# **Monitoring and Evaluation for Ecosystem Management (MEEM) - Comparing theory and** documented practice across Europe

**Technical Report, November 2017** 



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# Acronyms

AES	Agri-environment schemes (under Rural Development Programme)
САР	Common Agricultural Policy of the European Union
EAFRD	European Agricultural Fund for Rural Development
EU	European Union
GIS	Geographic information system
GDP	Gross domestic product
M&E	Monitoring and Evaluation
MEEM	Monitoring and Evaluation for Ecosystem Management
N2K	Natura 2000, including Birds- and Habitats Directives of the EU
NGO	Non-Governmental Organisation
РоМ	Programme of measures (under Water Framework Directive)
RDP	Rural Development Programme
RBMP	River Basin Management Plan (under Water Framework Directive)
SMP	Site management plan (under Birds Directive or Habitats Directive)
WFD	Water Framework Directive

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## **1. Executive Summary**

This report summarises the findings of a research process that sought to consider to what extent the statutory monitoring and evaluation procedures associated with three European Union (EU) policies (Water Framework Directive (WFD), Natura 2000 (N2K) and Common Agricultural Policy (CAP) enable theoretical ideals of adaptive management of socio-ecological systems. Whilst these policies may not have been set up with these ideals in mind, management of natural assets such as water, soil and biodiversity requires adaptive approaches to their protection and restoration, particularly in light of climate change.

The research focused on site level management actions, and their associated monitoring, namely programme of measures (PoMs) for WFD; site management plans (SMPs) for N2K and agrienvironment schemes (AES) as part of the Rural Development Plans (RDP) under CAP Pillar two. A comparative approach was taken across nine geographical cases covering six member states and three regions where the implementation is devolved (see section 4). Consortium members provided information using common templates and discussed findings at a workshop and through virtual meetings. There are some limitations to our approach. Firstly, although the EU policies are common across all cases, the process of transposition and implementation varies, affecting our ability to compare like with like. Secondly, our data comes only from publicly available documentation, which often meant that we may have only a partial understanding of what happens in practice.

The monitoring and evaluation of programme of measures, site management plans and agrienvironment schemes were analysed against three areas reflecting adaptive management principles:

- 1. Are all aspects of the system being monitored?
- 2. Is monitoring data accessible and available?
- 3. Is monitoring data used in decision making about site management?

In terms of the first question, it appears that monitoring as currently carried out fails to deliver what might be required to understand a dynamic and multi-level socio-ecological system. Across all three directives there is some social and economic data collected, but it is insufficient, in our view, to fully understand interactions between humans and the rest of the ecosystem. Monitoring for the WFD includes both biotic and abiotic components, whilst the N2K directives and AES focus more on biotic indicators. However, this is not always enough to understand (eco) systems. Especially for the AES there is much more information that could be collected or used to better understand interactions and eco-systems. Findings show that contextual information is often missing in the monitoring programmes, although context is considered in some management plans based on secondary data.

In terms of the second question, comparing across policy areas shows that monitoring data collected for WFD and N2K are generally reasonably accessible, often with interactive web-interfaces, while data availability for AES is not good in most countries. Our results also suggest the WFD tends to rely on primary data more than N2K monitoring, whilst AES tends to use the most secondary data (i.e. data collected for other purposes and re-analysed); which influences data availability and accessibility. We found that WFD monitoring tended to be done by state agencies with limited nonstate or citizen involvement, whereas both the N2K and AES site monitoring often involved both state and non-state agencies. Where citizen science is used, it tends to be linked to biodiversity assessments.

In terms of the third question, most cases show that management actions had been adapted, although it was not always clear to what extent these choices were driven by monitoring data. However, our participants felt the data were not sufficient to link any change in environmental status to management actions; as the monitoring regimes remain focussed on monitoring the state of the environment. In all three policy domains, it remains rare for there to be publicly available documentation that explains how the monitoring data has been used to revise the management actions (PoMs, SMPs or AES measures) or the parent policies. Furthermore, whilst there are evaluation processes for each policy, the effect of management interventions tends to be evaluated using separate research projects that mean there is no systematic overview of what works at a national scale over time. Whilst there is participation in decision making to varying degrees, it is very unclear from publicly available documentation which actors actually influenced these decision making processes.

Our findings suggest that there are differences between policies that partly reflect the political and ecological features of the time when the policies were introduced. The WFD appears to be the most adaptive scheme with different forms of monitoring anchored in the fabric of the policy, whereas the AES seems to be the most procedural and variable between cases. The site management plans under N2K are statutory; and the PoMs tend to contain both regulatory and voluntary measures; whereas AES are voluntary incentives. Sometimes there are similarities, for example the Scandinavian region (Estonia, Finland, Sweden) have greater focus on data accessibility, while other regions appear to take a minimalist approach to meeting monitoring requirements (Flanders, Catalonia).

Recommendations arising from this study suggest the need to broaden the informational basis of monitoring schemes to include other forms of knowledge (including available secondary data and citizen science) and to include stakeholders at all stages of the adaptive management cycle. This implies including socio-economic information (in particular preferences and perceptions of the public), interactions in systems and wider contexts affecting the system (including economic and policy contexts). Recommendations also point at the need for increasing transparency of how monitoring data are used in decision making at the level of both management plans and policy reforms. This transparency could be achieved by publishing regular evaluation reports at a level between raw monitoring data and policy change. Drawing the analytical link between these two levels is the essence of adaptive management and is currently often missing. A final point emerging from the recommendations is the potential of integrating monitoring schemes for the different directives. This would require improved coordination between ministries or departments and would benefit from further open access policies applied to monitoring data.

Overall, the research has illustrated that there is room to make the monitoring of these policies more adaptive and fit for purpose in multi-level socio-ecological systems. However, the research has also illustrated plenty of good practices already ongoing, often within very constrained public sector spending. These messages, along with our recommendations, will be shared with policy makers in

the nine cases, to begin a conversation around whether, and how, to make statutory monitoring more amenable to the principles and ideals of adaptive management.

## 2. Introduction

This project was designed to explore the monitoring and evaluation (M&E) aspects of three major EU policies affecting the environment: Water Framework Directive, Natura 2000 and Rural Development Programmes under the Common Agricultural Policy (the choice of our cases is discussed in section 3). M&E is a critical part of the adaptive management cycle, which is in turn essential for improving environmental management (Holling, 1978). The ability to learn and adapt has become more pressing given the global challenges of the Anthropocene, such as climate change, non-native invasive species, demographic shifts, impacts of new technologies and unpredictable political and economic crises. Global initiatives, like the Sustainable Development Goals, further emphasise the need to improve how we govern and manage complexity (Vasseur *et al.*, 2017).

The importance of adaptation to environmental change for the management of natural capital (soil, water and biodiversity) is recognized by incorporating drivers of environmental change (e.g. climate and land use) in policies relevant to the management of natural capital. For example, the Scottish Climate Change Adaptation Programme (Scottish Government, 2014) states that the inherent uncertainty in some aspects of climate change means that adaptation policies need to be flexible and change based on new information.

Whilst adaptive management has been advocated, and implemented, for many years, the meaning remain contested. Although we recognise that informal adaptation occurs much of the time e.g. farmers observing their fields and updating their land management, we focus on cases when there are clear objectives and a purposeful plan to learn from monitoring data. Ideally there should be a documented plan for both monitoring, and how the resulting data will be used in evaluation and feedback.

Whilst the focus on M&E in adaptive management is well established in the literature, there is still little recognition of how statutory monitoring programmes, required by nation-state governments, work with an adaptive management framework. Therefore the aim of this study is to consider how well statutory monitoring regimes specified in three EU policies comply with theoretically derived principles of adaptive management.

These principles were adapted from criteria developed in Waylen & Blackstock (2017). The focus was on the following questions:

- (1) What is being monitored?
  - a. Are social aspects of the socio-ecological system monitored?
  - b. Are all aspects of the non-human ecological system monitored?
  - c. Are contextual factors influencing the cases monitored?
- (2) 'How' is monitoring carried out?
  - a. Are secondary data being used?
  - b. Are all relevant actors involved?
  - c. Are the data available and accessible?

- (3) How does monitoring allow management and policy to be adapted?
  - a. Does monitoring inform decisions to revise management actions?
  - b. What is the role of monitoring data in policy evaluation?
  - c. Which actors are involved in using monitoring data?

However, our research did not explore the motivations for monitoring, given that in our cases, monitoring is prescribed by the parent policy. Instead, the third area for our focus was on whether the monitoring data were used to inform and improve site management.

The report uses the lens of adaptive management, rather than adaptive governance (Chaffin, Gosnell and Cosens, 2014), to focus our attention on how monitoring data is used to make decisions about measures implemented at specific sites rather than the more abstract levels of plans, strategies and parent policies. However, site management is influenced by, and influences, the multi-level and poly-centric policy processes and their associated governance process (Schultz *et al.*, 2015). Therefore, adaptive management is part of a wider adaptive governance process. The workshop participants also debated whether to use the prefix "co-" to imply the need to develop approaches with a collective (co-management e.g. Olsson *et al.*, 2007) but decided this was redundant as the literature on both adaptive management and adaptive governance advocate the need to work with all the relevant stakeholders.

The aim of this report is to consider how these academic insights can be used to consider how best to adapt and improve the statutory monitoring processes at the appropriate points in their wider policy cycles. The academic literature sets out an ideal that can be read to imply a requirement to monitor everything, everywhere, and involve everyone in decision-making. However, this ideal may not be practical in an era of public spending constraints. Therefore, this report looks at how the monitoring regimes currently perform against our selected adaptive management principles, but the recommendations focus on areas where improvement could make statutory monitoring procedures both more effective and more efficient.

## 2.1. Defining our terms

The definition of 'monitoring' was not necessarily simple or shared by all. For example, for one workshop participant monitoring had a very precise meaning: measuring a problem whilst collecting data on variables would be described as a survey; whilst others noted that monitoring could mean any form of record keeping. For the purposes of our study, we concluded that monitoring can be used in three ways: to identify the problem, to design the solution, and to see if the solution works. We also discussed the relationship between data, information and knowledge (Zins, 2007), recognising that data were provided by monitoring but further analytical processes were needed to turn these data into information, and many cognitive, cultural and social processes intervened to allow information to become useful knowledge. Likewise, there is a huge literature on evaluation with many different definitions and debates about timing, purpose and focus of evaluation (cf Daigneault, 2014).

For the purposes of this research, we were interested in monitoring data collection and use as part of the official monitoring programmes for the individual policies. Data collected under these programmes was considered primary data. Data collected for other policies and purposes but used to (re)design management measures were considered as secondary data. We were interested in how these primary and secondary data sources were used to *ex-post* evaluate the performance of past management and where they were used to run *ex-ante* appraisals for the same site based management approaches.

## 2.2. Overview of document structure

The document is structured as follows:

Firstly, we discuss the selection of cases, including our rationale for the choice of the three policies and the range of geographical cases that are compared (section 3). Secondly, we discuss the methodology selected, how the data were collected and analysed, including the limitations to our approach and the corresponding caveats to our findings (section 4). We then turn to our findings (section 5) where we discuss:

- What is being monitored;
- How is monitored carried out; and
- How is M&E used in changing site management and the wider policy.

In section 6, we discuss our findings, both comparing the directives but also considering any patterns arising between the geographical cases. Finally we look at the recommendations arising (section 7) and conclude with a brief summary of the remaining next steps (section 8).

## 3. Cases

Three European Union policies were selected to provide insight into how policy-driven monitoring is in line with the principles of adaptive environmental management, specifically understanding and management of natural assets such as soil, water and biodiversity. The selected EU policy areas were:

- The European Agricultural Fund for Rural Development (EAFRD) under Pillar II of the Common Agricultural Policy (CAP);
- The Water Framework Directive (WFD; 2000/60/EC); and
- The Natura 2000 (N2K) coordinated network of protected areas which are made up of Special Areas of Conservation and Special Protection Areas designated respectively under the Habitats Directive (92/43/EEC) and Birds Directive (2009/147/EC).

These European policy cases were chosen because they provide a common basis for national level policy influencing land and water management across European countries. Three cases provided a balance: sufficient diversity to compare and contrast approaches; yet sufficiently focussed to manage the data in a matrix for our workshop activities. These policies were not necessarily designed to be adaptive or to take a socio-ecological systems approach. However, all three have monitoring and evaluation cycles built into their policy framework; and are having to adapt to processes of environmental, economic and societal change.

The report focusses on how the monitoring and evaluation for these three EU policies was implemented across nine geographical cases, drawn from the ALTERNET network. Whilst these were self-selecting, the process was managed to ensure a wide range of institutional and bio-climatic conditions. Of these nine, six were EU member states and three were regions within member states:

Catalonia; Estonia; Finland, Flanders; Hungary; Romania; Scotland, Slovakia and Sweden. The reason for the difference is that we wished to look at the statutory monitoring processes associated with the three EU policies and in three cases, Catalonia, Flanders and Scotland, environmental policy is devolved to the regional level.

The WFD, N2K and EAFRD have been transposed into national policy instruments. For example in Scotland the Habitats Directive is translated into Scots law through the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended in Scotland); the WFD as <u>Water Environment and Water Services (Scotland) Act 2003;</u> further elaborated in the <u>Water Environment (River Basin Management Planning: Further Provision) (Scotland) Regulations 2013</u> and <u>the Cross-Border River Basin Districts (Scotland) Directions 2014</u> and the EAFRD through the Rural Development (Scotland) Regulations 2015. As discussed in the workshop, there is heterogeneity of approaches taken across Europe, with three main approaches observed. Firstly, some cases implement each directive with its own legislation. Secondly, some cases implement many environmental policies through one law (e.g. Estonia's Nature Conservation Act). Finally, some cases have more than one piece of legislation for one directive (e.g Slovakia has 3 main regulations and 41 further regulations for transposing N2K). Furthermore, the specific details of policy monitoring are often influenced by the legacy of past ways of working. Therefore, there will be limits to the comparability; however any commonalities or trends across this diverse group are likely to be generated by the common policy.

Our focus on adaptive management means we have focussed on main management level for each of these policies, which generally equates to the scale at which monitoring is carried out. For the WFD it is the cycle of programme of measures (PoMs) on individual waterbodies and for N2K it is individual site management plans for specific species and habitats. The RDPs tend to be large and multi-faceted, so we selected agri-environment schemes, with their associated monitoring of the management actions at the farm level. The WFD and N2K management instruments have a specific focus on landscape scale management, and the AES are an important financial instrument for meeting WFD and N2K targets.

