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Review of cost-effectiveness methods

Authors: Anne Wolff and Bernhard Osterburg (TI)

Approved by Work Package Manager of WP7: Bernhard Osterburg (TI)

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Approved by Project Coordinator: Gerald Schwarz (TI)

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SEVENTH FRAMEWORK PROGRAMME

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Acronyms

CEA	Cost Effectiveness Analysis
CMEF	Common Monitoring and Evaluation Framework
EENRD	European Evaluation Network for Rural Development
FADN	Farm Accountancy and Data Network
FFH	Fauna-Flora-Habitat
FSS	Farm Structural Survey
GIS	Geographic Information System
HNV	High Nature Value
IACS	Integrated Administration and Control System
M&E	Monitoring & Evaluation
RD	Rural Development
RDP	Rural Development Programme

Executive Summary

The main objective of WP7 is to test the application of the concept of cost-effectiveness analysis to M&E of RD programmes in the context of the indicators and evaluation methods tested in the public good case studies. WP7 aims at answering the questions:

– How much do the developed indicators, monitoring requirements and evaluation methods cost?

– What does the use of resources actually achieve?

– Do the newly developed evaluation tools either provide a given level of effectiveness at lower cost or a higher level of effectiveness for the same cost in comparison to comparable current evaluation methods?

The assessment of the cost effectiveness of the evaluation methods including indicators and monitoring requirements is based on a literature review, interviews of experts, the dialogue within the ENVIEVAL project team and especially with the ENVIEVAL expert and stakeholder group, and in-detail analysis of the case studies. In this deliverable, results of the literature review and outcomes of the stakeholder interview are presented. The objective of the literature review is to review existing methodological approaches in cost-effectiveness analysis and apply them to indicators and evaluation methods. The stakeholder interviews were aimed at collating information on current approaches and gaps in RDP evaluations and on the stakeholder expectations and requirements for future indicators and methods. This report only deals with the information relevant for the research questions in WP7, i.e. information on the use of existing and additional data sets, data access, use of technical assistance and models.

Literature Review on Cost-effectiveness of Evaluation and Monitoring

The literature review identified that there are only a few publications directly dealing with the cost effectiveness of evaluation methods, although an increasing interest is visible. Many reports indicate that evaluation and monitoring should be designed and implemented in a ‘cost-effective’ way but most of them do not define and explain what that precisely means. It seems that cost effectiveness is a keyword as it sounds reasonable to consider but the approach is not applied or explained.

Cost-effectiveness assessment (CEA) is therefore not widely applied in environmental monitoring and evaluation; however more and more articles are recognising the importance of including cost

in the assessment. In the past, the focus was more on ecological impacts; now a more interdisciplinary approach is used.

A broad basis of articles is dealing with ‘effective monitoring’, as monitoring is often criticised as being costly, inefficient and not targeted. Therefore, as monitoring is essential to justify and receive information on the success of policies and programmes, many articles deal with its improvement. Concerning environmental monitoring, most articles considered in this review are related to biodiversity monitoring.

Stakeholder Consultation on Monitoring and Data Use

A strong need for targeted monitoring data is expressed by the interviewed stakeholders. There is a large variety of data sets used for the evaluation of RD programmes in the EU member countries. However, the main data set seems to be IACS data as it is used in all consulted countries. It is not designed primarily to serve evaluation purposes; therefore it does not always fit the requirements. Several other problems with data management were mentioned and the evaluators seem not to be able, or lacked the time, to extend the use of data sources for evaluation.

The stakeholder consultation further highlights the need to collect additional data sets when no suitable data or no access to data is available. Although it is only a ‘soft’ approach, evaluation of RD programmes relies often on such data, e.g. from farmers’ interviews, to provide information on environmental impacts. It appears that the respondents could not provide information on the costs of data access or the source of funding for additional data collection.

Several interviewees pointed out that the programmes are lacking well-articulated objectives and that the CMEF indicators are not suitable to detect environmental impact of RD programmes. Another hint that concrete environmental objectives are lacking is that the payment-by-result approach is scarcely used in the analysed RD programmes. A general and frequently-mentioned criticism of RD programme evaluation procedures is that too much time is spent on fulfilling the formal requirements of the evaluation, even if they are considered to be ineffective.

Summary

The outcomes from the literature review as well as the stakeholder interviews show the high relevance of the question how to increase cost-effectiveness of evaluation of RD measures and their environmental impacts. Cost and appropriate design of monitoring, access to existing data sets and their integration, and additional monitoring have been identified as key issues. Regarding the need to describe the counterfactual, the lack of appropriate data for non-beneficiaries is a special challenge.

1 Introduction

1.1 Overview

The EU member states have to monitor and evaluate the impacts of rural development (RD) programmes. For this, the Common Monitoring and Evaluation Framework (CMEF) was established by the EC and the member states to develop a single monitoring and evaluation (M&E) framework for all rural development activities. A focus is given to detect the impacts of the programmes to be able to justify the policy interventions. This is an ambitious task that provides some conceptual and methodological challenges, e.g. the attribution of impacts to a specific measure. This is particularly difficult for environmental impacts as the effects depend on site-specific conditions and are often only measurable after a long time period (Lukesch and Schuh, 2010).

