

**IMPEL Project:
Implementing Article 10 of the SEA Directive
2001/42/EC**

Final Report

**Regine Barth
Amrei Fuder**

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Institut für Angewandte Ökologie • Institute for Applied Ecology • Institut d'écologie appliquée

**Geschäftsstelle
Freiburg**

Postfach 62 26
D-79038 Freiburg
Tel.: 07 61 / 45 29 5-0
Fax: 07 61 / 45 54-37

**Büro
Darmstadt**

Elisabethenstr. 55-57
D-64283 Darmstadt
Tel.: 0 61 51 / 81 91-0
Fax: 0 61 51 / 81 91-33

**Büro
Berlin**

Novalisstr. 10
D-10115 Berlin
Tel.: 0 30 / 28 04 86-80
Fax: 0 30 / 28 04 86-88

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Final Report

Executive Summary

The objective of the present IMPEL Project was to investigate existing practice and experience in EC Member States and Accession Countries as regards monitoring of significant environmental effects of the implementation of plans and programmes according to Art. 10 of the SEA Directive (Directive 2001/42/EC on the assessment of the effects of certain plans and programmes on the environment). Since the SEA Directive has not been transposed yet by the Member States (transposition period ending on 21 July 2004) the working group which has been set up for the project was confronted with the problem that only very little experience exists concerning monitoring of environmental effects resulting from the implementation of plans and programmes. Apart from the outcome of the few existing case studies the present report is therefore mainly based on practical experience with the revision of plans and programmes and monitoring schemes operating independently from planning activities. The results of the project should be understood as suggestions and assistance for those who are involved in the transposition and implementation of Art. 10 of the SEA Directive.

In absence of a definition of monitoring in Art. 10 of the SEA Directive the working group agreed to describe monitoring as an activity of following the development of the parameters of concern in magnitude, time and space. From a procedural point of view, monitoring may be split into several tasks, comprising the collection/gathering of environmental information, the processing of the information and the interpretation or evaluation of the information.

One of the main conclusions drawn by the working group is that scope, depth and way of monitoring depend very much on the characteristics of each type of plan or programme. Art. 10 of the SEA Directive refrains from laying down detailed requirements and leaves thus enough flexibility to develop flexible and individual solutions adapted to the respective type of plan and programme. However, the importance of starting monitoring on the grounds of baseline environmental information has been recognized as a common principle for monitoring. The baseline environmental information relevant for monitoring the significant environmental effects of plans and programmes are given in the environmental report which has to be prepared in the course of an SEA (Art. 5 of the SEA Directive). Monitoring is therefore closely linked with the environmental report. Monitoring focuses on those

environmental effects which have been identified as "significant" in the environmental report.

The report includes a case study of a monitoring arrangement which has been introduced for a waste management plan (Vienna).

Experience shows that monitoring in general (i.e. not only in an environmental context) is often based on indicators. Indicators may also be used for monitoring of environmental effects of the implementation of plans and programmes. The DPSIR-scheme as a methodological background developed by the European Environmental Agency (EEA) may give some ideas about the appropriate factor to be addressed within a cause-effect-chain.

Monitoring systems can not be attributed to clearly distinguished types. In practice, environmental monitoring systems are often established to control the achievement of environmental objectives or the implementation of measures intended to produce positive environmental effects (approach to be found in the context of Structural Funds). In particular on project level, impact-related monitoring systems can be found which cover for example emissions and changes in the air quality. In addition, in all European countries great amounts of comprehensive environmental data describing the state and changes of the environment effects are collected which, however, may not always allow a clear interpretation of changes in the environment and their attribution to a certain planning activity.

Many environmental data have already been systematically collected by authorities and operators of certain industrial installations on the basis of obligations deriving from EC legislation (e.g. EIA Directive, IPPC Directive). Where appropriate, these data sources can be used for the purpose of Art. 10 of the SEA Directive.

Art. 10 of the SEA Directive does not determine which authority or body is responsible for monitoring. Depending on the individual situation, it may even be conceivable to involve private organisations in the collection of environmental data (e.g. through wildlife observation).

The present IMPEL Project is only one step in the process of implementing the SEA Directive. The working group recommends to support additional case studies accompanying the implementation of the SEA Directive and in particular of Art. 10 of the SEA Directive.

1 Introduction

1.1 The Project

Art. 10 of the SEA Directive 2001/42/EC obliges the Member States to ensure the monitoring of significant environmental effects of the implementation of plans and programmes:

- (1) Member States shall monitor the significant environmental effects of the implementation of plans and programmes in order, inter alia, to identify at an early stage unforeseen adverse effects, and to be able to undertake appropriate remedial action.*
- (2) In order to comply with paragraph 1, existing monitoring arrangements may be used if appropriate, with a view to avoiding duplication of monitoring.*

The implementation into national planning systems bears a number of difficulties. Therefore the IMPEL network has started a project which deals with the particular difficulties of the implementation of Art. 10. The main objectives are to investigate different options of monitoring, to compare the monitoring instruments currently applied in the Member States and to develop feasible solutions for implementing the monitoring requirements of the directive. The project primarily focuses on monitoring of waste management plans and land-use plans but includes also other types of plans and programmes.