Therefore, the focus of the research has been on the officially designated monitoring procedures for those management actions. For example:

- Official WFD monitoring programme in each country, plus any plans for monitoring of measures listed within RBMPs (River Basin Management Plan);
- Monitoring guidance for N2K sites, plus any plans for monitoring of measures listed in the site plans; and
- Monitoring guidance for AES schemes, plus any country-specific statements about how they apply the EU Common Evaluation and Monitoring Framework for the whole CAP).

## 4. Methodology

#### 4.1. Recruitment and sample

As part of ALTER-Net's 'High Impact Actions' initiative<sup>1</sup>, the James Hutton Institute publicised a call<sup>2</sup> to find partners in European countries with an interest to contribute to the understanding of policydriven monitoring and evaluation practices across Europe, and to identify implications for future monitoring and evaluation in line with adaptive ecosystem management. The resulting sample includes 9 countries (see Figure 1), representing a good geographical spread, and including both younger and older member states of the EU.



Figure 1 Map representing sample of 9 countries involved in the MEEM initiative (Norway was later removed as case study due to lack of comparability)

Institutes representing these countries were the Scottish James Hutton Institute (Hutton); the Finnish Environment Institute (SYKE); the Flemish Research Institute for Nature and Forest (INBO); the Estonian University of Life Sciences (EMU); the Institute of Landscape Ecology at Slovak Academy of Sciences (SAS); the Hungarian Academy of Sciences Centre for Ecological Research (MTA); the University of Bucharest; the Ecological and Forestry Research Applications Centre at the University of Barcelona (CREAF); and the Swedish University of Agricultural Sciences (SLU). The Norwegian Institute for Nature Research (NINA) was initially one of the case studies, but since

Norway is not part of the EU, their policies proved difficult to compare. NINA has been involved in the project in an advisory role.

#### 4.2. Templates for data collection

The data collection was guided by templates developed for this purpose. The same templates were used to assess the three EU policy areas under focus: the WFD, AES, and N2K which encompasses the Birds and Habitats Directives. An **initial template** was developed before the workshop to structure the information collection and to help scoping key issues and differences across countries. The resulting data was the main input for discussion at the workshop in June 2017 (see section 4.3). A **second template** was developed to follow up on the issues identified in the workshop. The second template was more specific and aimed at providing further information. To ensure rigour, participants were urged to provide references for the claims made in the completed templates, which are given in section 10. To ensure that partners had identified the relevant publicly available documents for completing the second template, members consulted experts from their networks. To ensure comparability, we have explicitly used only publicly available documentation, even when participants, their institutions or the consulted experts may have inside knowledge of the practical implementation of monitoring of the particular schemes.

<sup>&</sup>lt;sup>1</sup> http://www.alter-net.info/ahia

<sup>&</sup>lt;sup>2</sup> http://www.hutton.ac.uk/sites/default/files/files/projects/AlternetAdvert-MEEM.pdf

## 4.3. Workshop

A research workshop was held in Aberdeen at the James Hutton Institute from 13<sup>th</sup> -16<sup>th</sup> June 2017, which was a key step in the project. It was facilitated by social scientists from the Hutton, and all partners were represented. The aims of this meeting were to:

- Describe similarities and differences in monitoring
  - $\circ$   $\;$  between key European policies affecting environmental management
  - o between different European countries
- Analyse how monitoring practices compare to adaptive management
- Scope implications and recommendations for European policy-driven monitoring
- Decide next steps for finalising our analysis and recommendations

Broadly, the first half of the workshop aimed to share experiences from each country, in order to learn and compare countries and policies, whilst the second half of the workshop focused more on adaptive management and resulted in establishing a list of key problems with their associated policy recommendations. A 38 page workshop report was produced and shared internally among the participants.

## 4.4. Virtual meetings

Several virtual meetings were held via WebEx, both before and after the workshop to ensure smooth cooperation and a shared understanding of the approach.

Date	Meeting highlights
17 May	Introductions and discussing process of initial template
13-16 June	Workshop
08 August	Discussing content of second template and preliminary recommendations
22 August	Discussing issues with second template, and definitions of ecosystems

Table 4-1 Overview of virtual meetings held with MEEM partners

## 4.5. Process of analysis

The primary data collected through the templates was restructured in 'matrices' that gathered together the answers given by the different country representatives. This allowed a structured process of looking for patterns by making comparisons across the directives and across countries. The process of analysis can be characterized as 'social qualitative analysis', which relies on looking for patterns based on texts and interpretation of those texts. The validity of this approach was established by a theoretically-derived approach. The questions driving the templates covered issues that are considered relevant in the literature. Validity was also strengthened by a continuous process of member checking among the MEEM partners. Reliability was addressed by a continuous transparency about the approach, continuous reflection on subjectivity both during virtual meetings and during the workshop.

## 4.6. Limitations to our analysis

This report relies strictly on publicly available data on monitoring, which may therefore not always represent practice on the ground. The data at the basis of this research was obtained through web searches by consortium members whose disciplinary background was often limited to one policy area and who were no expert the other fields. Nevertheless, valuable conclusions emerged from the analysis, and the availability and accessibility of monitoring data itself was one of the interests in this study.

Given the wide diversity in the background of countries, the analysis faced an inherent trade-off between providing detail and overview. Countries differed in how long they were a member state of the EU, the number and type of legacy (pre-EU) policies still in place, and the level of political commitment to environmental issues.

## 5. Findings

At the workshop, we checked to ensure that all the participating member states had a policy on the requirements for monitoring for our three policies, at the level at which we were analysing them. This was confirmed as both existing and being implemented. Whilst unsurprising, due to being a statutory requirement, this is nevertheless positive given that the literature highlights the need for monitoring to allow adaptive management.

Therefore the focus was on the content and application of these monitoring policies. As highlighted in section 2.2, we set out our findings as follows: Whether all the relevant aspects of a socioecological system were being monitored; whether the monitoring was being implemented in the spirit of adaptive management principles; and whether the monitoring data were being used to evaluate and change the implementation of management instruments and/or the parent polices.

## 5.1. What is being monitored?

This section looks at 'what' is being monitored under WFD, N2K directives and AES. Following the literature we focus on three elements considered important to include in monitoring programmes for adaptive management:

- The inclusion of social and economic information
- The inclusion of both abiotic and biotic indicators supporting ecosystem functioning
- The inclusion of aspects of 'context'

## 5.1.1. Are social aspects of the socio-ecological system monitored?

The goal of this section was to establish if social, economic and preference information is being collected, and whether this information allows understanding of interactions between humans and their natural environment. An overview of the data collected for each policy directive and each country is given in section **11.1.1**.

#### WFD

For the WFD there is little evidence of formal monitoring programmes to include social or economic information. As a consequence this is not normally being used to understand the interactions between humans and the natural environment. Certain countries e.g. Romania and Slovakia do include socio-economic information to a certain extent. Most countries do collect socio-economic data for other programmes, and examples were given of how this could be useful to be considered for WFD monitoring, e.g. household water use, national/regional statistics, infrastructure maps and plans, and even gross domestic product. There is no clear evidence that these are considered as secondary data for WFD monitoring of PoMs at present.

#### N2K

For the N2K directives a mixed picture emerges: about half the countries report that socio-economic information is not really part of the formal monitoring programme, while the other half give examples of some socio-economic information being collected. The statutory monitoring of 'pressures' on habitats includes socio-economic aspects like forestry, agriculture, urbanisation, tourism, hunting etc. Finland reports that employment and income impact are included, while Sweden reports that social information is often focussed on interactions between large carnivores

and humans. Even countries who consider socio-economic information argue that it only allows limited understanding of interactions in the system. Some countries (e.g. Finland, Slovakia) note that socio-economic information is being used in management plans, presumably based on secondary data. Several examples were given of potentially relevant sources including environmental impact assessments, GIS databases on AES, forest management databases, and maps of ecosystem services, which are not currently used as secondary data for N2K monitoring but could be in the future.

#### AES

In line with standard EU reporting requirements, all countries seem to collect some basic socioeconomic information, including farmer characteristics (education, age) and farm characteristics (income, share of organic products). Most social and economic information is collected under other RDP schemes, but it is difficult to say if these are being used for AES monitoring and evaluation. Countries report that land use information and one off farmer surveys provide information which allows some understanding of human-environment interactions. A diverse set of examples of potentially relevant social and economic information was referred too, some nation specific e.g. Romanian policy on hazardous substances, and others using European level datasets e.g. use of Corine in Hungary.

#### **Summary**

Across all three directives there is some social and economic information in the monitoring schemes, although it is generally a small part of the formal monitoring or secondary data use. Across the three directives, countries report that the socio-economic data that is collected only partly allows for showing interaction between humans and the ecosystem. As observed during the workshop, perceptions, attitudes and social preferences of the public of how ecosystems are managed and changing are not currently part of the primary monitoring data collected for any of the schemes. For each policy area, participants gave suggestions of potentially-relevant existing socio-economic data that could or should be considered as secondary data.

#### 5.1.2. Are all aspects of the non-human ecological system monitored?

This section looks at whether a systems perspective is used in monitoring, and whether it considers both biotic and abiotic elements of the non-human ecological system in such a way that helps to understand (eco) systems. An overview of the collected data for each policy directive and each country is given in section **11.1.2**.

#### **WFD**

In the WFD, the status of water bodies is based on a set of agreed rules related to abiotic and biotic variables (referred to as quality elements) e.g. fish (biological) and nutrients (chemical). In general there is similarity between countries, although what is done in practice may be different from what is required by the policy. As discussed during the workshop, several countries suggest that some data on biotic indicators is probably redundant if the pressures on the water bodies are known. Few examples of potentially-relevant data were provided, though Finland's example of remote sensing is probably relevant to other countries due to standardisation of WFD data collection.

#### N2K

For the N2K directives, most countries report that both biotic and abiotic indicators are considered in the monitoring, with some countries reporting no monitoring of abiotic indicators. The

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respondents were more hesitant to conclude that this allows for understanding ecosystems, due to compartmentalized analysis and a site-specific focus. Some argued that the monitoring of habitats is in some cases reflecting ecosystems (e.g. forests or lakes), although this does not hold true for each habitat. There were no examples of redundant information being collected. Several examples were given of available data that would be relevant to understanding ecosystems, which are currently not considered as secondary data, including monitoring of water and air quality, climate data, land cover data, management information, bird and butterfly surveys, etc.

#### AES

Biotic attributes, e.g. plant or bird species, are the main focus of monitoring under agri-environment schemes. Abiotic attributes (like water or soil) are less widely collected; for example not collected in countries like Flanders, and where collected e.g. in Slovakia used to delineate payment areas. The monitoring is not designed to allow a broad understanding of ecosystems; narrower understanding of specific trophic relationships of beetles and farm land birds was in some cases provided. There is no clear evidence of the collection of redundant information. Several countries gave examples highlighting the potential of using other existing information sources to understand the ecosystems, e.g. climate data for Slovakia.

#### **Summary**

The 'ideal' for what should be monitored – according to the literature – to understand (eco)systems is to ensure that biotic and abiotic elements are covered, and that the focus is on the interactions that form the system or community. The overview given in this section shows that while the monitoring for the WFD includes both biotic and abiotic components, the N2K directives and AES focus more on biotic indicators. Even with this information being collected, respondents did not think this was always enough to understand (eco) systems. Especially for the AES, there is much more information that could be collected or used before interactions and eco-systems can be better understood.

#### 5.1.3. Are contextual factors influencing the cases monitored?

The focus of this section is on the inclusion in the monitoring programmes of contextual elements external to the 'system' – but that affect the system. We focussed on social, technical, environmental, economic and policy aspects of context. An overview of the collected data for each policy directive and each country is given in section **0**.

#### WFD

The extent to which contextual factors are included in formal monitoring differed per country, ranging from none (Estonia) to a wider range of factors (Romania). Especially environmental, technical and some social aspects of context are mentioned, economic context is mentioned once (gross domestic product), while policy aspects of context are never mentioned. Sometimes contextual factors are considered in management plans. No specific examples of redundant information collection were provided; Finland assessed and stopped any redundant information collection in 2006. A range of information sources relevant to ecosystem that are not currently used were mentioned e.g. data from N2K directives, national/regional statistics, and a data nature conservation non-governmental organisation (NGO) in Flanders.

#### N2K

For the N2K directives, contextual information is only marginally collected, and if so it is used in management plans and originates from secondary data sources. Catalonia mentions that mandatory monitoring of human activities around sites is not necessarily done in practice. Several countries mention that no contextual factors are considered in the monitoring of N2K directives. In most cases (e.g. Catalonia and Scotland), identification of 'pressures' includes contextual indicators like invasive species, water management, extraction (quarrying), infrastructure, agriculture, pollution etc. No examples of redundant contextual data were given, and there were few examples of existing relevant contextual data that is not currently used.

#### AES

A diverse range of responses were provided on what aspects of context were monitored. The 'continuous evaluation' in the Estonian RDP looks like a good example of a wide range of context attributes being monitored to support evaluation of policy implementation, while countries like Flanders seems to have limited monitoring of context indicators. Context indicators are a recent EU requirement, and it is not clear to what extent member states are collecting them. As for the WFD, no monitoring of the policy context was mentioned. There were no examples of redundant context data collection. Only three countries provided examples of other relevant information that could be used as secondary data, including climate data, socio-economic data and some additional bird surveys.

#### **Summary**

The 'ideal' following from the literature is that the social, technical, environmental, economic and policy context external to the 'system' - but that affects the system - is monitored. However, this section shows that context information is often missing in the monitoring programme, although context is considered in management plans based on secondary data. None of the directives include monitoring of the policy context and how this affects management of the (eco) systems, and few countries report considering economic context. Social, environmental and technical aspects are more commonly reported.

#### 5.1.4. Summary

This section showed that 'what' is being monitored under WFD, N2K directives and AES is generally not meeting the requirements set out by the literature. Although some socio-economic information is collected in all three policy areas, it is not enough to fully understand interaction between humans and the ecosystem. In particular, monitoring of social attitudes and preferences is missing. Monitoring appears to focus on specific sites or features rather than landscapes or systems, and although both abiotic and biotic elements are included in monitoring, the interactions allowing us to understand (eco) systems are not sufficiently considered. Monitoring of context is also limited, most countries report across policy directives that context factors like water use, climate change and land use are not part of the monitoring scheme, as primary or secondary data.