Therefore, the evaluation of RD programmes in the EU member states is more and more directed to assess its impact on the beneficiaries. The environmental impact assessment in the current evaluation of RD programmes is often criticised for being imprecise and not able to detect real environmental impacts. Impact indicators that were defined by the CMEF are not considered to be suitable for the evaluation of European RD programmes by many stakeholders, particularly not for quantifying environmental effects. Further, there is a 'missing link' between output and result indicators at (sub)measure level and impact indicators reported at the regional or sectoral level. Proof and quantification of impacts at the level of RD measures is rather patchy. As a consequence, the assessment of the influence of RD programmes to the change of environmental indicators, considering other drivers, remains a challenge.

Monitoring and evaluation activities have to deal with limited funding. A design of the M&E framework is necessary which balances a careful use of resources with obtaining the most valuable and intended information. Therefore, to use the cost-effectiveness approach seems to be suitable for the evaluation of M&E of RD programmes.

1.2 Research Questions and Objectives (WP7)

The main aim of WP7 is to test the application of the concept of cost-effectiveness analysis to M&E of RD programmes in the context of the indicators and evaluation methods tested in the public good case studies. WP7 aims at answering the questions:

- How much do the developed indicators, monitoring requirements and evaluation methods cost?
- What does the use of resources actually achieve?
- Do the newly developed evaluation tools either provide a given level of effectiveness at lower cost or higher level of effectiveness for the same cost in comparison to comparable current evaluation methods?

Therefore it is necessary to determine and attribute the cost associated with M&E activities as well as to define the quality of outputs that is required to undertake this analysis. This includes on the one hand an assessment of *cost* involved in M&E, and approaches to keep M&E cost limited. On the other hand the quantity and quality of M&E outputs has to be defined in order to measure the *effectiveness* of M&E. Aspects of the quality of M&E results are the robustness of information on effectiveness of measures and programmes and evidence provided by M&E on how to improve programme performance. Further, the required level of completeness and preciseness needs to be defined.

To understand the principles of cost-effectiveness of M&E, it is necessary to analyse mechanisms and principles to increase cost-effectiveness, and the trade-offs between cost (effort) and outcomes of M&E. On this basis, a decision tree on how to use limited resources for M&E activities will be delevoped in WP7. This should enable us at the end of this project, to derive recommendations for cost-effective monitoring and data use in future RDP evaluation methods.

1.3 Research Approach

In brief, the assessment of the cost-effectiveness of the evaluation methods including indicators and monitoring requirements is based on a literature review, interviews of experts, the dialogue within the ENVIEVAL project team and especially with the ENVIEVAL expert and stakeholder group, and in-detail analysis of the case studies. In this first deliverable, results of the literature review and outcomes of the stakeholder interview are presented.

2 Literature Review

The objective of this section is to review existing methodological approaches in cost-effectiveness analysis and apply them to indicators and evaluation methods.

2.1 Approach for the Literature Analysis

The first step of the literature analysis was undertaken with regular scientific databases and catalogues that are available online. As expected, there is not abundant and ready-to-use literature available on cost-effectiveness of evaluation and monitoring methods. Hits mainly refer to health-related research areas such as 'Health Care Science Services' and 'Pharmacology and Pharmacy'. Literature referring to environmental science, ecology and biodiversity conservation can be found, but it focuses mainly on the cost-effectiveness of single programmes and projects, or only deals with single components of the research question (e.g. either costs or environmental impacts) rather than with evaluation methods as a whole.

A search for key words was undertaken with the Web of Science database, which is one of the most comprehensive online databases as it contains scholarly literature of various research areas. Further it is possible to select and analyse the number of hits by research areas. The test to search for 'cost-effectiveness of evaluation methods' produces zero hits. Therefore, the literature analysis is based on the combination of different keywords that are presented in Table 1. The number of hits of the predominant health research areas is opposed to the results in environmental research areas.

Table 1 Keywords for literature search and number of hits

Search	Hits	Research area	
		health related	environment related
cost-effectiveness of evaluation methods	0	0	0
cost-effectiveness	46,184	39,432	1,369
cost-effectiveness of evaluation and monitoring	0	0	0
cost-effectiveness of evaluation	3	3	0
cost-effectiveness of monitoring	12	8	4
cost-effective evaluation	95	51	11
cost-effective monitoring	119	16	63

Taking a closer look, only one article (Lindenmayer et al., 2012) is exactly suitable for our literature review, dealing with an innovative cost-effective monitoring approach for outcomes of a biodiversity conservation scheme in Australia. This shows that suitable peer-reviewed, scientific literature is rare. This can be explained by the fact that cost-effectiveness analysis is

either not yet widely applied in environmental monitoring and evaluation, or it is not explicitly discussed but included in the considerations about M&E. Many articles only deal with one or more facet (e.g. monitoring costs, comparison of different evaluation methods) of our research question. Therefore, it is necessary to collect and merge bits and pieces of important information from a large number of articles to get a broader overview of the desired information.

In addition to the data base search, an internet-based search for ‘cost of monitoring’ and ‘cost of evaluation’ was undertaken with Google Scholar. Afterwards the keywords ‘biodiversity’ and ‘water’ were added to the search respectively in order to achieve more suitable results. This search detected some peer-review articles on environmental monitoring mainly related to biodiversity. Further, some ‘grey’ literature such as working and discussion papers, handbooks, comments on articles and reports on workshops related to the research question could be found with this method. The search also led to several EU projects dealing with monitoring of biodiversity and protected areas such as BioBio ‘Indicators for biodiversity in organic and low-input farming systems’ (also recommended by colleagues of the project team), ALTER-Net ‘Improving cost-effectiveness of Natura 2000 conservation’ and EBONE ‘Cost-effective design of biodiversity monitoring for Europe’. Therefore, it is obvious that this research area is now getting more attention.