The project was coordinated by the Bavarian State Ministry for Regional Development and Environmental Affairs. A working group, which was open to all EU Member States and five Accession Countries, met in three workshops. The workshops, which were held in Munich and Berlin, were attended by experts from nine Member States and three Accession Countries. The Oeko-Institute, Germany supported the project as a consultant.

This report, which presents the results of this IMPEL Project, gives an overview of various options and some suggestions to those who are involved in the implementation of Art 10 of the SEA Directive and to others "having a sufficient interest" such as NGOs and consultants.

1.2 Methodology of the Project

The project was based on the active cooperation of the participating representatives of Member States and Accession Countries. The three workshops were central to the success of the project. Above all, they served as a means to gain information and to discuss the topic from the specific national perspectives. The presentations given by members of the working group, external experts and the consultant, discussions during the workshops, the first two interim reports, the evaluation of the few existing case studies and the answers to a questionnaire have flown into this report.

In parallel to this IMPEL Project a group consisting of experts from the European Commission and six Member States (so-called "Guidance Group") has been preparing a Guidance Document for the interpretation of several provisions of the SEA Directive including Art. 10. The results of the IMPEL Project contributed to the chapter on monitoring drafted by the Guidance Group and vice versa. Because of the close relationship between this project and the Guidance Group it has been agreed to adopt the legal interpretation drafted by the Guidance Group as a common basis. However, it might not be entirely excluded that during the finalisation of the Guidance Document (which will probably be subsequent to the publication of this report) the chapter on monitoring in the Guidance Document might be subject to amendments.

2 Legal Aspects (as presented at the SEA Guidance Group)

(1) Art. 10 extends Member States' duties beyond the planning phase to the implementation phase and lays down the obligation to monitor the significant environmental effects of the implementation of plans and programmes. Monitoring is considered as an important element of the SEA Directive since it makes sure that the results of the environmental assessment during the planning stage are cross-checked with the environmental effects occurring during the implementation phase

(2) One general conclusion, which can be drawn from a legal analysis of Art. 10 is that the SEA Directive is not prescriptive about the way how the significant environmental effects are to be monitored and leaves a lot of flexibility to the Member States. In particular, Member States are free to determine the bodies responsible for monitoring, time and frequency of monitoring, the methods they want to use and the consequences of monitoring. Art. 10 refrains from laying down detailed requirements, considering the very wide range of plans and programmes subject to the Directive. The consequence of this broad flexibility is that a legal analysis can only point out certain minimum requirements.

2.1 Art. 10 para 1

“Member States shall monitor ...”

(3) Art. 10 establishes that monitoring of the significant environmental effects of plans and programmes covered by the Directive is an obligation. When a plan or programme is adopted, the authorities referred to under Article 6(3), the public and any Member State consulted under Article 7 must be informed about “the measures decided concerning monitoring in accordance with Art. 10” (Art. 9 para 1 lit. c)

(4) The Directive does not give a definition of the term "monitoring". Monitoring can however be generally described as an activity of following the development of the parameters of concern in magnitude, time and space. In the context of Art. 10 and with regard to the aspect of "remedial action" monitoring may also include an evaluation of the environmental information. Art. 10 does not contain any technical requirements about the methods which are used for monitoring the significant environmental effects. The objective of Art. 10, namely to find out whether the assumptions made in the environmental assessment correspond with the environmental effects which occur when the plan or programme is implemented and to identify at an early stage unforeseen adverse effects resulting from the implementation of the plan or programme, may give some orientation in this respect. It is thus clear that monitoring is embedded in the context of the environmental assessment and does not require scientific research activities. Also the character (e.g.

quantitative or qualitative) and detail of the environmental information necessary for monitoring depend on the plan and its predicted environmental effects.

Furthermore, it follows from Art. 10 para 2 and the potential revision of the plan or programme which is implicitly addressed by the words "remedial action" that Art. 10 creates an obligation which, although coming into effect after the environmental assessment and the adoption of the plan or programme, may be integrated in the regular planning cycle where appropriate. It is not necessarily required to establish a separate procedural step for the purpose of monitoring. Monitoring may coincide for example with the regular revision of a plan or programme.

“...the significant environmental effects ...”

(5) Monitoring has to cover the significant environmental effects. The “significant environmental effects” are also one of the most important pieces of information which have to be included into the environmental report according to Article 5 para 1. Thus, when determining what information needs to be collected for the purpose of monitoring (e.g. identifying relevant effects, determining whether environmental effects are significant) one can apply the same principles and criteria as for the preparation of the environmental report [*link to papers on environmental report and significance criteria*]. The "significant environmental effects" as mentioned in Art. 10 cover in principle all kind of effects, positive, adverse, foreseen and unforeseen¹ ones.