Overall, regarding social information, non-human systems and contextual factors, the templates suggest that potentially relevant information is available from existing sources but only always used as secondary data. This data is sometimes used in management plans, but more on an ad-hoc basis

than following from the policy in a structured way. Few examples of redundant data collection were given, except for some indicators in the WFD.

## 5.2. 'How' is monitoring carried out?

This section looks at 'how' monitoring is carried out, especially whether adaptive management principles are incorporated in the monitoring, including:

- The extent of use of secondary data, for more cost-effective monitoring.
- Involvement of a range of individuals and organisations to improve data coverage as well as engagement.
- The extent to which monitoring data is available and accessible to its users and the public.

## 5.2.1. Are secondary data being used?

In our inventory of the forms of data collected for the three EU directives, we distinguish between primary data (information collected as part of official monitoring programme for the policy) and secondary data (information collected for other policies and purposes). Secondary data is only included in this analysis if we know it is incorporated into monitoring or evaluation to inform management (i.e. PoMs, SMPs and AES measures). An overview of the data collected for each policy directive and each country is given in section **11.2.1**.

#### WFD

Monitoring programmes for the WFD rely mainly on primary data collection, with a common picture emerging across the participating countries. Finland and Hungary suggest no secondary data is used, while in Romania it is not clear from publicly available documents. The other countries do use some secondary data, which tends to be data of a general nature. Secondary data used in the WFD includes soil erosion maps and 'biological evaluation' maps in Flanders, land use maps, invasive species maps and reviews of airborne pollutants in Sweden, environmental impact assessments of project developments in Estonia, biodiversity data in Catalonia, and citizen apps gaining fishers' perception of biological quality and obstacles to fish migration in Scotland.

#### N2K

Monitoring programmes for the N2K policies rely mainly on primary data collection, but the picture is more diverse than for the WFD. Romania, Hungary, Estonia and Slovakia claim no secondary data is used. In Flanders and Scotland some secondary data is used, like habitat mapping (Flanders) and Seabird 2000 and Wetland Bird Survey directives (Scotland). Sweden and Catalonia appear to integrate secondary data more into their monitoring scheme, sources of which include land use and climate data to establish threats on habitats and species (Sweden), and habitat cartography and bird and butterfly abundance status (Catalonia).

#### AES

The monitoring programmes for AES seem to rely more on secondary data than the other directives. For some countries the use of secondary data is practically absent (Catalonia, Flanders) or limited (Estonia, Scotland), but in Hungary, Romania, Slovakia and Sweden both primary and secondary data are used in monitoring AES. Examples include data bases of forest management, game management, and land cover (Hungary), satellite images for compliance checks and modelling (Romania).

#### **Summary**

The WFD very much relies on primary data and little secondary data, whereas N2K policy areas do include some secondary data in several countries. Monitoring for AES includes more secondary data across countries. Most examples of secondary data use concern biodiversity, e.g. butterflies, birds.

## 5.2.2. Are all relevant actors involved?

Two aspects of this question are highlighted in this section: the balance between state and non-state agencies involved in monitoring the directives; and the use of citizen science. An overview of the collected data for each policy directive and each country is given in section **11.2.2**.

#### **WFD**

The monitoring of WFD is dominated by state agencies. Only in Sweden are both state and non-state organisations involved in monitoring. Where other agencies or consultancies are involved, these subcontracts are strictly controlled and restricted to certified organisations. Only Catalonia and Scotland mention some marginal use of citizen science as secondary data, including some bird species (Catalonia), and biological water quality and obstacles to fish migration (Scotland).

#### N2K

In all countries the monitoring of N2K directives is done by a mix of state and non-state actors and relies for a substantial part on citizen science. In some cases this is directly (through online platforms) in other cases indirectly (as volunteers at NGO's). In Catalonia, birds and butterflies are surveyed by specific associations of volunteers; In Estonia, citizen/ amateur surveys provide information in addition to the official monitoring scheme. Their data are validated by expert assessments, and although it is extra, it is used in plans and reports. In Flanders, a big conservation NGO is paid to survey animals; it uses volunteers to do this. In Hungary, amateurs provide information on birds, butterflies, reptiles and amphibians. In addition, some of Sweden's species databases are fed by citizen science. There is currently a lot of interest in using citizen science for monitoring in several countries (e.g. Kettunen *et al.*, 2016), as state organisations often have less funding to do it themselves.

#### AES

The compliance monitoring of AES is usually done by a state agency that is also responsible for the payments, while monitoring of environmental impacts is generally done by a mix of state and nonstate actors. Non-state actors include academia and NGO's specialized in e.g. birds. Catalonia, Hungary, Romania and Sweden mention citizen science as playing a marginal role, and only as secondary data mainly related to bird surveys. Other countries note the absence of citizen science. Indeed, the private contractual nature of the relationship between farmers and government – compounded by disconnection or hostility to conservationists – may make it very difficult to involve non-state actors in monitoring.

#### **Summary**

The WFD monitoring in most of the countries in the sample is almost exclusively managed by state agencies with citizen science only marginally being used in two countries. Monitoring for N2K involves both state and non-state agencies, with especially biodiversity surveys relying on citizen science –both directly through on-line platforms, and indirectly as volunteers at NGO's. Monitoring

for AES involves both state and non-state agencies, including academia. Some citizen science is included, especially linked to bird and biodiversity assessments.

## 5.2.3. Are the data available and accessible?

In this section three aspects of data availability are considered: whether there is an official data sharing policy, whether the data is available, and how accessible the monitoring data is, in particular for citizens. An overview of the collected data for each policy directive and each country is given in section **11.2.3**.

#### WFD

Finland and Sweden report that there is a data sharing policy calling for the open accessibility and transparency of the monitoring data collected. Other countries could not find a data sharing policy explicitly. Overall, data availability and accessibility is good, although in some cases data has to be specially requested, or is only available to or interpretable by experts. In Catalonia, Estonia, Flanders and Scotland data availability is good, in Romania and Slovakia it is reasonable with some data being only commercially available (Slovakia) or has to be requested (Romania). In Finland and Sweden, data availability and accessibility are excellent, with raw data, classification data and analysed data publicly available in user-friendly formats. In Flanders, Hungary and Romania WFD monitoring data is not available in a user-friendly format, while in Catalonia, Estonia, Scotland and Slovakia accessibility is good.

#### N2K

Only Slovakia and Sweden report the existence of a formal data sharing policy, which in both cases requires that all monitoring data is publicly available (except for vulnerable species and sensitive data). The data availability and accessibility are generally good. Exceptions are Hungary and Romania, where databases are only partial operational (Hungary) or do not contain raw monitoring data (Romania). Both countries also report that the most user-friendly monitoring data is available on EU websites rather than national websites. Catalonia reports intermediate availability and access, limited in particular for citizens. Other countries report good data availability and access.

#### AES

Only Romania reports the existence of a formal data sharing policy. The general picture across the countries is that monitoring data availability for AES is not good. Moreover, this data is difficult to find or interpret by the public. Estonia and Finland seem to set the standard, with both raw and analysed data to an extent available and accessible, although mainly aimed at experts. Other countries report absence (Hungary) or serious limitations on availability of monitoring data. Reasons for limited availability and access include the need to respect land owners' privacy (Catalonia), fragmented across institutes (Hungary, Finland, Sweden), and a focus on fact sheets and administrative synthesis (Romania, Scotland).

#### **Summary**

When it comes to availability of the data, the differences between the countries and associated cultural expectation are important determinants, with the countries in Northern Europe (Estonia, Finland and Sweden) having an advanced open data policy, and some countries in Eastern Europe (Hungary and Slovakia) having data mainly available to experts but less to the public. Comparing across policy areas shows that monitoring data collected for WFD and N2K are generally reasonably

accessible, often with interactive web-interfaces, while data availability for AES is not as good in most countries.

## 5.2.4. Summary

This section considered 'how' data is being used, with reference to the adaptive management principles of using secondary data where possible, involving all relevant actors, and making monitoring data available and accessible. The WFD very much relies on primary data, whereas N2K policy areas do include some secondary data in several countries, and monitoring for AES includes more secondary data across most countries. The policy areas differed in their involvement of non-state actors and citizen science. WFD monitoring seems to be dominated by state agencies with limited citizen science. N2K monitoring seems to involve both state and non-state agencies (especially NGO's) with some indicators depending entirely on citizen science. Finally, the AES monitoring seems to have less state involvement and many non-state agencies including NGO's and academia, with some use of citizen science for monitoring. Assessing the availability and accessibility of the data, there were big differences between the countries, with Northern Europe (Estonia, Finland and Sweden) having an operational open data policy, and some countries in Eastern Europe (Hungary and Slovakia) having data mainly available to experts but less to the public. Monitoring data collected for WFD and N2K are generally reasonably accessible, while monitoring data availability for AES is not as good in most countries.

## 5.3. How does monitoring allow management and policy to be adapted?

This section looks at whether the monitoring information collected in the three policy areas is used by considering two feedback levels:

- Whether monitoring informs management actions.
- Whether monitoring informs policy changes.

As part of these questions, we assessed which stakeholders were involved in the use of monitoring data, as participation and transparency in decision making are major aspects of adaptive management.

## 5.3.1. Does monitoring inform decisions to revise management actions?

This section looks at evidence from publicly available information and official reporting on whether management actions are updated or changed in response to collected monitoring data. The level of analysis is local implementation of policies, i.e. programmes of measures under WFD, site management plans under N2K, and agri-environmental measures under RDP. An overview of the collected data for each policy directive and each country is given in section **11.3.1**.

#### Programmes of measures under WFD

Most member states have revised programmes of measures for the second RBMP (River Basin Management Plan) cycle, suggesting that management is being adapted. However, there were still cases were it was not entirely clear whether these changes were influenced by the statutory monitoring data. For example in Flanders, the changes may have more to do with changes in opinion and increased appreciation for initiatives like 'room for the river'. We did not find much evidence in publicly available official documents that lack of data was impeding the selection of measures (except Romania's first RBMP, see Rîşnoveanu et al., 2017). However, workshop discussion focussed

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on whether the monitoring was sufficient to determine if the intervention was having the desired effect on the environment. Workshop participants felt that most of the cases were making good progress although some changes might not be due to the WFD itself (e.g. processes of deindustrialisation in Flanders and Finland).

#### Site management plans under N2K

The N2K policy cycle requires site management plans to be adapted if conservation status is not favourable, however, there are some examples where the implementation is delayed or problematic, so this is not happening in every case we reviewed. Where countries have made few management interventions (e.g. Catalonia, Flanders on privately-owned sites), or plans are in early stages of implementation (e.g. Romania) we cannot yet expect these plans to have been updated or revised. In the workshop, some felt good progress was being made (e.g. Estonia), in some progress was limited by resources (e.g. Slovakia) but in others it is possible that some goals won't be achieved (e.g. Scotland may not meet all of the 2020 Biodiversity goals despite much effort). There are some examples where lack of data is noted to be an issue. There are also cases where alternative sources of data, or opinion, are used in decision making. The workshop discussions highlighted how it was unclear if the outcomes of management actions are then tracked, and we often felt unable to answer if data were adequate or appropriate to inform management actions – we suspect that quite often new or different data might be desired, to learn from the effects of actions.

#### Agri-environmental measures under RDP

In all but two cases, there is again evidence of adaptation in the management measures being promoted. The workshop discussed how there *should* be feedback – as farmers who do not comply with AES rules should have their payments withdrawn and uptake of a scheme might also influence future AES designs: i.e. unpopular schemes are withdrawn or revised when AES programmes are revised. However, overall the distribution of money between the different pillars of CAP does not reflect monitoring results as in many cases the resources allocated to AES were perceived to be declining, even though environmental problems are worsening. Some participants highlighted the politics of decision making where influence and interests may triumph over evidence from monitoring schemes. Like the other examples, there is often little published evidence that illustrates how the statutory monitoring and evaluation processes supported the review and amendment of measures. In one case, there is evidence that the lack of data may have impeded the ability to evaluate measures effectively.

#### **Summary**

Overall, it seems that there is a much closer link between WFD monitoring data and revision of measures than for N2K or AES processes across our participating case studies. This is probably due to the explicit cycle of reporting and reviewing that is premised on ecological status, which is in turn based on these monitoring data. Site management plans are linked to the results of site condition monitoring, but the N2K policy does not have the same strictly defined cycle prompting change across all SMPs at a stated time. In contrast, the agri-environmental measures are influenced by regular reviews of the CAP but these reviews seem to be much less directly linked to the monitoring data in our cases. In all three cases, there are few examples where official documentation identifies **a lack of data** to evaluate the effects of management actions. (Documents often referred to the need for new or different measures, but the need to change the monitoring regime was only

incidentally made in e.g. Romania). However, during the workshop, a strong view emerged that the data were not sufficient to link any change in environmental status to management actions. The monitoring regimes remain focussed on monitoring the state of the environment, rather than the outcomes of interventions, whilst the latter (focus on outcomes) is the essence of adaptive management.

## 5.3.2. What is the role of monitoring data in policy evaluation?

The goal of this section is to consider whether monitoring feeds back into policy evaluation and the redesign of PoMs, SMPs and AES. This reflects the adaptive management principle of being transparent about how decisions are driven by evidence obtained through monitoring. An overview of the collected data for each policy directive and each country is given in section **11.3.2**.

## Programmes of measures under WFD

In most cases, synthesised information from monitoring data is publicly available. It is slightly more heterogeneous for reports that evaluate the delivery of WFD. This may be explained by the fact that evaluation is built in as part of the RBMP cycle, so one may not require additional separate evaluation reports. However, echoing the findings in 5.3.1 above, even where synthesis or evaluation reports exist, there is very little detail in the documentation illustrating how programmes of measures were altered based on the synthesis of the monitoring data, nor how the overall RBMP cycle uses monitoring data to revise and update the plans themselves. There is a difference between operational, surveillance and investigative monitoring, but the WFD is constrained in its ability to allocate resources between these categories, with some workshop participants feeling there should be more resources available for investigative monitoring.

## Site management plans under N2K

There are examples of change. For example, in Estonia there are new AES schemes introduced for bumblebees and Sphagnum moss, which has been informed by monitoring. There appear to be some big differences in the ability to obtain synthesised data and results of evaluation – from cases with regular publication of such information<sup>3</sup> (Slovakia) to others where there is little to no information. In Flanders publicly owned land has been well monitored and used to inform management, but sites on private land have been treated quite differently. In Hungary information use is generally based on undocumented informal observations, so there is a feedback loop but it is often disconnected from officially reported and collected monitoring programmes. Interestingly, there are some cases where synthesis reporting is available but not evaluation reports and others where the reverse holds true. There are very few cases where there is publicly available documentation showing how monitoring data influenced revisions of site management plans. Likewise, only a couple of cases have documented the process by which monitoring data led to a change in the wider Natura 2000 policy implementation. Scotland documents the relationship at site level but not at policy level, whilst the reverse is true for Finland.