Due to the large number of articles containing sometimes only bits of valuable information, a comprehensive and conclusive literature analysis is not possible given the short time period and limited volume of this report. In this report we will address the relevant literature detected in our literature research including handbooks of the EC, OECD and The World Bank to get an idea how cost-effectiveness is dealt with in these contexts. Further we have consulted ‘grey’ literature to find some good examples.

2.2 Cost-effectiveness as an Element of Evaluation in Literature

The evaluation of a programme or project usually requires to give information on the output, results and impacts of an activity as well as the associated cost. Cost-effectiveness analysis (CEA) has the objective to find out how to achieve a desired impact with minimal resource use and thus at the lowest associated cost. In evaluation it is often used to assess the economic efficiency of policies, programmes or projects. It is a comparative approach aiming to identify the most efficient alternative by comparing different projects or programmes (Görlach et al., 2005). Wätzold el al. (2010) point out that recently cost-effectiveness is regarded as key

requirement particularly for *expensive* conservation measures, such as Natura 2000, to increase the social and political acceptance (Wätzold el al., 2010).

Cost-effectiveness can be analysed ex-post after a policy measure or programme was established in order to assess if its design is appropriate to address the target problem and what costs are associated with the programme. An ex-ante cost-effectiveness analysis has the objective to assess, before a programme is implemented or at an early stage of the programme, the most economic efficient way to reach its objectives (Görlach et al., 2005).

To calculate the cost-effectiveness, the annualised cost of the programme is divided by a physical, non-monetary benefit measure. This measure could be either a pressure (e.g. tons of reduced emissions) or an impact on the environment such as improvements or avoided damage in environmental quality. It is important to establish causality between the observed impacts and its influencing factors (Görlach et al., 2005).

To get a better idea how CEA is applied for the evaluation of RD programmes and agri-environmental policies for delivering public goods, we have reviewed handbooks and basic publications on evaluation methods of the EU, OECD and World Bank.

The OECD recognises the importance of well-designed and implemented evaluations to promote learning that is seen as the most important aspect of an accountability structure. Only through learning adjustments and improvements are possible (OECD, 2005). The OECD uses the two criteria environmental effectiveness and economic efficiency to evaluate agri-environmental policies. Environmental effectiveness shows the extent to which the programme/policy meets its intended environmental objective (e.g. threshold levels, targets), while the criteria of economic efficiency (cost-effectiveness) is used to show the extent to which the policy achieves its specified objectives at lowest cost in terms of resource allocation, budgetary expenditure etc. (OECD, 2005). Only a few evaluations have been done by the OECD focusing on environmental effectiveness but in future activities should address the development of models and statistical methods to evaluate the causality between policies and environmental outcomes. Economic Surveys of the OECD focus on the cost-effectiveness of agri-environmental policies; however they are of a general nature and have only been conducted in recent years (OECD, 2005).

Similar to the OECD, the World Bank sees in monitoring and evaluation of development programmes the chance to learn from experience and to improve their programmes regarding service delivery, planning and allocating resources as well as to present results to the

stakeholders. There is a wide range of tools and approaches used by the World Bank for the M&E of its programmes. The application depends on some considerations such as the main stakeholders interested in the results, the time frame of the evaluation and the cost. Cost-effectiveness analysis is one of them and estimates inputs in monetary values while outcomes are expressed in non-monetary quantitative terms. The cost-effectiveness assessment is used to receive information about the most-efficient allocation of resources and identifies the projects and programmes that provide the highest return on the investment (The World Bank, 2004).

According to the World Bank, the advantage of cost-effectiveness analysis is that it facilitates the estimation of the efficiency of programmes and projects, and draws explicit economic assumptions that otherwise would have remained implicit or undiscovered at the design stage. It helps to justify the relevance of projects or programmes to policy-makers and funders.

The challenges are that CEA is a quite technical approach. Therefore adequate financial and human resources need to be available. Data availability and suitability is also not always given which could lead to highly assumption-based data increasing the uncertainty. Further, the interpretation of results could be challenging particularly when the quantification of environmental benefits is difficult (The World Bank, 2004). The right timing of an assessment is crucial as it has to be long enough after the programme's implementation to be able to measure effects as well as early enough that the results can be used for follow-up measures in the future (Görlach et al., 2005).

In Europe cost-effectiveness analysis is only little used as yet as it is associated with some difficulties. Especially in the assessment of environmental impacts it is often difficult to establish causality between the observed effects and the influencing factors and to 'net-out' the effects of a single measure or programme by separating them from the effects of other factors. Further, the data collection and analysis is expected to be costly and time-consuming. Another challenge is the upscaling of measured effects to regional, national or European level as it increases uncertainty (Görlach et al., 2005).

In 2004, Wätzold and Schwerdtner conducted a literature review on the cost-effectiveness of biodiversity conservation in Europe. There was only limited literature available which the authors trace back to the focus on natural sciences and therefore on conservation goals so far, as well as the need to combine expertise from ecology and economics (Wätzold and Schwerdtner, 2004). Recently, the literature base is growing.