Further, Art. 10 does not necessarily require that significant environmental effects are monitored directly. The SEA Directive also allows to monitor the significant environmental effects indirectly through monitoring for example pressure factors or mitigation measures (see also below, section 2 c).

(6) It can be said that the scope of the information on significant environmental effects included in the environmental report sets a framework for the scope of monitoring. Monitoring has to come to a conclusion regarding the environmental effects of the implementation of the plan or programme. For this purpose it will probably use the same criteria as for putting up the environmental report – with the difference that the statements of the environmental report are prognostic ones, and monitoring focuses on the actual facts evolving during the implementation phase.

(7) Annex I specifies the information referred to in Article 5 para 1. For purposes of clarity it should be noted that not all of the information listed in Annex I is covered by the monitoring requirement since much of Annex I does not deal with environmental effects, but with other information like “the relevant aspects of the current state of the environment and the likely evolution thereof without implementation of the plan or programme” (Annex I lit. b). Monitoring concentrates

¹ See explanation on "unforeseen" effects in paragraph 12.

on the information mentioned in lit. (f) Annex I, i.e. “*the likely significant effects on the environment*” and may also include those mentioned in lit. (g) Annex I, i.e. “*the measures envisaged to prevent, reduce and as fully as possible offset any significant adverse effects on the environment*”. Monitoring the measures to prevent or mitigate adverse environmental effects can be an efficient way of monitoring since the implementation of such measures directly correlates with the environmental effects of a plan or programme.

(8) According to Article 5 para 2, the environmental report is limited to the information that “may reasonably be required taking into account the contents and level of detail in the plan or programme and its stage in the decision-making process”. Given the close link between the environmental report and monitoring the reasoning behind Art. 5 para 2 seems also valid for Art. 10. Therefore, also monitoring does not cover any more than the information that “may reasonably be required”.

“... of the implementation of plans and programmes ...”

(9) Implementation means not only the realisation of the projects envisaged in the plan or programme, beginning with the grant of a development consent and the construction of the project and continuing with the operation of the project, e.g. for production or transport purposes, but covers also other activities included in the plan or programme (e.g. behavioural measures which are performed to achieve targets or to ensure that the conceptual aims of the plan or programme are put into practice).

(10) Art. 10 requires monitoring arrangements which cover all plans and programmes subject to the Directive. However, Art. 10 does not specify whether the environmental effects of each plan or programme have to be monitored individually. Following from the flexible character of Art. 10 it is conceivable that one monitoring arrangement may cover several plans or programmes as long as sufficient information about the environmental effects of the individual plans or programmes is provided and the obligations deriving from Art. 5 para 1, Annex I i) and Art. 9 para 1 concerning the publication of the monitoring measures are fulfilled.

In some cases, it may even help to better identify cumulative effects of different plans and programmes when they are monitored together.

It is therefore conceivable to establish monitoring arrangements covering several plans or programmes for example within the same thematic category or on different levels in the planning hierarchy.

“ ... in order, inter alia, to identify at an early stage unforeseen adverse effects...”

(11) The Directive explicitly refers to “unforeseen adverse effects” which shall be identified by monitoring. This should not be understood in such a way that monitoring would have to be designed specifically to discover unpredicted effects. It would even seem impossible to design in advance a system of monitoring measures (as it is required in Art. 5 para 1 and 9 para 1) without having an idea about the environmental effects which might occur. Even though unforeseen changes in the environment might be detected it is usually extremely difficult to attribute them to the implementation of the plan or programme. “Unforeseen adverse effects” means therefore rather shortcomings of the prognostic statements in the environmental report (e.g. regarding the predicted intensity of an environmental effect) or unforeseen effects resulting from changes of circumstances, which have led to certain assumptions in the environmental assessment.

“... and to be able to undertake appropriate remedial action.”

(12) One purpose of monitoring is to enable the planning authority to undertake appropriate remedial action if monitoring reveals adverse effects on the environment that have not been considered in the environmental assessment. The Directive does not, however, necessarily require Member States to modify a plan or programme as a result of monitoring. This is consistent with the general approach of SEA, which facilitates an informed decision, but does not create substantive environmental standards for plans or programmes.

(13) However, in order to consider appropriate remedial action in the framework of national legislation Member States have to take into account the environmental information received through monitoring.