#### Agri-environmental measures under RDP

There is a quite a bit of variability in the ability for the public and interested stakeholders to access information about monitoring data results and to read about scheme evaluation. Other than Finland,

<sup>&</sup>lt;sup>3</sup> However, Slovakia only has six Special Protection Areas.

none of the cases were able to trace how the monitoring results are used to inform management decisions (for the individual AES measures) or the parent Rural Development Plan policies. In the workshop, the participants argued that the data collected are not appropriate for informing AES design. This is partially because the uptake of schemes themselves are so patchily distributed across a landscape, it limits the possibilities to learn from them.

#### **Summary**

Overall it appears that there is more publicly available synthesised information available regarding the WFD monitoring data than there is for either the N2K or AES cases. Access to formal evaluation reports is patchy across all three policy domains, although evaluation is partly built into the RBMP process, making it less likely to have separate evaluation reports in this domain. In all three policy domains, it remains rare for there to be publicly available documentation that explains how the monitoring data has been used to revise the management actions (PoMs, SMPs or AES measures) or the parent policies. During the workshop, we discussed how many of the parameters collected for the statutory monitoring processes do not help to establish the effects of interventions. Instead, the effect of interventions tends to be evaluated using separate research projects that mean there is no systematic overview of what works at a national scale over a time series.

#### 5.3.3. Which actors are involved in using monitoring data?

The goal of this section is to consider which actors are involved in using monitoring data for decision making, and whether it is clear from publicly available documentation who influences changes to the PoMs, SMPs or AESs respectively. An overview of the collected data for each policy directive and each country is given in section **11.3.3**.

#### **Programmes of measures under WFD**

It is clear from the documentation that many stakeholders are either consulted, or actively participate in developing, the RBMPs. The RBMPs contain the management actions of interest to this study – the PoMs. However, none of the public documentation provided evidence that illustrated *how* these stakeholders used the monitoring data to influence the planning process. In general, all cases involved similar stakeholder groups: governmental bodies, environmental managers, research organisations and water resources users (industry, farmers, recreationalists), but it is not always clear which groups had influence. There are possibly some differences in the degree to which the general public is consulted on the RBMPs (e.g. this is unusual in Slovakia).

#### Site management plans under N2K

The situation is very variable between cases, ranging from little to no stakeholder involvement in the past (Flanders), through engaging solely with the land managers in a technical planning process (Scotland, Sweden) or ad hoc processes (Finland, Estonia) through to full public consultation processes in Romania, Hungary and Slovakia. These marked differences between countries may reflect where consultation is a legal requirement and where it is not. However, as with the WFD domain, stakeholder influence and engagement does not seem to be explicitly enabled or based upon the monitoring data.

#### Agri-environmental measures under RDP

There seems to be a relatively homogenous picture of AES schemes being designed by governments with the main channel for involvement through a generic consultation on the draft RDP, rather than

active involvement in co-developing the schemes with the stakeholders. However, within Romania, non-state interests can initiate a dialogue that has led to proposed changes to AES. The Catalonian response illustrates that these measures can be controversial and there may be ways in which stakeholders try to influence the government in their choices. Workshop participants felt that farming lobbyists had more influence than environmental groups but there was no evidence for this view in the documentation assessed. Finally, unlike some of the WFD PoMs (some are mandatory via regulation or licensing) and the SMPs, AES schemes are voluntary, so the farming stakeholders have some influence through choosing whether or not to enrol in the schemes.

#### Summary:

Our evidence suggests that in general there is more participation in the decisions surrounding management of water, than is apparent with site management plans or agri-environment scheme development. In all cases, it was very unclear from publicly available documentation how decisions using monitoring data were made (see section 5.3.1 above) and also which actors were actually influenced these decision making processes. As noted earlier, participation can result in 'post-rational' policy-making based on interests and power as much as scientific evidence. Given that the literature on adaptive management and adaptive governance highlights transparency of decision making processes, the difficulty in seeing who uses monitoring data and how it is used suggests there is room for improvement.

## 5.3.4. Summary

Overall, we were not able to find much evidence of interpreting and using the monitoring data in a transparent and participatory manner to make management choices, although this is a fundamental principle of adaptive management. There was evidence of adaptation in the choice and implementation of management actions; and there was also evidence of participation in the management planning processes (although more limited for AES than for RBMP or SMPs). All three policy cases have formal evaluation mechanisms, although the ability for the public to access evaluation reports was patchy. The main problem was that there was little or no clearly documented discussion of how monitoring data were used in decision making about management. Therefore, whilst adaptive management may be occurring in practice, the decision making process remains a 'black-box'.

## 6. Discussion

The findings presented in this report provide a high-level overview of how monitoring programmes driven by the Water Framework Directive (WFD), Natura 2000 policy (N2K), and agri-environment schemes (AES) under Rural Development Programmes (RDPs) are functioning within a wide sample of EU member states. The monitoring was assessed against 'good practice' of adaptive management as set out in the literature, and the use of monitoring information was evaluated regarding impacts on site management and policy change. As outlined in the methodology, this review is based on publicly available sources, and as such it is not claiming to be an exhaustive representation of actual monitoring practice. It is a reflection of what is available through web-based searches by a group of academics and therefore also an indirect indicator of transparency.

## 6.1. Differences between directives

The three directives under consideration vary considerably in their historic development and institutional fabric, which is also reflected in how the monitoring schemes are functioning. The three policies differ in terms of their coverage: WFD covers every single waterbody aggregated to a catchment scale; N2K covers areas across the country, whereas AES – although often geographically targeted – are very random depending on which farmer takes part. Compliance with the WFD is 'more' legally binding than N2K and CAP – this may explain some differences. Though where directives conflict, N2K trumps WFD - areas protected under N2K directives are strongly protected, even if monitoring is less rigid than under WFD.

The age of a policy and its historical context affect its design, both through changes in dominant ecological theory, and the political and societal context at the time of policy design. CAP itself is very old but AES and monitoring environmental effect is a relatively new part of it. The influence of preexisting policies is perhaps strongest for WFD and N2K– as many countries already had similar policies in place for tackling water pollution problems and of trying to conserve nature. This effect is weakest for AES and CAP in general since most countries did not have anything like the second pillar of CAP before joining the EU, although farm subsidies were also common during socialism (e.g. in Slovakia).

In several ways, AES are different from the other two directives. In terms of who influences the policies and the monitoring, it is environment groups and NGO's that are influential for N2K and WFD, while it is mainly agricultural institutions that shape the design of CAP (including AES). AES are voluntary and depend on farmers applying for it and adopting the measures. As such the progress cannot be judged by the EU in the way it can be judged for the WFD. Another aspect that surrounds CAP in general, but also AES, is the unacknowledged expectations and assumptions about the purposes of policies that shape what is and is not done. Many view the main purpose of CAP as delivering social support to farmers – these are hidden factors that can be hard to detect and tackle.

Workshop participants felt that monitoring of AES needed more attention to effects of management actions, and ideally needed the interventions themselves to be coordinated across time and space. There is often an opaque or unclear link with evaluation and scheme redesign. Regarding WFD, especially countries with many water bodies expressed the need to change the scheme since the prescribed monitoring puts these countries under high pressure for data collection and reporting.

The need to change N2K directives was motivated by a lack of resources and political willingness to implement and respond to monitoring.

Although the three policy areas have a formal evaluation cycle, there is a difference in how monitoring is implemented and institutionalized. AES under CAP are reviewed on a regular basis but it appears that the environmental indicators are only measured every six years. The WFD has continuous monitoring that feeds into the six-year cycles of RBMPs, but N2K seem to evolve more gradually with less emphasis on temporal milestones. There is a trade-off in how much flexibility member states allow in design of monitoring: more flexibility may achieve higher compliance but may also be less transparent (and so harder to assess what is occurring). Where there is less flexibility allowed in designing monitoring methods (e.g. WFD) perhaps this makes non-compliance more obvious.

Differences between directives were apparent in the use of secondary data (ranging from less secondary data in WFD to some in N2K and more in AES) and involvement of all actors (mainly state agencies for WFD, mix of state and NGOs for N2K, and a mix of state, NGO and academia for AES). Monitoring data availability and accessibility was generally good for WFD and N2K which in most countries have interactive web-interfaces where both experts and the public can find the status of natural features and the management that is being done, although access to raw data is generally not easy if at all possible. Monitoring AES is generally characterized by poor data availability and accessibility, often including for experts or even evaluators. Discussions at the workshop highlighted that in most countries it is not clear what is being monitored for AES. Section 5.3 also showed that redesigning AES is less driven by monitoring than for N2K and especially WFD.

A connection can be made between these issues and budget allocations for monitoring compared to the budget of the policies. Although it is difficult to point out the precise details, monitoring for the WFD are an important part of the directive also in terms of available budget. Monitoring of AES is less integrated in the policy design, and depends on very low budget allocations. The example of Scotland shows a budget for monitoring of AES of less than 1% of the total policy budget<sup>4</sup>, where the literature often suggests monitoring budgets of around 10% (O'Sullivan, 2004). The picture emerges that the WFD is very prescriptive about its monitoring requirements, while monitoring for AES is much more diverse between countries and more limited by budget.

# 6.1. Similarities across directives and countries

Monitoring for all policy areas is generally not sufficient to fully understand dynamic and multi-level socio-ecological system. Understanding human-ecosystem interactions is limited because of limited inclusion of socio-economic information. In particular the social preferences and perceptions of the public about of how ecosystems are valued or should be managed are lacking in monitoring programmes in most participating countries. This information would be useful to better target

<sup>&</sup>lt;sup>4</sup> The 2014-2020 budget for AES implementation in Scotland is £355 million

<sup>(&</sup>lt;u>http://www.gov.scot/Resource/0051/00514108.pdf</u>). This is about 25-30% of the total SRDP budget of £1.326bn<sup>-</sup> The budget for monitoring AES in Scotland (as evident from invitation to tender for monitoring the 2014-20 SRDP AES) is £350k-£400k, which includes monitoring of 'greening' measures which are not part of AES (<u>https://www.publiccontractsscotland.gov.uk/search/show/search\_view.aspx?ID=MAR238898</u>).

limited funds towards site management that has demonstrated public interest. Monitoring of (eco) system functioning is part of the WFD, but for the other policy areas it continues to focus mainly on individual indicators and species. It was acknowledged during the workshop that defining systems is difficult and can be done at multiple levels. Nevertheless there was agreement in the workshop, as in the literature (Waylen and Blackstock, 2017) that monitoring of systems is important in natural resources management. Monitoring of context-related factors was generally included to some extent, but especially the economic and policy context were often not considered.

Although socio-economic-, systems-, and context information does not feature prominently in official monitoring programmes for the three policy areas, several participants showed that this information is sometimes being used in site management plans, often based on secondary data that is available from elsewhere. From the publicly available documents, however, this use of data appears to follow from an ad-hoc approach rather than a formally policy-driven monitoring strategy.

Overall there is a clear understanding of the policy goals that are being monitored, and there is a single 'monitoring' policy for each directive which is then transposed into national law and practice in varying ways. Whilst the policy cycles for RBMP/SMP/RDP are relatively clear, it was less clear when and how the monitoring policies are being reviewed and revised. Regarding the process of revising management actions and policy evaluation, there is evidence across all directives that management actions are changing, and policy is redesigned. It is however very difficult to evaluate from publicly available documents whether this is due to information arising from the monitoring schemes, which would be expected if ecosystems were adaptively managed, or whether these changes occur for political or other reasons.

The data from the templates did not suggest that a lack of data was impeding the selection of measures, but during the workshop a strong view emerged that the monitoring data were not sufficient to link any change in environmental status to management actions, which is the essence of adaptive management. Moreover, for all policy areas it was very unclear from publicly available documentation how management decisions were made and also which actors were actually influenced these decision making processes. The lack of clarity on the use of monitoring data in these feedback cycles shows that more needs to be done in order to learn in a systematic way what management actions and policy measures are having a desired impact on ecosystems. This lack of clarity is linked to the lack of what at the workshop was termed 'mid-level' evaluation reports. This level of reporting was seen as an essential in adaptive management and adaptive governance to make the analytical links between the raw monitoring data and policy and management change.

The question rises whether the ideals derived from the literature on adaptive management are simply too demanding, meaning it is not possible for monitoring programmes to consider all these elements. Workshop participants agreed that having extremely detailed, demanding and costly monitoring regimes was not desirable: more monitoring does not always lead to better use. Nevertheless, the findings show that participants in this project could come up with many examples of potentially-relevant secondary data of which there is no evidence that it is currently being used. This shows that the question is not so much how to collect more data, but how to make better use of existing data. It also highlights the need to include more stakeholders in the design of monitoring schemes and allow expert opinions and ideas to feed into this process.

## **6.2. Difference between countries**

It is interesting that there is variation in how countries implement monitoring under the WFD. This was not an expected outcome, as that directive is relatively prescriptive. Some countries seem to be making more effort to monitor at least some environmental impacts of AES, like Romania and Estonia. It is less clear how other countries (e.g. Sweden, Scotland) are currently addressing this, although there has been some monitoring of trends in the past. This is surprising, given that Sweden and Scotland are doing comparatively well regarding monitoring of the other directives and may be a result of particular circumstances, for example, the uncertainty about agricultural policy in the UK post 2019.

Availability and accessibility of monitoring data seems to vary greatly between countries, and within one country is often similar across one policy. In general terms, countries from Northern Europe (like Estonia, Finland and Sweden) generally have open data policies. Other countries vary in their degree of availability and accessibility of monitoring data. Some countries in Eastern Europe (like Hungary and Romania) have less experience in sharing monitoring information with the public, although this situation has changed in recent years. Other countries are somewhere in between. These differences may partly reflect the history of policy-making of different countries, with some former socialist states having a shorter history of monitoring policies on environmental issues, especially related to agriculture and water. Countries have been implementing EU policies for different lengths of time (Romania and Bulgaria joined the EU in 2007; Slovakia in 2004). Differences between the countries can also reflect cultural expectations regarding norms of open access to data.