Guidance documents for M&E at EU level contain several references to cost-effectiveness of M&E procedures. The workshop report of the European Evaluation Network for Rural Development (EENRD) contains several references to cost-effectiveness of M&E procedures. With regard to the evaluation of environmental impacts, the importance of additional, specific indicators beyond the CMEF catalogue of appropriate monitoring and integration of different data and information is emphasised. Although the following citation from the EENRD working document is with regards to job creation, it appears quite suitable for a key question addressed in WP7: What is the value added of additional effort on M&E, and especially the potential contribution of quantitative measurements: "*Therefore the major challenge will be to find the optimal point of intersection between the costs of impact measurement and the quality standards necessary to get closer to the true impact; this will directly impact the requirements for data availability and quality. Quantitative assessment of impacts are often not realized due to*

- *the diversity of RD support;*
- *the way in which monitoring systems are set up;*
- *partly also the relative small scale of RD schemes; and*
- *doubts over "good value for money".*

However, as long as secondary data are available to implement a quantitative analysis, it should be done because cost arguments should then weigh less than the potential gains from less biased assessments." (EENRD, 2010: p. 81).

Cost-effectiveness as one of several 'evaluation alternatives' is addressed in the Evalsed Sourcebook of the European Commission (2012) on methods and techniques of evaluation of structural funds and their socio-economic impacts. As the sourcebook is under revision, it is only mentioned here without analysing specific contents. Another document of the Evalsed activity is "The resource for the evaluation of Socio-Economic Development" (European Union, 2008), which provides guidance for the evaluation of structural funds and can serve as a reference for WP7 activities.

2.3 Cost-effectiveness of Environmental Monitoring

An efficient environmental monitoring programme needs to be well-designed including a clear definition of its objectives (Lindenmeyer et al., 2012; Maes et al., 2012; Nolte et al., 2010; Lovett et al., 2007; Nichols & Williams, 2006; Yoccoz et al., 2001). The main

shortcoming of biodiversity monitoring programmes is often mentioned to be the lack of well-articulated objectives (Lovett et al., 2007; Nichols & Williams, 2006).

Yoccoz et al. (2001) recommend to arrange the design and implementation of a monitoring programme along the questions How? What? and Why? A clear definition of scientific and management objectives is essential as well as the integration of hypotheses and models in the programme (Yoccoz et al., 2001). Tackling the question How?, the integration of detectability and spatial sampling using an efficient sampling design promotes a better understanding of spatial and temporal changes of biodiversity. The different sources of error such as detection, spatial variation and survey errors should not be neglected in a monitoring programme (Yoccoz et al., 2001).

Also Nichols and Williams (2006) argue that an unfocused monitoring design results in low efficiency for the use of monitoring results in conservation. According to Platt (1964) about strong inference, the unfocused data collection that is not directly linked to the hypothesis is one of the main issues in scientific investigations. Nichols and Williams transfer this criticism to the conduction of environmental monitoring programmes. They argue that unsystematic data collection of monitoring data is not effective and underline the importance of targeted monitoring instead. To understand the function and objective of monitoring helps to create an efficient monitoring design which focuses only on the collection of data that provides exactly the information needed for the conservation decision. A well thought-through monitoring design should aim to provide the most useful data for ecological conservation (Nichols and Williams, 2006).

Hutto and Belote (2013) distinguish four types of monitoring schemes based on the questions and goals they want to address: surveillance, implementation, effectiveness, and ecological effects. Effectiveness management is focusing on the question of whether a programme is achieving its goals and objectives that were defined before. It includes a before-after comparison with a control group (counterfactual approach) to prove that the programme has an effect (Hutto & Belote, 2013). Nichols and Williams describe this approach as targeted monitoring (Nichols & Williams, 2006).

However, if a monitoring programme turns out not to achieve its intended goals it could still provide valuable information. Researchers from Scotland put it in a nutshell:

“A well designed programme that shows the scheme is ineffective is still producing useful information, especially if it indicates why there has been no response. The worst outcome is a

monitoring programme that does not indicate significant effects, and for which it is not possible to determine why; this represents a waste of resources and should therefore be avoided if possible. Adequate information should be collected to allow interpretation of negative results." (FERA, 2009: p. 8).

Cost of Monitoring

Monitoring is necessary but costly, accounting for a larger share of the financial volume of agri-environmental schemes (White, 2002). The paper of White looks at the optimal monitoring of long-term agri-environmental schemes. Monitoring has two important functions in this context. Firstly, to detect if the environmental impacts are like expected and secondly it provides an incentive to farmers to comply with the requirement in order to be not expelled from the programme (White, 2002).

It is important that monitoring programmes are linked to clear objectives, and performance indicators should be used. A baseline assessment should be included, as well as suitable and feasible controls. As environmental impacts usually need a long time to be assessed, an appropriate timescale needs to be selected. Further, it is important to select indicators that are likely to respond within this timeframe (FERA, 2009).

In the PEER (Partnership for European Environmental Research) report it is stated that a better understanding of the impacts of current policies on ecosystem services would help to manage the ecosystems better and more cost-effectively. It also points out the need for systematic and long-term monitoring programmes in order to provide detailed and systematic data about ecosystem services (Maes et al., 2012).