(14) If the plan or programme is modified as a result of monitoring, this modification may again require an SEA (Art. 2 lit. a) unless it is a minor modification and Member States do not determine that significant environmental effects are likely to occur (Art. 3 para 3). Plan modifications resulting from monitoring serve to offset or mitigate adverse environmental impacts. When deciding whether the modification of the plan has to undergo an environmental assessment it may be taken into account to what degree the environmental performance of the plan or programme will be improved and which environmental effects have already been subject to a comprehensive environmental assessment

- **Art. 10 para 1 lays down the obligation to monitor the significant environmental effects of the implementation of plans and programmes whilst the way how, when and by whom the environmental effects are monitored will be determined by the Member States.**
- **The scope of monitoring is closely linked with the scope of the environmental assessment.**
- **Significant environmental effects can be monitored directly and/or indirectly.**
- **Art. 10 para 1 does not set out a direct obligation to undertake appropriate remedial action, but requires an evaluation of the results of the monitoring measures and the consideration of remedial action.**
- **Monitoring may be integrated into the planning cycle and coincide with the regular revision of a plan or programme.**

2.2 Art. 10 para 2

“In order to comply with paragraph 1, existing monitoring arrangements may be used if appropriate, with a view to avoiding duplication of monitoring.”

(15) Although Art. 10 para 2 is in fact self-evident it helps clarifying the obligations deriving from Art. 10 para 1. The Directive allows Member States to use existing monitoring arrangements. This means that the information on the effects of plans and programmes does not have to be collected specifically for this purpose, but other sources of information can be used. Also it is not required to establish a new procedural step for the purpose of monitoring which is separated from the regular planning process. Monitoring can, for example, be integrated into the regular revision of the plan or programme (see also above p. 7). However, if no appropriate monitoring schemes exist Member States have to develop them.

(16) The main difficulty is to identify sources of information in different Member States that are suited as a basis for implementing the monitoring requirements, and to adapt existing monitoring arrangements to the requirements of the Directive. It should be noted that EC legislation contains already several provisions which require independently from Art. 10 of the SEA Directive the collection of specific environmental data (e.g. Water Framework Directive 2000/60/EC, IPPC Directive

96/61/EC, see Annex II). These data may be used for the purpose of monitoring according to Art. 10 provided that they are relevant for the respective plan or programme and its environmental effects. In essence, the challenge to monitor the environmental effects of a plan or programme on the basis of existing information is a factual, not a legal one.

- **Art. 10 para 2 allows to use existing monitoring instruments for the purpose of Art. 10 para 1.**
- **Monitoring instruments are to some extent already foreseen in other EC legislation.**

2.3 Related Aspects and Provisions

(17) Art. 10 is linked with Art. 5 para 1, Annex I i) and Art. 9 para 1 c). Art. 5 para 1 and Art. 9 para 1 require that the public is informed on the envisaged and finally adopted monitoring arrangements. At the stage of the preparation of the environmental report it is obvious that no definite statement about the final monitoring measures can be made since the content of the plan or programme is not decided yet. But also when informing the public according to Art. 9 para 1 on the finally adopted monitoring arrangements it can not always be precisely predicted when and how the plan or programme will be implemented. Bearing in mind the reasoning behind Art. 5 para 2 and the close link between the content of the environmental report and monitoring, it can be stated that the information on the monitoring arrangements needs to be only as detailed as it may reasonably be required. In this respect, one may take into account that successful monitoring is to some extent a dynamic process, which may include continuous adaptation.

Detailed information on the monitoring measures which will finally be carried out and their results are subject to the provisions of Directive 90/313/EEC on access to environmental information anyway (reference to chapter on environmental report).

(18) The environmental assessment covers also transboundary environmental effects (see Art. 7 and also Annex II Nr. 2, 3rd indent). Consequently, transboundary environmental effects may also be subject to monitoring. Therefore, in case of plans and programmes which require transboundary consultation the possible arrangements concluded according to Art. 7 may also address monitoring measures (reference to chapter on consultation) A model for such arrangements could be the provision of Article 7 of the EspooConvention.

(19) The purpose of monitoring may overlap with that of quality control (Art. 12 para 2). If monitoring reveals that a certain effect is systematically overseen or underestimated in SEAs for a certain type of plans or programmes, then monitoring can contribute to improving the quality of future environmental reports. Generally spoken, monitoring may provide information on the quality of the existing environmental report which may be used for the preparation of future environmental reports. In that regard, efficient monitoring can be regarded as a tool for quality control helping to fulfil the requirements of Art. 12 para 2. [*link to paper on quality control*].)

- **Art. 5 para 1 and Art. 9 para 1 do not necessarily require that detailed arrangements for monitoring measures are made publicly available. It may be sufficient to provide a framework for the monitoring measures.**
- **Arrangements for transboundary consultation may also address monitoring.**
- **Monitoring can be used as a tool for quality control of environmental reports.**

3 Practical and Methodological Aspects of Monitoring

The following text aims at making general suggestions for the implementation of Art. 10. As it has been pointed out before, the Directive offers a lot of flexibility in many respects. Thus, these suggestions are only one possibility when implementing Art. 10. Also, it must be stressed that a wide range of very different kinds or plans and programmes exist in the Member States, regarding scope, content, procedure and impact. The specific character of the plan will always play a major role for the determination of the appropriate monitoring arrangements. The suggestions in this chapter therefore can only be general ones. They were developed in the course of this project through presentations, discussions, questionnaires, research and assistance from other institutions and researchers. These suggestions could be taken into consideration when implementing Art. 10 into national law.