## 7. Recommendations

Some recommendations arise from the identified need to efficiently use existing data allowing more effective and targeted approach to monitoring. Studying the three policy areas together directs the attention to similarities in environmental objectives, which could go hand in hand with integrated monitoring for the different directives – i.e. ensure that one sample can be used for different purposes, where relevant. This requires improved coordination between different ministries or departments that are supposed to use data to improve policy and practice. During the workshop some suggested (but not all agreed) that instead of increasing monitoring resources within CAP, AES could be monitored via WFD and N2K policies. It would be interesting to relate any changes to ecosystem changes monitored by these other directives. Equally, a N2K site could be managed via targeted AES. CAP is an important mechanism to address problems that occur outside of the N2K network (which account for most pressures on water quality and biodiversity). An interesting case in this respect is Finland where they are trying to combine monitoring for five directives into one scheme. However, this is not necessarily easy as the policy areas have different rationales/logics.

Regarding the important issue of how monitoring data is actually being used in programmes of measures under WFD, site management plans under N2K and agri-environment schemes under RDPs, two recommendations present themselves. Firstly, monitoring programmes should include wider information about socio-ecological systems, including the context elements that shape the policies. Wider information is also ensured by wider stakeholder participation in monitoring activities itself, but also in the re-design of policies (including monitoring strategies). Secondly, transparency of how monitoring data feeds back into site management could improve by what workshop participants called 'mid-level' evaluation reporting, which provides the analytical links between raw monitoring data and changes in policy. Making that connection would facilitate adaptive management by linking changed status of the environment with a change in management intervention. Currently this connection is difficult to make due to the lack of systematic evaluations, based on data that are spatially distributed and have a sufficient time series (including baselines) to make these judgements.

#### 7.1.1. Recommendations identified during the workshop

During the workshop, participants were asked to consider recommendations to respond to key challenges. These recommendations were then discussed and revised in small groups. This exercise was intended to gather ideas, and will be used to produce a final set of recommendations at a later stage, which still requires more work by MEEM.

#### Recommendations to improve M&E linked to WFD

- Collect more information on people's actions that affect waterbody status, working with those people to do so.
- Engage users and stakeholders in all phases of the adaptive management cycle.
- Monitor people's perceptions of change: do people see a change in waterbody status? Do they agree that money is being spent wisely?
- More monitoring of social issues across Europe, ideally using data that is already available.
- More transparency about the use(s) of monitoring data.

• Use the concept of ecosystem services in evaluation – especially with respect to cultural and leisure services.

## Recommendations to improve M&E linked to N2K

- Promote public participation in data collection <u>and</u> in defining monitoring schemes.
- Propose that local people can 'adopt' a N2K site so that they will feel more engaged: this will encourage more citizen science, citizen-led websites to share and report information.
- Carry out reporting that is both transparent and targeted to different user groups (e.g. academics versus visitors to protected areas).
- Require mid-level reporting with the 'right' level of detail something between raw data and high-level overviews.
- Explore the problems that decision-makers have in using monitoring data.
- Establish rules to be used in making decisions.
- Require transparency in the cycle of adaptive management/governance.

## Recommendations to improve M&E linked to AES

- Improve the efficiency of monitoring by using indicators that are directly targeted to AES goals.
- Use an independent institution to measure the impacts of actions.
- Create a new fertiliser tax and hypothecate the revenue to study the effects of AES measures.
- Use local ecological knowledge and improved /latest research to help to target monitoring.
- Combine and connect the monitoring that is done under different directives (as in Finland).
- Change reporting requirements, so we decrease the amount of 'numbers' reported to the European Commission<sup>5</sup>, whilst increasing the number of policy briefs targeted to them: resources freed up can then be reallocated to improve monitoring.

## 8. Next Steps

This interim report is a stepping stone to the final outputs for this ALTER-Net project, due by 31<sup>st</sup> July 2018. These outputs consist of:

- A scientific journal paper (working title: "Policy-driven monitoring & evaluation: does it support adaptive management of socio-ecological systems", potentially to be submitted to Science of the Total Environment). A draft outline has been prepared alongside this report, to be finalised in spring 2018. Partners have identified the potential for further papers to be developed based on more in-depth comparative analysis for each policy area; or to focus on specific issues (e.g. the omission of the social aspects of the socio-ecological system).
- A **2-page briefing** focused on recommendations for future M&E practices that could be used by each partner for discussion with their respective national-policy makers.
- A **PowerPoint presentation** on the results of the project that can be distributed among ALTER-Net partners, and published on the ALTER-Net website.

<sup>&</sup>lt;sup>5</sup> For example, see REPORT FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS (2017) 'Actions to Streamline Environmental Reporting', <u>http://eur-lex.europa.eu/legal-content/EN/ALL/?uri=COM:2017:312:FIN</u>

There was also interest in following up these findings with policy makers to supplement the findings with their knowledge of how the rules of the game are implemented in practice (cf North, 1990; Hodgson, 2006) given the limited amount of evidence we were able to find regarding how monitoring is used in decision making. However, this further step was not possible within the existing timetable and will require the relevant participants to seek further funding.

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## 10.1.6. Romania

## Agri-environment schemes

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# **11. Annex: Findings overview by country- linked to section 5**

# 11.1. Overview by country – linked to section 5.1

# 11.1.1. Overview by country – linked to section 5.1.1

 Table 11-1 WFD: Are social aspects of the socio-ecological system monitored? (See 5.1.1)

Catalonia	What social or economic information is collected under formal monitoring programmes? Very scarce, focus is on	Does any of this information allow understanding of interactions between humans and their natural environment? Some references e.g. alternation	Describe examples of potentially-relevant social or economic info collected for related national policies that is not currently used as 2ery data for M&E of above? National and regional statistic
	status of water bodies including priority substances.	of water regimes, and water provision for the citizenship.	services (e.g. IDESCAT) can provide relevant social and economic info at county/ municipality level (e.g. population, unemployment, GDP, etc.)
Estonia	Probably none directly.	No, since none collected.	No evidence available.
Finland	The only economic information collected is household water consumption, no social info is collected.	No, since limited economic information is collected.	House hold water consumption is not used as 2ery data for M&E.
Flanders	No primary data collection dealing with social and economic items is used to implement the WFD, but secondary data regarding infrastructure construction are sometimes consulted.	No, since no formal monitoring of social or economic factors.	No evidence available.
Hungary	There is no monitoring of social or economic issues.	None.	AES CAP areas with low input nutrients.
Romania	Though the National Water Management Plan (NWMP) refers to social and economic aspects, no clear example of formal monitoring was found.	Yes, information on anthropogenic pressures should be collected.	National Institute of Statistics collect and make synthesis about different indicators e.g. land use, productivity in different economic sectors, population info. Unclear whether this information is used in water management e.g. economic analysis of water use.
Scotland	No clear example found of monitoring of social issues. Though actual monitoring may differ to what written down in monitoring strategies.	No, as there is nothing collected.	No clear examples found.
Slovakia	No social or economic data are collected under formal monitoring program, but the Water monitoring data	No, as there is nothing collected.	Socio-economic indicators including GDP could be used to assess water utilization.

	are sometimes included to evaluate social impact of flooding, and economic analysis of water use.		
Sweden	Seldom used in WFD with the exception of heavily modified water bodies.	Not really, as only used with heavily modified water bodies.	No evidence available.

### Table 11-2 N2K: Are social aspects of the socio-ecological system monitored? (See 5.1.1)

	What social or economic information is collected under formal monitoring programmes?	Does any of this information allow understanding of interactions between humans and their natural environment?	Describe examples of potentially-relevant social or economic info collected for related national policies that is not currently used as 2ery data for M&E of above?
Catalonia	Not much. The ministry does mention something on aligning habitat management to community interests, but unclear whether really put to practice.	No, although some academic research on provision and demand of ecosystem services is done.	Cartography of ecosystem services is available, but not being used.
Estonia	None under formal policy, although some socio/economic factors are considered in management plans.	Probably not, but difficult to tell.	Some state agencies arrange monitoring which could be interpreted as considering socio-economic aspects, e.g. the State Forest Management Centre (responsibilities include recreation management on protected areas) conducts visitor monitoring on PAs. These data are used for compiling management plans.
Finland	Some socio/economic information from pressures and trends (e.g. forestry, agriculture, urbanisation). Stakeholders are heard in targeted evaluations (see template). Employment and income impacts are evaluated.	Yes, but ambiguous.	No example available.
Flanders	Not much. Since 2016, impact of N-emissions by farms near N2K sites is being assessed	Yes, but ambiguous.	No example.
Hungary	No socio/economic information is collected directly, but 'threatening factors' and land use change are considered in the Landscape Monitoring of the National Biodiversity	Evaluation of habitats and land-use change allows insight in socio/economic interactions with the system, e.g. intensification of agriculture; land/grassland	Central GIS database on AES under CAP, National Forest Management Database, and the National Game Management Database could be used, but are usually not used. A newly started project

	Monitoring System (NBmR) – III Project	abandonment; urbanization; higher habitat pressure by tourism; expanding biotic invasion; restoration efforts; land drying effect etc.	aims at using this data as 2ary data.
Romania	Socio-economic context is part of the management plans, as are threats and pressures - including anthropogenic and natural ones. Still in early stages, first management plans are currently in process of approval.	Yes, that would allow for some understanding of human influences and interactions on a site.	Monitoring info collected for RDP (AES) related to forestry, water management in agriculture
Scotland	Pressures, including social ones, that might change the status are also evaluated, like over-grazing, recreation, agricultural operations, development, or trampling.	Yes, human activity that is likely to affect the site adversely is considered.	No example.
Slovakia	Historic area use, socio/economic importance of area. 11 sub-chapters include nature protection, forestry, agriculture, transport, tourism, hunting, mining, utilization of water, education, research, other utilization. Need to link socio- economic with habitat/species data.	For particular N2K areas – creation of the model of optimal care (maintenance) for habitats or habitats for species with same parameters of utilization, which will reflect value of favourable status – the sustaining model , the regeneration model Creation of ecologic- functional areas and zones.	Environmental Impact Assessments
Sweden	Social/economic aspects not considered by national or regional authorities, but some by research (see template for papers).	Interactions focus on human-carnivores and conflicts between habitats and project development (e.g. railway).	No example.

	What again as a companie	Dees any of this	Describe exemples of
	information is collected	information allow	potentially-relevant social or
	under formal monitoring	understanding of	economic info collected for
	programmes?	interactions between	related national policies that
		humans and their natural	is not currently used as 2ery
Catalonia	A limited amount of	Yes land use is how land	
Catalonia	A limited amount of	res, land use is now land	Other payment and Dayment
	Agrarian Declaration (DUN)	their land	basic payment and Payment
	Agranan Declaration (DON)		to young farmers) collect
	on economic and social		some more into on the socio-
	aspects related to failu		which could be used for AES
	technical information on land		which could be used for ALS.
Estonia	A range of social and	Probably not although	The social and economic
LStonia	A range of social and	some info on socio-	information collected under
	collected as part of the	economic as well as	the Estonian RDP
	Estonian RDP under the	environmental aspects are	
	themes of income for rural	collected interactions	
	enterprise share of organic	seem not to be the focus	
	products e.g. amount of	here (difficult to answer	
	products produced and env	hased on document	
	awareness	analysis)	
Finland	Information about how	Yes, understanding of agri-	No example of unused
- mana	agri-environmental support	environmental support	relevant data.
	has affected the potential for	impact on farming helps to	
	farming.	understand how agri-	
		environmental support	
		should be developed to	
		increase its impact.	
Flanders	Social and economic	Indirect information is	No example of unused
	information is monitored	collected on the nature of	relevant data.
	(though not formally through	farm businesses and	
	the AES) and used in annual	farmer social	
	Rural Development report to	circumstances e.g.	
	the EC.	successor or not.	
Hungary	Though no direct monitoring,	No redundant information	A range of databases e.g.
	there is impact monitoring to	is collected.	CORINE Land Cover are used
	reveal the influence of		for evaluation.
	management treatments by		
	specific AES aim.		
Romania	A range of social e.g. training	Land management applied	An example of
	level of farmer and their age,	at farm level is an example	environmental policy on
	and economic information	of this information.	hazardous substances e.g.
	e.g. about the farm and its		the import and use of these
	operation are collected		is collected by National
			Agency for Environmental
			Protection and (ii) used as
			secondary information.
Scotland	Under the Scottish AES	The one-off survey would	A range of potentially-
	limited social information was	to a limited extent.	relevant social e.g. farmers
	collected for evaluation of		views on biodiversity or
	previous schemes, this		economic information e.g.
	included one-off survey of		tarm income and size is

#### Table 11-3 AES: Are social aspects of the socio-ecological system monitored? (See 5.1.1)
	farmers perceptions of the AES.		collected. It is not clear if used for monitoring and evaluation.
Slovakia	The annual implementation reports draw on an Operational Database Of Agricultural Paying Agency that contains information on the nature of the farm business and its operations.	Land use related information e.g. managed areas in LFAs were provided as examples.	It was suggested that the annual reports and evaluation reports could be used to redesign the AES measures to stop land abandonment in LFAs.
Sweden	Apart from standard EU reporting requirements e.g. on farm business and their operation there is little formal monitoring. A range of research projects have been carried out.	In line with other countries, land use information provided some understanding.	Periodic synthesis activities have assessed the impact of CAP on the environment. Unclear what social or economic information was collected for this purpose.

# **11.1.2.** Overview by country – linked to section 5.1.2

Table 11-4 WFD: Are all aspects of the non-human ecological system monitored? (See 5.1.2)

	What attributes of ecosystems are monitored (abiotic and biotic, and interactions) and does this allow understanding of ecosystems?	Are any examples of redundant info collected but not used/useable?	Are there any examples where info relevant to ecosystems is available from other sources, but is not used as secondary data?
Catalonia	Range of abiotic (physical-chemical, hydro- morphological) and abiotic (relevant biodiversity components) variables are used to assess status.	Potentially for biological quality, this is evaluated using several indicators. Although there is spatial and temporal variation.	No response.
Estonia	Range of abiotic (physical-chemical, hydro- morphological) and abiotic (relevant biodiversity components) variables are used to assess status. The WFD supports an approach where the management of water ecosystems is considered holistically, i.e. at catchment level. To what extent this has been realised in practice is another question.	Not possible to assess based on document analysis.	Not possible to provide examples based on document analysis.
Finland	Range of abiotic (physical-chemical, hydro- morphological) and abiotic (relevant biodiversity components) variables are used to assess status as required by WFD. Though this integrates interaction between effects, there is no specific interaction effects assessment.	Yes, as many taxonomic groups respond similarly to common pressures, such as elevated nutrients. Hence, monitoring all taxonomic groups as stipulated by the WFD is probably not justifiable in many situations i.e. in areas with known pressures.	Satellite data is not directly used, or used as secondary data in status assessment.