However, environmental monitoring is often criticised for being too costly, unscientific and wasting resources. A review of Lovett et al. in 2007 deals with the importance of environmental monitoring when it was effectively designed. The scientists mention the need to consider data quality and accessibility as well as cost-effectiveness in the development of environmental monitoring programmes. The keys to a good monitoring programme are the formulation of compelling scientific questions, an appropriate research design that could adapt to changes if necessary, high quality data that is accessible and the careful interpretation of results (Lovett et al., 2007). The OECD also mentions these criteria as essential for good environmental monitoring. For the development of a sound evaluation framework, the selection of performance criteria as well as the consideration of technical feasibility and policy priorities is crucial. They are linked to each other, e.g. has the development of

appropriate research questions implications for the type and amount of data collection? Once the decision has been made, it is difficult and costly to change the type or amount of data collection. The collection of relevant data is important while gathering of irrelevant variables should be avoided. In addition, data have to be considered that could become important at a later evaluation stage (OECD, 2009). However, as mentioned before, the collection of unnecessary data should be avoided as this is a waste of resources (Nichols & Williams, 2006). In conservation biology, surveillance monitoring involving a large amount of omnibus data is mainly used while monitoring for decision making and science is not widely applied (McDonald-Madden et al., 2008).

During the evaluation process, several decisions have to be made that influence the cost-effectiveness of an evaluation framework. Cost-effectiveness can be increased by making the right decisions about evaluation design. The decision making is influenced by the limited factors of money and knowledge. Furthermore, the relationship between the programme and the environmental impact is usually uncertain and thus relies on assumptions and estimations. This increases uncertainty substantially when it comes to detecting these relationships (McDonald-Madden et al., 2008). A decision tree (simple framework) was developed by McDonald-Madden et al. to monitor support to the decision-making process (McDonald-Madden et al., 2010). Geupel et al. comment on this simple framework that it simplifies the costs, benefits and uncertainty too much. However, they recommend it to decision makers to use it carefully as it still provides a systematic approach to develop monitoring programmes (Geupel et al., 2011).

Wätzold et al. (2010) used a framework for assessing cost-effectiveness of conservation policies that includes decision-making costs. Decision-making costs are related to attaining information on optimal design and implementation of conservation measures including the cost of monitoring the success of the measure. Trade-offs between the cost that occur for decision-making and the quality of the decisions are possible. Decisions that have been made with low decision-making costs may not automatically result in cost-efficient policies regarding production costs (Wätzold et al., 2010).

The results from case studies in Finland, Germany, the Netherlands and Poland show that future research should be directed to trade-offs between different cost sources, e.g. higher decision-making cost through stakeholder participation could lead to lower production cost. A better understanding of these trade-offs is necessary in order to develop mitigation options to enable better policy recommendations. Further, a stronger focus should be given on the

analysis of other factors that have an important influence on cost-effectiveness. Besides spatial and temporal analysis, administrations and rules and governance structures within administrations proved to be relevant factors (Wätzold et al., 2010).

Optimisation of biodiversity monitoring can be achieved through the close collaboration of data users and providers. Furthermore, important aspects influencing the cost-effectiveness of environmental monitoring are the sampling design and the time required to carry it out (De Blust et al., 2012).

Tulloch et al. (2011) developed and evaluated approaches for a cost-effective and useful indicator selection. The selection of indicators is often driven by the skills and knowledge of the monitoring organisation and not done in a systematic, transparent, explicit and repeatable selection process. Selection criteria, such as the indicator being easy-to-measure or the historic prevalence of data, are usually more important than considering cost-effectiveness or responsiveness to management. The authors used fox control measures in Australia as a case study to compare different approaches of indicator selection. By including information about monitoring costs, leverage, certainty, benefits and probability of management success in an indicator selection process, the efficiency and effectiveness of conservation programmes could be improved and the use of financial resources for conservation actions justified (Tulloch et al., 2011).

Carlson and Schmiegelow (2002) investigate cost-efficient sampling strategies for ecological monitoring programmes using long-term avian population of a boreal forest in Canada as an example. The design of a cost-effective monitoring programme needs the understanding of why it is useful to apply a certain kind of sampling method. To identify cost-effective sampling methods, power and cost analyses were applied comparing the rate of increase in power to the rate of increase of costs. The results suggest that it is more cost-efficient to monitor a larger number of sample sites more infrequently than a smaller amount of sampling sites with a high frequency. This can be explained by the fact that a high sampling frequency is costly and the inclusion of more sites increases power (Carlson & Schmiegelow, 2002).

Lindenmeyer et al. (2012) mention three possibilities to reduce sampling costs: to visit fewer farms, to reduce measurements at farm level or to visit farms less frequently. The authors favour the last one, reducing the frequency, using a rotating sampling approach. Thereby they keep the number of sampling sites as well as the amount of data collected (Lindenmeyer et al., 2012).

Experiences from the evaluation of environmental impacts of the Scottish RD programme regarding the sample size led to another conclusion. A survey was undertaken covering a high number of farms (80 pairs = 160 farms). Farms were visited for a baseline assessment and the reassessment was undertaken in the following two years. However, due to financial and human resource constraints, the visits of the farm were short, leading to the collection of few and not always suitable data. A consideration of FERA was to reduce the number of visited farms to 30 pairs (60 in total) but to spend more time on data collection on the farms. When the sample sites are not located close to each other, it is possible that too much time is spent on travelling between the sites (FERA, 2009).

The literature analysis detected several projects at European level in the area of monitoring of biodiversity conservation. The EU-FP7 project BioBio – 'Indicators for biodiversity in organic and low-input farming systems' - aimed to identify biodiversity indicators that are scientifically sound, generic at the European scale and relevant and useful for stakeholders (BioBio project website, 2013). Environmental monitoring is dealing with limited resources; thus the availability of cost data of the monitoring activities related to biodiversity indicators is important. However, only few studies exist that deal with the cost of biodiversity monitoring. The BioBio project conducted several case studies whereof the following dealt with the cost of biodiversity monitoring.