Furthermore, it is important to take into account that, while there is considerable experience in general environmental monitoring in many European states, there is not a lot of experience and knowledge available as regards the monitoring of plans and programmes. More case studies and research projects are needed. Hence, these suggestions have to be considered preliminary and Member States should follow future developments in this field of work very closely, including possible future activities of the European Commission, respectively DG Environment.

3.1 Practical Aspects of Monitoring

The following sections address the main practical aspects of monitoring and give some orientation for the implementation of Art. 10 of the SEA Directive. It must be stressed though, that it is impossible to determine in the present report what the “right” scope, method and procedure for the monitoring of a specific plan or programme are. The adequate design of the monitoring largely depends on the specific plan or programme which needs to be monitored. The scope of the plan, whether it is for land use, waste management or any other application, or whether it is on the national, regional or local level, the characteristics and sensitivity of the current situation in the specific nation or region, the legal implications of the plan and its position in a possible array of different plans and, last but not least, the content of the plan – all these factors, and more, must be considered when determining the appropriate way to monitor a plan or programme.

3.1.1 Scope and Depth of Monitoring

Monitoring should aim *inter alia* at identifying unforeseen adverse effects in order to be able to undertake appropriate remedial action. An unforeseen adverse effect can be an effect, which has not been taken into account at all during the environmental assessment. It is likely, however, that monitoring will discover in most cases a higher intensity of the foreseen effect than it has been assumed in the environmental report.

Thus monitoring is closely linked with the environmental report which sets the framework for the scope of monitoring by identifying the likely significant environmental effects.

3.1.1.1 Factors of Influence – Nature of the Plan

Scope and depth of monitoring depend on the content and degree of detail of the plan or programme in question. It should be taken into account that the type of plan or programme, the state and sensitivity of the respective area as well as human resources and financial capacity have a strong influence on the scope of monitoring.

The same is valid for the depth of monitoring. Art. 10 of the SEA Directive does, for example, not specify whether quantitative or qualitative environmental data are needed for monitoring. In some cases, the use of only qualitative data might prove to be insufficient, whereas in other cases estimations of certain environmental effects may be the only method which is available. If the plan sets out more general decisions and guidelines, monitoring should be adapted to this specific case. This may be exemplified with the help of the Viennese waste management plan (WMP)². The Viennese WMP contains long-term prognoses and strategic concepts concerning the treatment of Vienna's waste until the year 2010 and was subject to an SEA process. Because of these objectives, which belong to a higher level of planning and strategic decisions, the plan does not decide on locations for future waste treatment facilities. Instead, more weight was put on the control of the overall content of the plan rather than on single environmental effects, which might occur. Thus, monitoring was focused on the question whether or not the current waste quantities corresponded to the ones prognosticated, whether the waste streams were still flowing according to the prognoses etc.³ It has been pointed out by the Viennese SEA team that monitoring measures, which deal with specific environmental effects, should be decided on a lower level of planning, since they are in most cases related to a specific project.

3.1.1.2 Factors of Influence - Different Planning Levels

Specific questions may arise when an issue is tackled in several plans in different hierarchies. For example, a regional land use plan could contain certain general stipulations on locations for settlement areas and industrial areas. The detailed planning could then be in the discretion of the local competent authority. This depends on the national planning laws, the SEA Directive is completely flexible in that respect. For the assessment itself recital (9) states: *“With a view to avoiding duplication of the assessment, Member States should take account, where appropriate, of the fact that assessments will be carried out at different levels of hierarchy of plans and programmes.”* This might as well be applied to monitoring.

² For further information see 5.5.1.

³ For a summary of the whole case study including monitoring measures, please see chapter 4.4.1 in the Annex.

In addition, there is no obligation to monitor every plan individually. Depending on the specific legal and factual conditions, results of the monitoring of the lower plan can be used for the monitoring of a plan higher in the hierarchy and vice versa. It can be even possible that the data used for the monitoring of a plan or programme on a higher level merely consists of the results of the monitoring of plans or programmes on a lower level, as long as some kind of evaluation takes place, whether the results are in line with the predicted effects of the plan or programme (on the higher level). In any case, it is recommended to take the specific situation into account, when designing the respective monitoring schemes for an array of hierarchical plans.