Flanders	The VMM (Flemish Environment Agency) monitoring strategy includes both abiotic and biotic indicators (± 100 different attributes). Interactions are not explicitly considered in the monitoring schemes, but interpretations are made in reports and feed site specific PoMs.	Not applicable.	Probably not.
Hungary	Important aspects of water abiotic features are monitored along with several biotic indicators. The system and the spatial resolution allows understanding of the interactions.	Not answerable, as not enough familiarity with the policy area.	Habitat mapping (N2K) could be high relevance but is not currently used.
Romania	Both biotic and abiotic indicators are monitored according to the requirements of WFD, and they could allow for identifying at least some interactions. Compared to Northern and Western Europe, biological indicators for Eastern European water systems are less developed.	Not aware of any examples.	Information collected for air and soil quality as well as those provided under N2k are relevant for understanding water ecosystem state. No awareness of how used to redesign PoMs.
Scotland	SEPA monitoring strategy includes both abiotic and biotic indicators. Interactions are not considered in the monitoring, or very limited. Indicators (UK) are aligned by scientific disciplines rather than by systems.	No examples, but as in other countries the wide range of monitoring data is not always directly used.	No evidence available.
Slovakia	Important aspects of water abiotic features are monitored along with several biotic indicators of ecological status and potential. Interconnections of monitoring results and relationship to policies are assessed.	Not aware of any examples.	No evidence available.
Sweden	A comprehensive set of abiotic and biotic variables are monitored in representative water bodies. Within water bodies it provides understanding of ecosystems, expert view is that flow of material and energy between water bodies not included.	Yes, as many taxonomic groups respond similarly to common pressures, such as elevated nutrients. Hence, monitoring all taxonomic groups as stipulated by the WFD is probably not justifiable in many situations i.e. in areas with known pressures.	No evidence available.

	What attributes of ecosystems are monitored (abiotic and biotic, and interactions) and does this allow understanding of ecosystems?	Are there any examples of redundant info collected but not used/useable?	Are there any examples where info relevant to ecosystems is available from other sources, but is not used as secondary data?
Catalonia	None, focus is on species and habitats. The latter can to a limited degree be seen as reflecting ecosystem function.	No examples.	Forest biophysical variables maps, and biodiversity data from bird and butterfly databases are available but not used.
Estonia	Biotic and abiotic factors are monitored, but different elements are covered in sub-programmes. With the exception of some monitoring programmes (forest/lake ecosystems) understanding of ecosystems is limited by a lack of integration.	Not known	Not known.
Finland	Several biotic and abiotic factors are monitored; however, this does not necessarily generate understanding of ecosystems.	No examples	No examples, most primary and secondary data seems to be used.
Flanders	Only biotic data is collected. To assess condition of habitats, key species and indicator species are monitored as proxy for abiotic measures.	No examples	1) A conservation NGO's species observation website ( <i>Natuurpunt</i> ). 2) a network of piezometers in nature reserves (measuring groundwater levels)
Hungary	No abiotic indicators are monitored.	No examples	Examples are: Monitoring programme of the Hungarian Ornithological Society MME (collecting land use + habitat types of sampling sites), CLC land cover (changes) data.
Romania	Both biotic and abiotic. Under the 'threats and pressures' heading some interactions are assessed, but very limited.	Unknown	Monitoring data on water and air quality, meteorological and climatic data
Scotland	Site Condition Monitoring includes both biotic and abiotic features (like earth science & geomorphological features). Webpages suggest focus on individual features, unclear to what extent interactions are analysed.	No examples	More landscape data could be used to achieve better integration of indicators (landscape monitoring programme)
Slovakia	Both biotic and abiotic. Abiotic ecological factors essential for species included. Biotic include species composition in forests. Ecological-functional zones (EFZ) are the tool for spatially assessing species-habitats interactions.	No examples	Other relevant data is not considered as secondary data
Sweden	Yes, interactions between habitats	No examples	No examples, wide range of

#### Table 11-5 N2K: Are all aspects of the non-human ecological system monitored? (See 5.1.2)

and species allow understanding of ecosystems and their change over time. Various monitoring programmes contribute (see template for details of N2K monitoring in Sweden and DPSIR).	1ary and 2ary data is used
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## Table 11-6 AES: Are all aspects of the non-human ecological system monitored? (See 5.1.2)

	What attributes of ecosystems are monitored (abiotic and biotic, and interactions) and does this allow understanding of ecosystems?	Are any examples of redundant info collected but not used/useable?	Are there any examples where info relevant to ecosystems is available from other sources, but is not used as secondary data?
Catalonia	Limited in the DUN to habitat types included in the SIGPAC (Sistema de Información Geográfica de Parcelas Agrícolas).	No redundant information is collected.	Some secondary data of N2k case (e.g. on land cover maps, and bird or butterfly abundance models) could be used in AES.
Estonia	A range of abiotic and biotic indicators are collected that cover a range of domains e.g. soil and water. Assessment of interactions is not a focus, though providing some insight into the understanding of ecosystems status and its causal linkage to specific AES.	No example found	None to our knowledge (difficult to assess based on document analysis).
Finland	A wide range of biotic attributes related to fungi, plant, insect and animal species is collected under MaaMET monitoring.	No clear cut evidence of redundant information, a possible example related to nitrogen monitoring was provided.	An example of data from third parties is Birdlife Finland <sup>6</sup> , this could be used more efficiently as secondary data.
Flanders	Monitoring AES is about biotic data e.g. species rich grassland indicator species, with no abiotic indicators measured.	Not applicable.	Yes, two examples are: The biggest nature conservation NGO in Flanders (Natuurpunt), having thousands of records of all kinds of organisms; and a network of piezometers throughout Flemish nature reserves to measure groundwater levels year-round.
Hungary	Abiotic information on nutrient (N and P) balances and load to groundwater. This provides some level of ecosystem understanding.	No example found.	No, the most relevant secondary data are used.
Romania	A wide range of abiotic e.g. fertiliser inputs and energy use,	No example found.	A range of relevant information on climate variability, air quality

<sup>&</sup>lt;sup>6</sup> Birdlife Finland website: <u>https://www.birdlife.fi/in-english/.</u>

	as well as biotic information e.g. grassland community structure and farmland bird surveys. No evidence of an assessment of their interaction.		data as well as scientific studies are available, but are not used as secondary data.
Scotland	The main focus is on biotic attributes e.g. invertebrate, plant and bird species, with limited abiotic information on landscape features are collected. An example of evidence that interactions are monitored are beetle counts- an important food source for farmland birds.	No example found.	Potentially relevant (secondary) data for designing schemes for farm ecosystems would be the nutrient levels in soil and water bodies, and more interestingly the potential impact of AES on these.
Slovakia	Reference was made to the collection of abiotic indicators e.g. to delineate LFAs based on soil quality, but unsure whether actually applied. An example of supporting HNV leading to less land abandonment was provided.	No example found.	Yes, climate data are available but are not used for monitoring or evaluation of measures regarding to measures related to "contribution to combating climate changes".
Sweden	A range of biotic and abiotic attributes are collected using a randomised sampling design (ca 500 sites/six year interval). However, given the heterogeneous nature of agriculture landscapes, this programme does not allow systematic understanding of ecosystems. A number of spatially restricted research projects provide a better understanding of pertinent ecosystem processes.	Not aware of any redundant information being collected.	No example found.

# 11.1.3. Overview by country – linked to section 5.1.3

Table 11-7 WFD: Are contextual factors influencing the cases monitored? (See 5.1.3)

Catalonia	What aspects of context are monitored (social, technical, env, economic, policy)? Limited information on environmental and socio- economic (e.g. water provision per capita) is provided at the water body level and summarised	Are there any examples of redundant info collected but not used/useable? No redundant info is collected.	Are there any examples where info relevant to ecosystems is available from other sources, but is not used as secondary data? National and regional statistic services (range of social and economic info at catchment and district levels) from county/ municipality databases.
Estonia	at catchment and hydrological district scales. The official regular monitoring programme probably does not focus on any contextual aspects directly, but some related aspects are considered when compiling the water management plans, e.g. by outlining the pressures and impacts as stated in the Water Act	No example found	None to our knowledge (difficult to assess based on document analysis).
Finland	Environmental, technical, and economic aspects are monitored whereas no social or policy aspects are monitored.	Policy integration across different ministries led revised monitoring in 2006, were non WFD essential monitoring was stopped.	A wide range of other monitoring programs, (e.g. listed in N2K), but these do not contribute to RBMP.
Flanders	Some social and environmental aspects may be monitored.	Not applicable.	Yes, the website of the biggest nature conservation NGO in Flanders (Natuurpunt), containing thousands of records of all kinds of organisms, including water- related plants, insects, birds.
Hungary	Monitoring is not really focussing on contextual aspects.	No redundant info is collected.	Yes, Results of N2K landscape level habitat mapping: Spatial and quality/naturalness features and water relations of these habitats and degrading, threatening factors.
Romania	A range of social e.g. population, technical e.g. Quality of Surface Waters Required for Protection and Improvement in Support of Fish Life (from 28.02.2002), environmental e.g. variables related to climate change, soils and N2K monitoring, economic e.g. GDP are monitored. No example of policy context was	No example found.	No example found.

	found.		
Scotland	Some monitoring of environmental context e.g. proximity of farmland.	No example found.	SEPA does have Supporting Guidance (WAT-SG-67) for Assessing the Significance of Impacts - Social, Economic, Environmental. This suggests that such data is available, but it is unknown if this is actually collected, by whom, or if this is used as secondary data in monitoring.
Slovakia	A wide range of aspects of context are monitored that include environmental e.g. pollution, and technical e.g. how samples and data are treated.	No example found.	No example found.
Sweden	Since DPSIR conceptual model is built into WFD, a range of aspects of context are monitored. However, WFD monitoring is solely focused on assessing the physiochemical and biological quality of the water body and, to date, this is being done by county administrative boards, with little interaction with stakeholders.	No example found.	No example found.

## Table 11-8 N2K: Are contextual factors influencing the cases monitored? (See 5.1.3)

	What aspects of context are monitored (social, technical, env, economic, policy)?	Are there any examples of redundant info collected but not used/useable?	Are there any examples where info relevant to ecosystems is available from other sources, but is not used as secondary data?
Catalonia	Some context monitoring is mandatory (e.g. human activities around sites, see template), but implementation is questionable	No examples	The Barcelona Province Council provides some context information.
Estonia	Context not systematically monitored. Context is considered in management plans. Main objective of official policy is environmental.	No examples found	No examples found
Finland	Context not systematically monitored. Context is considered in management plans.	No examples	Finland has a huge reservoir of monitoring data that are drawn upon in evaluations, but not systematically.
Flanders	None, drivers/context are neglected, a singular focus on biotic data	No examples	A conservation NGO's species observation website (natuurpunt).
Hungary	Factors threatening habitats are recorded, i.e. mining, pollution, various management options, and biological invasions,	No examples	No examples

	interactions, environmental and natural disasters		
Romania	Very limited, and only in management planning rather than formal monitoring. Contextual data does not appear in reports.	No examples found	No examples found
Scotland	Pressures are identified, including contextual indicators like invasive species, water management, extraction (quarrying), infrastructure, agriculture, pollution etc. N2K monitoring data itself is also used as secondary data for wider policy objectives (see template for examples).	No examples	No examples
Slovakia	All aspects of context considered, see template for examples	No examples	There is relevant information that is currently not used as 2ary data, such as the CBD indicators and surrogates.
Sweden	Using the DPSIR framework, for NK2 sites it is stressed that S (status) and I (impacts) are the main focus, while P (pressures) is used when selecting sites and when evaluating status and trends.	No examples found.	No examples found.

## Table 11-9 AES: Are contextual factors influencing the cases monitored? (See 5.1.3)

	What aspects of context are monitored (social, technical, env, economic, policy)?	Are there any examples of redundant info collected but not used/useable?	Are there any examples where info relevant to ecosystems is available from other sources, but is not used as secondary data?
Catalonia	Socio-Economic (owners), environmental (habitat types) and technical (cropping systems) aspects of context are monitored.	No redundant info is collected.	No example found.
Estonia	A wide range of landscape e.g. landscape elements and social and economic aspects e.g. income for rural enterprises.	No example found.	No example found.
Finland	A range of studies into social, technical, env, economic, policy contexts have been carried out, it is not clear if these are monitored as part of the formal monitoring policy	Potentially monitoring related to nitrogen maybe redundant, but this is not 100% clear.	Yes, secondary data from third parties such as the Birdlife Finland https://www.birdlife.fi/in- english/ or companies delivering abiotic data to national registers, which could be used more

			efficiently.
Flanders	Information on social, economic and environmental context is available, though the focus of AES monitoring is biotic information.	Not applicable.	Yes, there are multiple examples e.g. social and economic information on farms and farmers is available and could be used more to understand potential impacts on the system.
Hungary	A range of environmental context aspects e.g. nutrient load to surface waters are monitored in relation to AES measures. A wider set of social and economic information is available for analysis.	No redundant info is collected.	No example found.
Romania	A wide range of social e.g. education, technical e.g. land drainage, environmental e.g. conservation status of areas, economic e.g. young farmers business plans supported context information is monitored.	No example found.	Respondent did not know.
Scotland	There is evidence of technical e.g. targeted support for slurry stores, and environmental context e.g. use of remote sensing to assess land use change.	No example found.	Potential other sources available, like climate data.
Slovakia	Socio-Economic (public expenditure, type and size of farm holders), environmental (habitat types) and technical (cropping systems, management practices) aspects of context are monitored.	No example found.	Climate data are available but are not used for monitoring or evaluation of measures related to combating climate change.
Sweden	No clear evidence of context being monitored.	No example found.	No example found.

# 11.2. Overview by country – linked to section 5.2

## 11.2.1. Overview by country – linked to section 5.2.1

Table 11-10 WFD: Are secondary data being used? (See 5.2.1)

	Are secondary data being used?
Catalonia	Mainly primary, secondary data only marginally used in monitoring, e.g. biodiversity data.
Estonia	Mainly primary, some secondary e.g. statistical body (see original template).
Finland	No.
Flanders	Mainly primary data, but also secondary data like soil erosion mapping and 'biological evaluation' maps.
Hungary	No.
Romania	This is not clear from publicly available material.
Scotland	Mainly primary, some secondary data, e.g. citizen science (anglers monitoring biological quality/ obstacles to fish migration etc.).
Slovakia	Mainly primary, some secondary includes protected areas bordering with water bodies.
Sweden	Majority is primary. Secondary data includes e.g. land use, airborne pollutants, and invasive species.