Within the BioBio project, Targetti et al. (2011) compared the cost-effectiveness of four different biodiversity indicators in a case study in France. They noticed that the largest share of costs is attributed to the field work and analysis of the samples, with labour being the main cost source. Desk and laboratory work are only a small part of the total cost. The four analysed indicators vary in costs mainly due to different duration of sampling (e.g. the sampling of the spider indicator needs more time than the bee indicator). Good organisation as well as the use of cheap labour force (e.g. student workers) could reduce the monitoring costs (Targetti et al., 2011).

Another case study within the BioBio project was conducted at 16 dairy farms in Southern Bavaria, Germany by Wolfrum et al. (2012) using the earthworm indicator for biodiversity monitoring. The costs of the measurements were compared including all resources for the measurement and analysis of the indicator. The case study compared the cost-effectiveness of different sample sizes (1 – 5 plots per farm). In this study, a sample size of 3 turned out to be the most efficient considering the costs, but with a sample size of 5, bias, precision and

accuracy could be improved. Furthermore, this would provide a better basis to compare the species richness between the different farms (Wolfrum et al., 2012).

The EU ALTER-Net network has the objective to assess the cost-effectiveness of conservation policies (e.g. Natura 2000) in Finland, Germany, The Netherlands and Poland. Production costs for conservation measures, cost of monitoring compliance with policies and costs associated with researching, designing and evaluating conservation measures are included in the framework (EC, 2010). Results from this activity underline the importance of long-term funding, to avoid overlapping of institutional competences, and suitable attribution of funds for the development and the creation of management plans as well as the need for measurements in the field (Parr et al., 2009).

The protected area management effectiveness (PAME) evaluation study of Nolte et al. (2010) had the objective to provide an overview of the PAME evaluation activities in Europe regarding the application, methodologies and the assessment of the results. When it comes to the design or selection of an evaluation method, the information on financial and human resources needed for the evaluation are important to policy makers. However, only few studies include data on the overall costs and staff time, or attributes costs to its source. Further, the high diversity of evaluation activities hampers the comparison between different methods (e.g. field visit of evaluators, workshops, questionnaires). Also the indicator and data variety is high. Effectiveness could be increased if organisations would streamline their data, make it more transparent and share it with each other. In general, cost-effectiveness can be increased by setting well-defined objectives (better-informed priority setting) and by reducing inefficient processes. Furthermore, effective evaluation can increase the credibility of involved organizations and conflicts between the actors can be reduced when the evaluation is carried out along clearly defined and measurable objectives. The evaluation process should be seen as continuous improvement and institutional learning instead of judging or apportioning blame on stakeholders (Nolte et al., 2012).

2.4 Summary

The literature review identified that there are only a few publications directly dealing with the cost-effectiveness of evaluation methods, although an increasing interest is visible. Many reports indicate that evaluation and monitoring should be designed and implemented in a ‘cost-effective’ way but most of them do not define and explain what that precisely means. It seems that cost-effectiveness is a keyword as it sounds reasonable to consider but the approach is not applied or explained.

Cost-effectiveness assessment (CEA) is therefore not widely applied in environmental monitoring and evaluation; however more and more articles are recognising the importance of including cost in the assessment. In the past, the focus was more on ecological impacts; now a more interdisciplinary approach is used.

A broad basis of articles is dealing with 'effective monitoring', as monitoring is often criticised as being costly, inefficient and not targeted. Therefore, as monitoring is essential to justify and receive information on the success of policies and programmes, many articles deal with its improvement. Concerning environmental monitoring, most articles considered in this review are related to biodiversity monitoring.

3 Stakeholder Consultation on Monitoring and Data Use

3.1 Description of Stakeholders, Objectives of the Interviews

In the framework of the ENVIEVAL project, the first stakeholder consultation was carried out in June and July 2013 and conducted in the partner countries and associated states (e.g. Poland).

The main aims of the stakeholder consultation were:

- To identify key gaps and problems from the stakeholders point of view
- To collate information on why certain indicators, data bases and methods have been used
- To assess the expectations and requirements for future indicators and methods.

Each partner interviewed evaluators and other stakeholder such as representatives of the managing authorities involved in the evaluation of environmental impacts of the RD programmes. The stakeholders represent experiences from Finland, Germany, Greece, Hungary, Italy, Lithuania, Poland, the United Kingdom (England and Scotland), as well as the perspective of the European Evaluation Network for Rural Development (EENRD). A total of 31 qualitative interviews were conducted by the end of July 2013, using a guideline-based questionnaire with mainly open questions. Therefore, the outcomes of the stakeholder consultation represent a rough assessment of the situation in the partner countries and are highly subjective. The duration of the interviews varied between one and three hours per interviewee depending on the time availability and the work area of the stakeholders. Some were not directly involved in data analysis and therefore could provide less information than other stakeholders.

The questionnaire was divided into three sections:

- Part 1: Stakeholder description
- Part 2: Current approaches and gaps
- Part 3: Expectations and requirements for future indicators and methods

This report deals only with the information relevant for the research questions in WP7, that is Part 2 of the questionnaire concerning queries about the use of existing and additional data sets, data access, use of technical assistance and models. The objective was to get an overview of what is currently done in the partner countries and to identify the gaps and needs regarding evaluation methods and data analysis. This information was required to fill information gaps identified in the review of the evaluation reports and to ensure that the activities in the ENVIEVAL project are addressing the most urgent issues. WP3, WP4 and WP5 are using relevant information from the stakeholder consultation for their research questions. An overall synthesis of the stakeholder consultation is provided by D9.3 in WP9.