3.1.1.3 Monitoring of Mitigation Measures ?

In addition to the elements listed in Annex I f) (environmental effects), the environmental report must also contain information on the ‘measures envisaged to prevent, reduce and as fully as possible offset any significant adverse effects’ (Annex I (g)). Art. 10, however, refers only to environmental effects and does not contain a reference to mitigation measures. The wording of Art. 10 of the SEA Directive as it was finally adopted does not reflect the original intention of the EU Parliament to include mitigation measures with a view to enduring the effectiveness of appropriate corrective measures.⁴

On this basis, the participants of the workshops of this IMPEL Project discussed the role of mitigation measures when monitoring plans and programmes. On the one hand, monitoring of mitigation measures could be understood as complementary to the monitoring of environmental effects. On the other hand, it can also be seen in practice as an alternative and indirect way of monitoring the environmental effects so that if a mitigation measure does not serve the purpose or is not implemented this then could be seen as an unforeseen adverse effect. The participants of the workshops of this project have come to the conclusion that at least in certain cases the environmental effects may also depend on the mitigation measures. It is therefore seen reasonable to include them into the monitoring in these cases. In addition, mitigation measures may in practise be very closely linked with the activities for which the plan or programme is prepared in the first place, so that a clear distinction of them might not always be possible.

3.1.2 Use of Existing Data

As the different monitoring approaches show, a multitude of data has already been collected and used. It has to be considered carefully, however, that these data sources

⁴ Report on the joint text approved by the Conciliation Committee for a European and Council directive on the assessment of the effects of certain plans and programmes on the environment, Final A5-0177/2001, p.7; a similar approach has been taken by the Draft Protocol on Strategic Environmental Impact Assessment of the UNECE, Art. 17, <http://www.unece.org/env/documents/2002/eia/ac1/mp.eia.ac.1.2002.3.e.pdf>.

have been established for purposes different from those of the SEA Directive. Therefore, they cannot be applied to elsewhere without ensuring the compatibility⁵.

In particular, project/impact-related data is available, since many European Directives require the collection of data, either by the competent authorities or by the operator. In the latter case, the competent authorities can request the data from the operator given that he is not obliged to submit it to the authorities anyway. Some of the directives under consideration take a project-related approach, in the sense that data is collected in order to monitor compliance with the conditions set out when granting authorisation for a project (e.g. industrial installation), or for the purpose of determining the quality or quantity of substances emitted from a plant. Other directives require the collection of data that relates to a plan, programme or national policy (Directive on atmospheric pollutants). Consequently, these directives take a more general approach. A list of the major Directives as well as an overview of the indicators used can be found in Annex II of this report.

In spite of the data already available as a result of project-related and general environmental monitoring, it will become necessary in some cases to extend the existing monitoring schemes in order to obtain additional information. Each plan and programme has to be carefully analysed as regards this issue. Rather than multiplying the mass of data, it should be tried to extend existing monitoring schemes only, if and when necessary. If data is not available, it can also be sufficient to use plausible estimations. It could prove helpful if a planning authority consults the competent environmental authority in case of problems with data availability. All of this depends completely on national legislation, on the respective plan and the intensity of monitoring the responsible authority has opted for. It may be useful to keep in mind that Art. 10 asks for a reasonable monitoring only. Therefore extending monitoring schemes should be considered carefully.

3.1.3 How Can Monitoring be Organised (Procedural Aspects)?

Following from the examination of existing monitoring schemes, monitoring can be split into the following main tasks:

- Collection/gathering of data
- Processing of the data collected
- Evaluation and interpretation
- (Consideration of consequences)⁶

The following sections will take a closer look at some aspects when performing these tasks. Many of the suggestions derive from the evaluation of case studies and results

⁵ See also section 3.1.3.2 Data Processing and Management.

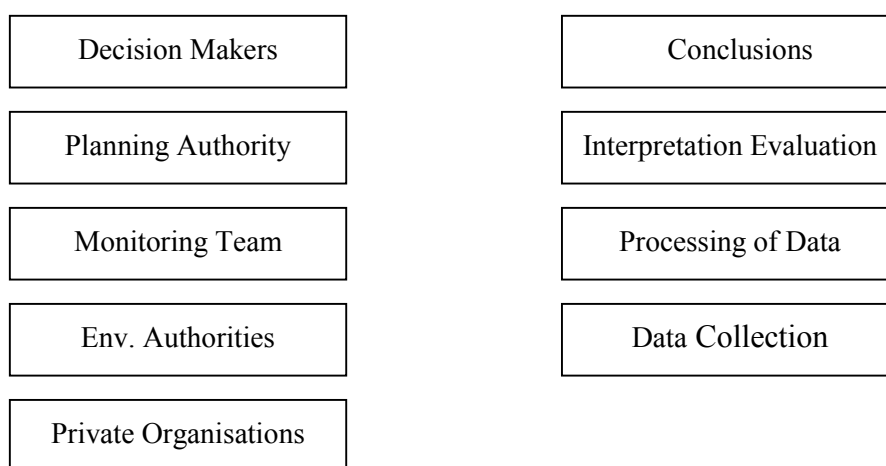
⁶ This consideration of consequences does not necessarily form part of the monitoring, but it certainly often will be one core element depending on the scheme.

of the questionnaire. These tasks often will be performed by different authorities or bodies, so one emphasis when designing monitoring schemes should be on provisions for an efficient and successful cooperation among the different actors involved.