#### Table 11-11 N2K: Are secondary data being used? (See 5.2.1)

	Are secondary data being used?	
Catalonia	Yes, N2K monitoring uses mainly secondary data, from private associations although	
	funded by state. E.g. habitat cartography, bird status etc.	
Estonia	Not much secondary data, although some from national environmental monitoring	
	programme.	
Finland	Mainly primary, but also secondary.	
Flanders	Mainly primary data, but also habitat mapping.	
Hungary	No secondary data.	
Romania	No secondary data.	
Scotland	Yes, some secondary data e.g Seabird 2000 and Wetland Bird Survey (WeBS).	
Slovakia	Primary only.	
Sweden	Both primary and secondary. Example of secondary data: land use data, climate data	
	etc. to estimate threats on habitat/species.	

#### Table 11-12 AES: Are secondary data being used? (See 5.2.1)

	Are secondary data being used?
Catalonia	Currently no secondary data is used, although it would be useful.
Estonia	Mainly primary, although some secondary, e.g national statistics.
Finland	Both primary and secondary data are used.
Flanders	Only primary data.
Hungary	Both. Secondary data includes forest management-, game management-, and land
	cover databases.
Romania	Both. Secondary data includes satellite images for compliance checks, and modelling,
	soils quality.
Scotland	Mainly primary data is used from non-state evaluation teams, it is unclear whether
	secondary data is used.
Slovakia	Both.
Sweden	Both.

# 11.2.2. Overview by country – linked to section 5.2.2

 Table 11-13 WFD: Are all relevant actors involved? (See 5.2.2)

	Are both state + non-state agencies providing monitoring data?	Is citizen science being used for monitoring?
Catalonia	State-led, parts are outsourced.	Marginally, some species (mainly birds and butterflies).
Estonia	State-led, parts are outsourced.	No.
Finland	State-led, parts are outsourced.	No.
Flanders	State agency.	No.
Hungary	Only state agency: general directorate of water management.	No.
Romania	Only state agency.	No.
Scotland	Only state agency.	Citizen science developed for other purposes is used as secondary data for WFD monitoring (but constitutes very small part of monitoring programme).
Slovakia	State-led monitoring, mainly state institutions.	No.
Sweden	Both state and non-state agencies	Much of the information stored by the Swedish Species Information Centre is provided by citizen science.

#### Table 11-14 N2K: Are all relevant actors involved? (See 5.2.2)

	Are both state + non-state agencies providing monitoring	Is citizen science being used for monitoring?
Catalonia	Doth	Vac in data collection mainly hirds but also buttarfling (come
Catalonia	DULI	initiatives on plants, still local).
Estonia	Both	Yes, not primarily, but supplemented by verified data from volunteers.
Finland	Both	Yes (including volunteers)
Flanders	Both	Volunteers at NGO
Hungary	Both	Yes, birds
Romania	Both, through subcontractors	Yes, both directly (through on-line platforms) and indirectly (as volunteer at NGO's)
Scotland	Both, although unclear how.	Yes
Slovakia	Both	Yes, volunteers and non-experts are involved
Sweden	Both, although for the Habitats Directive it is more using state	Yes, especially for the Birds Directive
	agency, while for the Birds Directive it is mainly citizen science	

#### Table 11-15 AES: Are all relevant actors involved? (See 5.2.2)

	Are both state + non-state agencies providing monitoring data?	Is citizen science being used for monitoring?
Catalonia	Only state agency	Yes, but not always considered in directive monitoring as 2ary data
Estonia	State and academia	No
Finland	Both state and non-state	No

Flanders	Both, including birds surveys by NGOs	No
Hungary	Both, especially birds by non-state agencies	Marginally, for bird surveys
Romania	Both state and non-state	Marginally, for bird surveys
Scotland	Non-state evaluation team- tendered by the	No
	government, and academia	
Slovakia	Both state and non-state	Unknown
Sweden	Both, specialist NGOs contribute	Marginally, for bird surveys, and only as
		secondary data

# 11.2.3. Overview by country – linked to section 5.2.3

Table 11-16 WFD: Are the data available and accessible? (See 5.2.3)

	Is there a "data sharing	Please confirm and	Please confirm and describe data
	policy" for monitoring data?	describe data availability.	accessibility/user-friendliness.
Catalonia	Open and transparent	Good	Good
Estonia	There is no official data	Good	Good
	sharing policy regarding		
	monitoring specifically, but		
	data is provided via specific		
	monitoring websites, an		
	information system and		
	regular reports.		
Finland	Very open and transparent	Excellent, both raw data	Good, user-friendly
		and classification and	
		analysed data.	
Flanders	Data are provided upon	Good	Not always user-friendly:
	request, some of them are		understanding the data requires
	available in reports on the		expertise
	Environmental agency's		
	website (VMM)		
Hungary	No (not aware of)	Good, new web interface	Not good for wider public: only flood
			risk and inundation risk maps are
			easily accessible.
Romania	By law, data should be	Not good - requires	Not good, some synthesis available,
	provided upon request	requests to obtain data;	but not much data.
		data is not easily given.	
Scotland	No (not found)	Good	Good, with a variety of user-specific
			visualisations
Slovakia	Yes, mostly statistics online.	Reasonable. Most is	Good, user-friendly interface
	Field data based on law are	available, some data only	
	available on request.	commercial and expensive	
Sweden	Very open and transparent	Excellent: raw data,	Excellent (except for 'polluter pays'
		classification and analysed	data (see original matrix)
		data.	

#### Table 11-17 N2K: Are the data available and accessible? (See 5.2.3)

	Is there a "data sharing policy" for monitoring data?	Please confirm and describe data availability.	Please confirm and describe data accessibility/user-friendliness.
Catalonia	Not really. Data are provided upon request	Intermediate, good for experts, less for citizens	Intermediate, not always user- friendly
Estonia	Yes, there are some elements of such policies in the form of departmental prescriptions or/and good practices	Good, variety of visualisations and level of detail	Good, variety of visualisations and level of detail
Finland	Very open and transparent.	Good.	Very good, a recently developed service for open access sharing exists <u>https://www.laji.fi/</u> .
Flanders	Not yet, discussion is going on about this	Good	Good
Hungary	No	Not good. There are some databases, but only partial operational.	Mixed. Gov: Not good. Best data is found on EU websites, not national ones. NGO's: better data presentation
Romania	No	Not good, not freely available, no raw data. Some synthesis reports are available.	Not good. Best data is found on EU websites, not national ones.
Scotland	No (=not found)	Good	Good, variety of visualisations
Slovakia	Yes. All data should be available to the public, except for sensitive data.	Good. Raw data available for experts/evaluators	Good
Sweden	Yes, all is publicly available, except endangered species.	Good	Good, although raw data sometimes not designed for public.

## Table 11-18 AES: Are the data available and accessible? (See 5.2.3)

	Is there a "data sharing policy" for monitoring data?	Please confirm and describe data availability.	Please confirm and describe data accessibility/user-friendliness.
Catalonia	No. By law, data should be provided upon request	Not good, data sharing limited by owners' privacy	No response
Estonia	There is no official data sharing policy regarding monitoring specifically, but data is provided via specific monitoring websites, an information system and regular reports.	Reasonable, both raw and analysed data available	Reasonable, not always adapted to lay readers

Finland	No	Moderate, but Improving. Species info is available on one website.	Moderate, mainly aimed at experts, not citizens.
Flanders	No	Not good. No raw data.	Not good, spread out over departments/institutes.
Hungary	No.	Bad. Raw data not available for public.	Mixed. Government generally bad. Ornithological society data is accessible.
Romania	Yes, there is data sharing in some degree between actors for RDP (through Monitoring Committee) <sup>7</sup> and for AES (through the Environment Working Group) <sup>8</sup> .	Not good. Mainly administrative and financial synthesis, no raw data.	Not good, only fact sheets and budget allocations, no raw data.
Scotland	No.	Not good. SRDP in general: yearly, but no raw data (mainly financial). RPID inspections: not available. AES: 6-yearly evaluation available, no raw data.	Data accessibility is not good: data is difficult to find.
Slovakia	No.	Not good: data is available only to experts, not to the public.	Reasonable, reports and statistics available online.
Sweden	Yes, although data are limited	Reasonable, although spread out over many institutes and not recognizable as CAP monitoring.	Not good, spread out over many institutes and not recognizable as CAP monitoring.

 <sup>&</sup>lt;sup>7</sup> According to regulation (CE) 1303/2013 articles 47-49 the Monitoring Committee (MC) streamlines data sharing for National Rural Development Program <u>http://eur-lex.europa.eu/legal-content/en/TXT/?uri=celex%3A32013R1303</u>)
 <sup>8</sup> For Romania: <u>www.madr.ro/.../implementare-pndr-2014-2020/comitet-monitorizare.html</u>

# **11.3.** Overview by country – linked to section **5.3**

## 11.3.1. Overview by country – linked to section 5.3.1

Table 11-19 WFD: Does monitoring inform decisions to revise management actions? (See 5.3.1)

	Are the management actions updated or changed?	How are monitoring data used to make these changes?	Are decisions hindered by lack of data?
Catalonia	Yes, the programmes of measures are reviewed and approved every 6 years.	Unclear, although the review of the PoMs can drive changes of the metrics.	No evidence available
Estonia	Yes, the management plans are updated as required by the WFD implementation scheme, over the 6-year period.	This is not so clear, the data may be used, but to what extent and how, is not possible to evaluate based on document analysis.	No evidence available
Finland	Yes, the programmes of measures are reviewed and approved every 6 years. However, there can be long lags between actions taken and responses in the receiving waters.	Progress made is documented in national reports and PoM as well as monitoring is adjusted.	No evidence available
Flanders	Monitoring data is used to revise and adjust RBMPs and new or adjusted measures are reported on the website.	it is not clear how these adjustments relates to monitoring, because there are few explicitly written links between the data (reports) and adjusted or new measures.	No evidence available
Hungary	Yes, the revision of the third RBMP was completed in 2015.	The trends to higher water levels had led to new measures to control flows	No evidence available
Romania	Romanian National River Basin Management Plan was updated and new measures are being implemented in the period 2016-2021, based on the monitoring of the implementation of the measures in the National Management Plan (NMP) approved in 2011.	Yes, the monitoring data are used to make the changes and this is explicitly mentioned in the law.	Lack of data or limited confidence in the data was mentioned in the <u>first</u> NRBMP, under the "problems and uncertainties" chapter. Lack or insufficient data are also mentioned in the literature (see Risnoveanu et al. 2017).
Scotland	Yes, the management plans are updated as required by the WFD implementation scheme, over the 6-year period.	The new Scotland RBMP acknowledges how information from environmental monitoring programmes, helped understand pressures better (but there is no evidence that shows how this helped to select the measures)	No evidence available

Slovakia	The management plans for watersheds were elaborated in 2009, and then updated in 2015.	This is not clear, maybe, but the extent is unknown.	No evidence available.
Sweden	Yes. The WFD requires updates (every six years) on RBMPs. County administrative boards need to describe what measures are being taken to achieve good ecological status.	Yes. Data are used to assess impacts and trends and design and implement programs of measures.	No evidence. However we lack understanding of how multiple pressures effect aquatic systems; and how management interventions function at larger spatial scales.

## Table 11-20 N2K: Does monitoring inform decisions to revise management actions? (See 5.3.1)

	Are the management actions updated or changed?	How are monitoring data used to make these changes?	Are decisions hindered by lack of data?
Catalonia	As there are some Spanish N2K areas without management plans, it is too early to answer this yet.	Not answerable as management and monitoring is only applied to a very little proportion of sites.	Not answerable as management and monitoring is only applied to a very little proportion of sites.
Estonia	Yes, the management plans for Natura areas are periodically reviewed and updated (normally every 5 years)	There is no information publicly available on how monitoring data is used for redesigning the management plans.	No evidence available.
Finland	Steps to ensure of favourable conservation status is required by law.	The systematic uptake of monitoring results is rare; some examples exist but often with long time lags.	No evidence available.
Flanders	As the integrated management plans for N2K- sites are still in a start-up phase, it is too early to answer this yet	There have been several changes to the monitoring systems, combined with new management plans, so it is too early to answer this question.	Not applicable
Hungary	As there are some Hungarian N2K areas without management plans, it is too early to answer this yet.	Whilst the plans should consider monitoring data in theory.	Not applicable
Romania	Steps to ensure favourable conservation status is required by law.	The monitoring data is used to inform future actions.	The lack of data is noted as a problem especially when dealing with occurrence, distribution and reference conditions for characterising habitats and species of community interests, especially when historic data are missing.
Scotland	Steps to ensure favourable conservation status is required by law.	Site Condition Monitoring is used to inform discussions and decisions between land managers	No explicit mention was found of lack of data or evidence that this is hindering management

		and Scottish Natural Heritage on remedial actions where necessary	decisions.
Slovakia	Management plans for habitats and species are updated and changed.	The monitoring data are used for this purpose.	The lack of data is a problem. Only few species or protected areas have accepted management plans.
Sweden	Management plans are updated but current measures are considered inadequate.	Yes. Monitoring data are used to develop and revise action plans; mostly focused on birds, endangered species and their habitats.	No evidence available.