3.2 Outcome of Stakeholder Interviews

3.2.1 Challenges for evaluating environmental impacts

Many stakeholders mentioned the need for clear and well-articulated objectives and related indicators to evaluate the impact of the measures and programmes. Challenges are multiple drivers and the diversity of landscapes and farm structures that make the evaluation very complex. Often it is not possible to evaluate the net-effects of RD programmes and attempts to calculate them are mainly based on assumption of experts. Further, measures with environmental ‘side effects’ are also difficult to evaluate as there is a lack of monitoring data.

The time lag between interventions and impacts was mentioned as a big problem. Therefore, a better timing of the evaluation was recommended. For example the mid-term evaluation was mentioned by several interviewees to be too early in the evaluation process to be able to measure impacts. Also, there are path dependencies when monitoring programmes are set up. At a later stage is is difficult to include additional data (as discussed at the Stakeholder Workshop in Rome, July 2013).

Further the lack of common evaluation activities beyond single RD programmes was reported, even between regions of the same EU member state. Obviously, there is scope for cost-saving cooperation between programmes of neighbouring regions. Another bottleneck is the question of scale. There were only few experiences with upscaling reported as it is difficult and increases uncertainty (‘extrapolation of assumptions’). Instead of weak GIS-

based extrapolation, more monitoring efforts on the ground are required. Environmental monitoring data is often lacking or not suitable for quantification of environmental impacts. Further the linkage to impact indicators is mentioned as being too weak. The EU monitoring data is mainly related to output and result indicators which are not considered suitable to measure environmental impact. Additional environmental monitoring data can be useful to strengthen the linkages to CMEF indicators (e.g. Farmland Bird Index).

3.2.2 Use of existing and additional data sets for the evaluation of RDPs

Most of the stakeholders that are involved with the analysis of data for the evaluation of RD programmes mentioned that Integrated Administration and Control System (IACS) data is the main data source and frequently used for different measures and public goods. Further, Farm Accountancy Data Network (FADN) and Agricultural Statistics (e.g. Farm Structural Survey, FSS) were mentioned by several interviewees to be used as well as FFH habitat types and HNV.

Access to data is not mentioned as a big problem as it is usually provided free of charge by the managing authorities to the evaluators. None of the interviewees could indicate the cost of the data necessary for the evaluation of RDPs. Several respondents reported technical problems with the data sets as they are not always suitable for the specific evaluation needs (e.g. low sample size, weak link to support measures, different scaling). Some data. e.g. IACS, is only provided as aggregates, or the precision is not high enough to be suitable for the evaluation. In case of IACS data, the geo-referenced data of the land parcel information system are not used for evaluation in all countries, although they provide a very detailed picture of land use and allocation of land-related RD measures. Further, legal restrictions, for instance single farm data of FSS, is difficult to access because of data protection laws, were mentioned as obstacle. Thus, many stakeholders were not able to establish a control group for a counterfactual analysis because the data of non-participants was not available or accessible. Therefore, the counterfactual approach was hardly used.

Legal obstacles are also reported to be an obstacle for the merging of data sets. Several respondents mentioned lacking ID codes so that different data sets cannot be matched. Furthermore, the acquisition, merging and analysis of data is very resource intensive, requiring expert knowledge. These reasons were also mentioned regarding the little use of models.

Another query of the stakeholder consultation addressed the use of additional data sets for the evaluation of RD programmes. Additional data was collected when the available data was not sufficient to derive conclusions on environmental impacts. Several interviewees indicated that additional data was collected through qualitative and quantitative farm surveys, based on interviews. Although this is not evidence based, but reflects farmer's views, the additional data was mentioned to be useful when no suitable data sets are available. A lack of resources for additional data monitoring was mentioned. There was no systematic information on the use of technical assistance according to Regulation (EC) No 1698/2005, article 66 available from the stakeholder interviews. Respondents often could not provide any information on the source of funding for additional data collection.

3.3 Observations from Stakeholder Interviews

A strong need for targeted monitoring data is expressed by the interviewed stakeholders. There is a large variety of data sets used for the evaluation of RD programmes in the EU member countries. However, the main data set seems to be IACS data as it is used in all consulted countries. It is not designed primarily to serve evaluation purposes; therefore it does not always fit its needs. Several other problems with data management were mentioned and the evaluators seem not to be able, or lacked the time, to extend the use of data sources for evaluation.

The stakeholder consultation further highlights the need to collect additional data sets when no suitable data or no access to data is available. Although it is only a 'soft' approach, evaluation of RD programmes relies often on such data, e.g. from farmers interviews, to provide information on environmental impacts. It appears that the respondents could not provide information on the costs of data access or the source of funding for additional data collection.

Several interviewees pointed out that the programmes are lacking well-articulated objectives and that the CMEF indicators are not suitable to detect environmental impact of RD programmes. Another hint that concrete environmental objectives are lacking is that the payment-by-result approach is scarcely used in the analysed RD programmes. A general and frequently mentioned criticism of RD programme evaluation procedures is that too much time is spent on fulfilling the formal requirements of the evaluation even if they are considered to be ineffective.