3.1.3.1 Who Should Perform the Monitoring?

The Directive does not specify which authority or body should be responsible for monitoring. It is also not required by the Directive that the collection and processing of data and the corresponding evaluation and interpretation are performed by the same authority. Thus, when designing a monitoring arrangement, it has to be decided whether the tasks should be performed by the same authority/body or by different authorities/bodies. It is also necessary to determine the relationship between the authority/authorities responsible for monitoring or several monitoring tasks and the planning authority (if they are not identical). Different models are available. The illustration below shows the variety of possible combinations.

Competences and Tasks



The choice of the competent authorities and bodies and the division of tasks will of course depend on the respective administrative system and structure. Despite the variety of national planning and administrative systems, it seems very likely that in general only the "technical" tasks such as the collection and processing of environmental data are conferred to environmental authorities or private bodies whereas the more "political" tasks such as evaluation and conclusions will be within the competence of the planning authorities.

3.1.3.1.1 Responsibility for the Collection of Data

Most of the data in existing environmental monitoring schemes is being collected by public authorities or institutions on national, regional or local level. Frequently,

research institutions are involved. Even private organisations are involved in data collection, e.g. environmental NGOs in the case of data on protected species or habitat specifications. Since the SEA Directive leaves this question open, many ways to collect data will be possible. Different approaches are shown below. One of the criteria for the selection of responsible bodies certainly is the type of data to be collected or to be gathered.

Model for the involvement of private organisations

As far as the collection of data is concerned, the case study of Nauen⁷ suggests for the land-use plan in question falling back on a combination of data, which have been collected by authorities as well as by private organisations like nature associations. The integration of non-official sources of information should be considered for areas in which authorities have to rely on non-officially collected information. This is in particular true for the sector of wildlife observation in biotopes. Other areas, however, might be affected as well. It is important to check the reliance of the data gained in any case, independent where the information stems from.

Model for a "monitoring team"

The Viennese model (waste management plan) follows a different approach. Contrary to the example named above, private organisations are not included in the collection of data. They are, however, part of the monitoring team. In the case of the Viennese model, the flow of information has been organised very well. Since representatives of authorities, which are responsible for collecting the data, are members of the monitoring team as well, these data are continuously fed into the monitoring process without the need to establish a complicated net of data transfer.

Results from the questionnaire

As regards the responsibility for the collection of data, a variety of authorities and other institutions is involved. Besides competent authorities and municipalities, scientific institutes and ministries also collect data. It is significant that in most countries data-collecting and monitoring bodies (i.e. those which are in charge of evaluating the information and drawing conclusions) are not identical. Nevertheless, responsibilities overlap partially in three cases.

3.1.3.1.2 Responsibility for Evaluation and Interpretation

The Directive also contains no stipulation on the responsibility for the evaluation and interpretation of the collected data. Different suggestions have been made which can be compared with the current practice of monitoring in the different Member States.

⁷ The content of the project was to draw up an environmental report for a land-use plan of the municipality of Nauen, including monitoring measures. For further information see 5.6.2.

Plan-giving authority (A German perspective for land-use plans)

An Expert Committee, which has been installed by the Federal Ministry of Transport, Building and Housing, has opted for the identity of plan-giving and monitoring authority. According to their concept, it would be the best to oblige the local authorities to monitor the significant environmental effects, which are caused by the implementation of their local and land-use plans. For this purpose, the local authorities would have to draw on the information of the competent environmental authorities. The competent authorities would be obliged to pass all the environmental information with relevance to the land-use-plan on to the local communities. The local communities themselves would decide for their exact monitoring arrangements and state them in the environmental report, when drawing up the plan. Hence, environmental authorities would participate only in collecting information but not in the process of monitoring itself. This model is based on German constitutional law which grants extensive competence for municipalities as far as land-use plans are concerned, including the competence for deciding on remedial action.

Monitoring Team

A different model has been applied in the Viennese SEA process, which might be useful for certain sectoral or general plans. There, a monitoring group has been established in order to conduct the continual monitoring. It consists of members of the waste and environmental protection department of the Viennese municipality, the Viennese Umweltschutzbehörde and the Ökobüro (an umbrella organisation for environmental NGOs). Once a year, the monitoring group draws up a monitoring report, which is based on the criteria of the agreed monitoring checklist (see below). The monitoring report is then sent out to the SEA team and to the politicians of the environmental department of Vienna. In case of finding out if developments have taken place, which the waste management plan did not foresee, the SEA team is responsible for making the necessary adjustments to the plan. Hence, different authorities and even NGOs are taking part in monitoring. But the final decision on whether and which remedial action should be taken is made by the SEA team. The advantages of this model are various. The broad possibility of participation is one way of guaranteeing public participation and a means to create transparency and acceptance of the whole process.

