted, they are not associated with farming practices. This could be due either to the absence of an environmentally sensitive agency, in the form of an NGO or a research institution, or to the importance of agriculture in the area both in economic as well as in social terms. An example of that would be the case of an area characterised by a highly intensive monoculture where biodiversity is not seen to be of much interest. Excessive use of pesticides would be perceived as a problem only if resistance to certain pesticides developed or beneficial organisms were damaged, while the effects of pesticides on wildlife flora and fauna would usually be considered as secondary.

The Nitrate Reduction Scheme, in Larissa, failed to produce significant environmental effects regarding the stated objectives, indicating a lack of additionality as far as these objectives are concerned. Together with the beneficial collateral environment impacts not directly targeted by the design of the measure, these results suggest that the design of this measure should be seriously questioned.

The second-level evaluation (SLE), by zooming in on the stakeholder groups related to specific indicators, can give a clearer picture of the environmental state of affairs in the area concerned. It is through this approach that the actual implementation of the measure is put under the microscope, making visible the specific actions or farming practices applied. In that sense, the SLE, as part of the AFI participatory method, should help to reduce the distance

between the policy making authorities at EU, MS, and regional level, communicating relevant information in a clear cut and quantified way between the afore-mentioned authorities.

In cases where robust impact models are lacking, an additional value of the process is that the method analysed strengthens the linkages of farming practices with the environmental outcomes. However, even in the cases where experts are asked to establish such a relationship, one cannot exclude the possibility of strategic behaviour. Hence, one could suggest that the use of the AFI approach could be a possible provisional alternative in the absence of quantified and reliable impact models but only up to a point.

The AFI has been implemented in 14 different agri-environmental contexts so far (Mauchline *et al.*, 2011). This chapter illustrated the use of the methodology for evaluating the environmental performance of farms for two AESs and in the two areas reported here. In the first case study, it showed that the policy design was insufficient to deliver the environmental objectives, since there was no noticeable difference between participants and non-participants. In the second case study, it revealed that the environmental benefits were of a collateral nature and the policy design did not fulfil the stated environmental objectives. Through the two distinctive parts of the method, the FLE and the SLE, the AFI can make a useful input into the designing process of an agri-environmental policy measure through swift relay of clear cut information among the competent authorities, while still in the phase of policy design. In that sense, the current chapter argues that it the use of participatory approaches would be essential for the development of an adequate and efficient *ex ante* evaluation mechanism. The informational and temporal gaps in the policy cycle, as applied in the case of agri-environmental policy measures, could be closed or shortened to a certain degree through use of the AFI methodology as a participatory, multi-criterion and indicator-based assessment tool, with attributes that make it a good candidate for such use.

Notes

1. Stamatios Christopoulos, MTT Agrifood Research Finland / Economic Research Unit and George Vlahos, Department of Agricultural Economics and Rural Development, Agricultural University of Athens.
2. This is also frequent in other sectors. For example, pollution caused by transport is more intense at peak periods.
3. Conclusions regarding significant differences between the two groups are based on a 2-sided *t*-test of the difference between their means, at the 5% significance level.

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