4 Results and Conclusions for Further Steps

The outcomes from the literature review as well as the stakeholder interviews show the high relevance of the question how to increase cost-effectiveness of evaluation of RD measures and their environmental impacts. Cost and appropriate design of monitoring, access to existing data sets and their integration, and additional monitoring have been identified as key issues. Regarding the need to describe the counterfactual, the lack of appropriate data for non-beneficiaries is a special challenge.

Further steps are the elaboration of a framework for defining and measuring cost and effectiveness. This framework constitutes the basis for the case study work, including the design of questions, data collation and analysis regarding cost-effectiveness of M&E. As an outcome, good practice examples and approaches can be provided, based on the individual case studies. In order to generalise the results, the whole evaluation process will be analysed regarding the costs and impacts included in each step. Key positions and determinants of cost in the evaluation process will be indentified, as well as crucial points in time and decisions needed during the M&E process which have impacts on both cost and effectiveness of the evaluation and the applied methods.

5 Literature

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6 Annex: Questionnaire for Stakeholder Interviews (Part 2)

Part 2 Current approaches and gaps

1. **Use of existing Data Sets for the Evaluation of RDPs**

Existing data is used	For which analysis was the existing data used? Was it used more generally for certain types of measures *(e.g. AEMs) or for specific public goods (e.g. biodiversity, water, climate)?*	Obstacles for accessibility to data			Comments
		Legal *(right to personal data, other legal restrictions)*	Technical *(structure of data, format, etc.)* cannot be taken	Financial *(if possible, please indicate a cost)*	
Agricultural Statistics (e.g. Farm Structural Survey, FSS)					
Integrated Administration and Control					

System (IACS):					
farm data on land use					
Land Parcel Information System (LPIS - GIS data)					
Data of the EU system for livestock identification, registration and traceability					
Farm Accountancy Data Network (FADN) FFH-Habitat types (mapping and status)					
HNV - what scale (regional or at farm level)?					
Target areas / designated areas (e.g. nature protection areas, water protection areas, WFD, flood areas)					
National Soil Inventory					
Topography (slope)					

Other					

1.1. Have different farm data sources been merged for analysis (FSS, IACS, FADN)? Are there restrictions for merging data sets?

1.2. Were there any useful linkages between monitoring data and impact indicators?

1.3. Were there any useful linkages between impact indicators and other types of indicators?

2. Technical support for the implementation of RDPs

2.1 Was the technical assistance according to Regulation (EC) No 1698/2005, article 66 used[1]?

2.2 To what extend and what was the technical assistance used for (e.g. for the collection of additional data)? If possible, please recommend documents on the use of the EAFRD budget for technical assistance.

3. Use of additional data sets for the Evaluation of RDPs

3.1 Was it necessary to collect additional data?

- Why?
- Was the explicit purpose to serve impact indicators?
- For what public goods and (specific) measures? Please give examples.

3.2 What type of statistical data collection and analysis was used?

- Was this data combined with existing surveys and data sets (IACS, FADN)?
- At which level: public good/measure or programmelevel?
- At which regional level: local, one or more RDP programme regions, national level?

3.3 Who collected the data? (e.g. Evaluators, public authorities, research project)

[1] (66) The effectiveness and the impact of actions under the EAFRD also depend on improved evaluation on the basis of the common monitoring and evaluation framework. In particular, the programmes should be evaluated for their preparation, implementation and completion.

- Which resources and funding have been used? *(apart from technical assistance, see Q2)*
- What are the required efforts (time, human, financial resources) or approximate costs for data collection?

4. Data use –general questions

4.1 Are effects at measure (e.g. AEM in general) or sub-measure level (e.g. specific AEM) quantified? For what public goods? Using which methodology

- **Climate and water:** Gross nutrient balance (GNB), N balance surplus (what data is used, e.g. Nitrate Directive, other administrative data? At farm or at regional level?)
- **Biodiversity** (HNV and wildlife): Linkage between habitat and biodiversity monitoring with administrative data (IACS) and other GIS data?
- **Soil**
- **Landscape**
- **Animal Welfare**

4.2 Is a counterfactual approach used? If yes, how are counterfactuals (farms without RDP measures) integrated in the assessment? If not, why was the counterfactual approach not used?

4.3 (For regions with sub-national EAFRD programmes:) Is data collection and statistical analysis realized at each EAFRD programme level, or in co-operation for different programmes?

4.4 Are there AEM or other measures based on a payment-by-result basis (outcome-oriented measures), where beneficiaries are remunerated according to the effects achieved? If yes, please describe briefly:

5. Use of Models: E.g. bio-physical modeling (e.g. on water pollution), farm level models?

For which analysis were models used? Certain types of measures (e.g. AEMs) or for specific public goods (e.g. biodiversity, water, climate)? Use as part of research projects, as part of EAFRD evaluation?

6. How did you deal with the following issues:

6.1 Farm – local – regional – national level data / indicators

Although the measures could be implemented at local – regional…. level, the decisions that affect the public goods are always taken and primarily, but not only, have an impact at the farm level. Furthermore in many cases data were drawn (and hence indicators estimated) at the farm level while the report should be made for impacts at a higher level or vice-versa. How did the respondent's team deal with this problem.

6.2 Sub-measure - Measure – Programme level data/indicators.

A similar with the above issue arises when sub-measures and programmes are concerned.

7. **Overall, what are the most important gaps and needs, which should be addressed by the ENVIEVAL project?**