## Table 11-21 AES: Does monitoring inform decisions to revise management actions? (See 5.3.1)

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	Are the management actions updated or changed?	How are monitoring data used to make these changes?	Are decisions hindered by lack of data?
Catalonia	AES schemes are regularly redesigned (± every 7 year, CAP-period).	Changes usually respond primarily to socioeconomic reasons, and very rarely to conservation issues.	Not applicable
Estonia	The goal of the annual implementation report is to raise the quality of implementation	Unclear to what extent and how exactly monitoring results affect redesigning the measures	No evidence available.
Finland	Yes, there has been increased funding and more focus on biodiversity in the current schemes.	Clearly monitoring results have influenced redesign of AES measures, e.g. the new project called MYTTEHO is assessing cost-effectiveness of AES measures.	No evidence available
Flanders	AES schemes are regularly redesigned (± every 7 year, CAP-period).	Monitoring data is used for this partly, but specific research and experience is also used.	No evidence available
Hungary	AES schemes are regularly redesigned (± every 7 year, CAP-period).	No clear evidence for using monitoring data in updating AES.	No evidence available
Romania	AES-CAP schemes are updated / redesigned.	No clear evidence for using monitoring data in updating AES.	The lack of data was not noted at the farm, regional or national level.
Scotland	AES-CAP schemes were updated / redesigned, compared with 2007-2013 programme.	Yes, although the data may not be adequate.	Due the aggregated nature of the data, the evaluation team was unable to analyse the management interventions as fully as required.
Siovakia	AES-CAP schemes have been	Unclear to what extent	No directly, but a need for

	updated with some new conditions added.	and how exactly monitoring results affect redesigning the measures	new measures has been identified.
Sweden	AES-CAP schemes are updated as required within the 7-year CAP period.	Yes (partly) but spatial coverage of monitoring data is poor.	No evidence available

# **11.3.2.** Overview by country – linked to section 5.3.2

Table 11-22 WFD: What is the role of monitoring data in policy evaluation? (See 5.3.2)

	Are reports that	Are the policy	Is there information	Is there
	synthesise and	evaluation processes	on how programme of	information about
	interpret the data	documented?	measures were altered	how monitoring
	available?	uocumenteu.	due to monitoring	data led to
	available.		data?	revising the
			uutu.	RRMP?
Catalonia	Processes of data	Evaluation reports	The process of how	The process of
Catalonia	synthesis and	(including results and	PoMs were revised is	how RBMPs were
	interpretation are	methods: PoMs) also	not publicly available	revised is not
	available on a public	are available in the		publicly available
	website	same website		
Estonia	To a degree this is	Yes, in the official	Not evident from the	Not evident from
	available in the	progress report	documents/reports.	the documents/
	respective RBMPs,	formats.		reports.
	and implementation			
	reports at EC web			
	page <sup>9</sup> . This is not			
	directly accessible			
	from Estonian MoE's			
	website.			
Finland	Numerous mid-level	Evaluation reports	Yes, monitoring data is	Monitoring data is
	reports are available	available on the	used to evaluate	used, but
	on the internet	internet.	impact of measures	information how it
	evaluation reports.		and if measure is not	is used is no
			efficient based on data	clearly written
			it can be changed.	out.
Flanders	Reports are available	Evaluation reports	In some evaluation	Public info on how
	on the website of the	are available on the	reports, the use of	water policy
	Flanders	website.	monitoring reports is	changes are
	Environment Agency		clear.	available but links
	(VMM) covering both			to monitoring data
	WFD and other			that determine
	water issues".			changes in action
Hungony	Nothing yet although	No ovidence	No ovidonco ovoilablo	plans are scarce.
nungary	a new projects has	NO EVIDENCE.		
	heen launched that			
	may deliver this			
Romania	Yearly synthesis	No evidence	The revised PoMs are	The law highlights
	reports are available	available.	based on the	the need to

<sup>9</sup> Estonian WFD implementation report from EC website: http://ec.europa.eu/environment/water/water-framework/impl\_reports.htm.

	on the web site		monitoring data.	consider the monitoring results but the process itself (remains unclear.
Scotland	Water body information is available online , which is to some extent a synthesis. Regular evaluation reports could not be found.	There are classification reports (which are not full evaluation reports).	There is some evidence of cases where the data for PoMs is used. Unclear whether this is true across the board.	In RBMPs there is a section with reference to how they were updated.
Slovakia	Evaluation reports available on the website.	Yes, the progress of WFD Implementation strategy in the Slovak Republic, River Basin Management Plan, identification of the problem is documented on website.	Probably not.	Public info on how water policy changes are available but links to monitoring data that determine changes in action plans are scarce.
Sweden	The ecological classification of all water bodies in Sweden is publically available.	Progress towards achieving WFD goals is evaluated during each six-year cycle. National environmental objectives are reviewed each year and a more in-depth evaluation is done every four years. These reports are available online from the responsible agencies.	How PoMs have been revised is available online. However, much is based on expert analysis, and therefore lacking in transparency.	Information of how RBMPs have been updated is available via five water agencies.

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	Are reports that synthesise and interpret the data available?	Are the policy evaluation processes documented?	Is there information on how site management plans were altered due to monitoring data?	Is there information about how monitoring data led to revising the implementation of N2K policy?
Catalonia	No reports were found	There are no official evaluations beyond the mandatory reports on the status of development of the N2K network. However, the overall system of protected areas in Catalonia, including N2K sites, was evaluated by the Catalan Institution for natural History (ICHN).	No as site management plans are not yet completed.	No as the policy is still being developed.
Estonia	No reports were found	No reports were found	No evidence was found - public participation is not required by law for SMP.	No evidence was found
Finland	Yes, there are regular analyses and syntheses available.	There is a formal evaluation procedure of the overall policy	There is often a lag between the data showing problems and remedial management actions being adopted; and the process remains unclear	There is a formal evaluation procedure of the overall policy and these reports are based on monitoring data.
Flanders	Midlevel reports are available on the website of INBO	Habitat quality and quantity are evaluated and reported in the public domain.	There is no evidence that monitoring led to changes in site management plans.	Public info on how N2K policy changes or has changed is scarce and not clearly related to N2K monitoring.
Hungary	The data synthesis and interpretation of N2K is not standardised, although there are a few useful publications on evaluation.	No evidence found	No documented evidence available	No documented evidence available
Romania	There are no synthesis reports publicly available.	There are no evaluation reports publicly available.	It is unclear how the data is being used to revise SMPs	it is unclear how the monitoring information is being used for the implementation of nature protection

#### Table 11-23 N2K: What is the role of monitoring data in policy evaluation? (See 5.3.2)

				policy.
Scotland	Mid-level reports are not regularly available (the last report dated 2006).	No evidence found.	The process of the M&E feedback to management is available on a feature by feature basis.	There is little information available online on M&E feedback to policy.
Slovakia	Yes, there are regular analyses and syntheses, the works are available at the web pages of Ministry of Environment and State Nature Conservancy.	Evaluation reports are available, downloadable in .pdf.	Yes, there is information included in "Conception of the nature conservation in Slovakia" and regular updates.	Yes, there are subsites of the Ministry of Environment and State Nature Conservancy available for public including such information.
Sweden	Regular analyses are available. Coordinated by the Swedish Species Information Centre.	No response received.	No response received.	No response received.

## Table 11-24 AES: What is the role of monitoring data in policy evaluation? (See 5.3.2)

	Are reports that synthesise and interpret the data available?	Are the policy evaluation processes documented?	Is there information on how AES measures were altered due to monitoring data?	Is there information about how monitoring data led to revising the RDP?
Catalonia	No 'mid-level' or evaluation reports are available.	There are no official evaluation reports of AES in Catalonia. There only are some evaluation reports performed by independent NGO's proposing improving measures of AES.	No evidence available	No evidence available
Estonia	General information as well as the most of "raw data" on monitoring results are available, however no 'mid-level' or evaluation reports.	Evaluation reports are available	There is no specific info on processes how AES are redesigned	ERDP annual implementatio n reports contain some general info on recommendati ons for future change.
Finland	Analysis of Data collected in the MaaMet –monitoring programme are available on line	Programme results and impacts have indicators and <u>metrics</u> , but how this impacts on policy is not clear.	The same www-page contains information that helps to understand how national policy has or will be redesigned.	No evidence available

	of AES packages, mid- level reports are available.	AES packages, mid-level and evaluation reports are available.	describes the process and how monitoring is used for this The feedback cycle but when the new packages (since ± 2015) suggests that new AES schemes rely on results of former monitoring.	on how AES policy changes or has changed was found. Changes were made but not clearly related to AES monitoring (although it could be so).
Hungary	No 'mid-level' report s available.	Monitoring and evaluation processes by MME projects are well published.	The need for monitoring (feedback) is noted [Rural Development Plan] as a necessity in the future, but does not occur at present.	No response received
Romania	Reports focussed on financial features of measures, surfaces covered by the measures, performance achieved.	Evaluation reports are available for RDP, but limited for AES. Annual progress report on program implementation is completed by evaluation (annex comprising questions, evaluation report, conclusions and recommendations).Not always clear link with Monitoring data.	Not clear what monitoring sources and data are used for redesign AES.	Public have access to AES modified documents. But no monitoring data that led to changes is available.
Scotland	There is no access to synthesis of primary data collected by RPID from the inspections.	Ex-post evaluation reports exist but these are infrequent.	No info on the process through which these evaluation or inspection reports, feed back into redesigning AESs or allocating resources	There is no info on how any aspect of SRDP policy is redesigned using the monitoring data.
Slovakia	Annual reports and mid-terms reports, as well as some other statistics are publicly available	Evaluation reports are available on webpage.	New measures were added due to secondary monitoring data (e.g. birds protection).	No response received
Sweden	Annual reports produced by SEPA summarize fulfilment of national environmental objectives related to agriculture.	Yes, as progress towards achieving national environmental objectives.	No response received	No response received

# 11.3.3. Overview by country – linked to section 5.3.3

Table 11-25 WFD: Which actors are involved in using monitoring data? (See 5.3.3)

	Which stakeholders influence decision-making about the creation of PoMs?
Catalonia	The Programme of Monitoring and Control within the WFD is reviewed every 6 years
	through a participatory process involving researchers, environmental managers and
	water resource managers. Stakeholders (i.e farmers' and anglers' societies) also are
	consulted, but I think that their participation is only at advisory level.
Estonia	The compilation of RBMPs which include PoMs, requires a public consultation by law.
	It is not clear from the documents which stakeholder groups have influence on the
	choices made.
Finland	River basin management planning processes involve invited representatives, which
	influence decision-making, of the main national and local authorities, organisations,
	landowners and business interests responsible for the use, protection and state of
	water bodies. In Finland, there are over 100 000 association, which represents
	different stakeholder groups in local level (water, hunters etc.).
Flanders	Stakeholders are consulted in the process of designing and implementing RBMPs [but
	it is not clear which ones have an influence on the choices made]
Hungary	Unable to answer the question
Romania	The PoMs are endorsed by the Basin Committee that involves the representatives of
	major stakeholders: the central public authorities, county councils and local councils,
	industrial and agricultural units, nature conservation NGOs and research institutes.
	The public are then consulted on the draft RBMPs.
Scotland	RBMPs are open to consultation for a wide range of stakeholders and the influence of
	such consultation on the new RBMP is well documented. Non-state advisory groups
	(including national advisory group, diffuse pollution management advisory group, fish
	and fisheries advisory group non-state agencies) are directly involved in RBMPs and
	programmes of measures
Slovakia	Public bodies, municipalities, non-government organisations and scientific institutions
	are consulted on the final RBMPs but the process of active influence is unclear. The
	public has, to date, not been actively involved.
Sweden	This work is organised by county administrative boards reporting to Water Agencies.
	Landowners and other stakeholders are consulted and involved in developing the
	RBMPs, including implementing measures of rehabilitation.

#### Table 11-26 N2K: Which actors are involved in using monitoring data? (See 5.3.3)

	Which stakeholders influence decision-making about the creation of SMPs?
Catalonia	Stakeholders are yet to be involved but there are discussions about how to involve
	stakeholders when updating N2K site management in the future.
Estonia	There is stakeholders' involvement but no strictly detailed participatory process
	foreseen by legislation for management planning. The profoundness of stakeholders'
	participation varies depending on type of the regimes, habitat types, socio-economic
	conditions of area, etc.
Finland	Evaluations of site condition tend to make use of stakeholder input, though there is no
	participatory process required by law, so the involvement tends to be ad-hoc and
	using conservation experts.
Flanders	In the past, there was little to no stakeholder involvement. However, a process for
	new integrated management plans for N2K-sites (set up with landowners, farmers,
	NGO's, Nature and Forest Agency together) is being designed.
Hungary	All stakeholders are allowed to comment and their views are documented. But this
	process does not appear to be based on monitoring and evaluation data.
Romania	When submitting draft management plans and for approval by competent authority,

	the administrators/ custodians of protected areas have to demonstrate that a consultation process with all stakeholders was conducted. All management plans must comprise a section describing this consultation process and its main results/ conclusions.
Scotland	The landowner is involved in discussing the SMP if the site is not in favourable condition, but it is not clear how and whether other stakeholders are able to comment
Slovakia	Yes, stakeholders are able to comment on the SMPs and their influence tends to be strongest in protected areas like National Parks.
Sweden	The majority of NK2 sites in Sweden are protected areas (national parks, reserves), with county administrative boards responsible for the monitoring and management. Stakeholder input (e.g. citizen science) is important for providing monitoring data (e.g. birds, endangered species). The Swedish Species Information Centre collaborates with the county boards, the Center for Biological Diversity (CBM) on management issues.

#### Table 11-27 AES: Which actors are involved in using monitoring data? (See 5.3.3)

	Which stakeholders influence decision-making about the creation of AESs?
Catalonia	There are documented studies of conflicts between farming and conservationist
	representatives that suggest that these stakeholders try to influence the selection of
	measures <sup>10</sup> .
Estonia	The overall ERDP has a distinct monitoring commission which is led by the Ministry of
	Rural Affairs and consists of experts from ministries, governmental agencies,
	representatives of the unions of agricultural producers, environmental NGOs, forestry
	unions, and research institutions. However, based on document analysis, it is difficult
	to assess if/how these stakeholders specifically affect the decision-making concerning
	redesign of AES.
Finland	The administrative model indicates that beneficiaries are involved from national,
	regional and local levels, the model show top-down structure.
Flanders	Farmers have a free choice among the different AES-packages that can be
	implemented in certain area. So, indirectly they determine the goals that will be
	achieved and the measures that will be implemented at the site-level.
	New experiences and insights in site management (managed and reported by NGO's)
	for farmland birds sometimes find their way to the Flemish Land Agency. This happens
	in an unofficial way, via conferences or conservation magazines.
Hungary	The wider Rural Development programme involves public consultation but there is no
	information about the specific development of AES with stakeholders.
Romania	Monitoring Committee of the Ministry of Agriculture and Rural Development and its
	different working groups represent stakeholders.
Scotland	No evidence of participatory decision-making at the management level could be
	found. The AES seem to be managed relatively top-down by a government
	organisation (RPID).
Slovakia	Stakeholder can provide feedback in preparation of new AES design, but usually their
	voice is too weak, as the support for individual measures is designed on higher policy
	level.
Sweden	Other than engagement of landowners to receive EU subsidies, the process is very top
	down. Any PoMs are administered by local monitoring boards.

<sup>10</sup> See for example