Current practice – results from the questionnaire

Right now a multitude of authorities is responsible for the evaluation of the environmental information. As regards the field of land-use, in three cases the plan-preparing authority is identical with the one performing the monitoring. In the field of waste management plans, only in one case monitoring is carried out by the plan-giving authority. In the majority of countries, different authorities are given responsibilities as far as monitoring is concerned, ranging from special boards to different ministries and bodies like the Central Statistical Office.

In the questionnaire, the participants were also asked whether environmental authorities were involved/consulted in the process of regular revision of a plan or programme. In the area of land-use seven out of 12 answered in the affirmative, without specifying the sort of participation in detail though. In the field of waste management plans eight answered in the affirmative. Two said that an involvement of environmental authorities was not mandatory. Hence, it can be concluded that in the majority of cases, environmental authorities are involved. How this will influence the decision of the Member States, when establishing monitoring systems, cannot be said yet. There is neither a preference for a monitoring group nor one for leaving the monitoring to the authority, which drew up the plan.

3.1.3.2 Data Processing and Management

Data processing and management of data can be central for a successful monitoring. They seem to be of particular importance when environmental data are used which stem from monitoring systems established independently from specific planning activities. The technical aspects of data processing and management of data are briefly addressed in the following section.

3.1.3.2.1 Comprehensive Approach

While originally a sectoral approach was followed for the collection, processing and storage of environmental data, future trends aim toward a comprehensive approach on the basis of meta-databases such as:

- the Environmental Data Catalogue, a cooperation of Austria and Germany⁸
- the German Environmental Information Network (GEIN), which is based on monitoring programmes in the federal states of Germany⁹
- the Geographical Information System (GIS).

On the other hand, there are specialized information systems inter alia for soil, air, water, biota and nature. In some cases, the information systems have been linked with GIS, showing the configuration of the measuring network with a link to the data base of the measuring results.

The focus of all of these programmes is to evaluate, interpret and assess the data, partly in cooperation with the operators. As a result a status report on the environment is drawn up.

It can be stated that a high quantity of data is already collected in Germany. The challenge posed by Art. 10 is to process and link these accumulated data in order to conduct a successful monitoring. Hence, the Federal Environmental Agency works on the development of a methodological concept to connect the different databases.

⁸ For further information see <http://www.umweltdatenkatalog.de/wwwudk/V-UDKServlet?>

⁹ http://www.gein.de/index_de.html.

Up to now, it is possible to show trends in urban and rural areas. Excluded are specific regions, since they fall within the scope of the federal states and are not subject to the work of the Federal Environmental Agency.

3.1.3.2.2 Coordination of Environmental Information (CORINE)

On a European basis, a programme for the Coordination of Information on the Environment (CORINE) was established in 1985 by the European Community's Council of Ministers, which may prove to be helpful in this respect. It was given three main objectives:

1. to gather information on the state of the environment, for use in priority Community applications;
2. to coordinate national initiatives taken by Member States, and to improve information at the international level; and
3. to ensure the consistency of nomenclatures, definitions, etc., as well as creating the conditions necessary to compare data.

A number of priority areas, including the protection of biotopes, combating local and transboundary air pollution and preserving the environment of the Mediterranean region were initially defined.

The CORINE Information System has three components:

1. projects (air pollution, biotopes, coastal erosion, land cover etc.)
2. data collected under EC Legislation; and
3. basic data required for analysis and presentation of results.

These components aim to provide the information requirements of the objectives. The associated data sets and information have been organized within two broad areas:

1. the compilation of environmental data and the development of a Geographical Information System (GIS) on the state of the environment in Europe;
2. the improvement of consistency, comparability, and availability of environmental data. This is to be addressed by developing standards for the collection, handling and management of environmental data.

The essential component of this system is its integration of different data. Information from various data sources must be made intercompatible. The ARC/INFO system contains modules which allow the conversion between commonly used projections. Once fully developed, this system will be similar in nature to UNEP's Global Resource Information Database (GRID).

3.1.3.3 Reporting the results of monitoring

Even though the Directive does not contain any specific stipulations on how to report on the monitoring process and its results, it could make sense from a practical point of view to consider the form and extent of the reporting on monitoring in an early stage. Factors to determine the appropriate reporting, if any, could be whether it will be necessary for another authority or body to draw conclusions from the results, whether the results are needed for a revision or development of a new plan, whether the authority has the obligation or the policy to publish the results etc. A practical example can be found in the Bavarian legislation on regional planning laying down an obligation to report every four years to the Bavarian Parliament on inter alia the implementation of the regional development plan (see also 5.6.1).

3.1.3.4 Monitoring and information of the public

According to the SEA Directive a description of the monitoring measures must be made publicly available in the environmental report¹⁰. As regards the results of the monitoring measures and their publication, the SEA Directive does not contain any obligations. However, it has to be noted that the monitoring measures, which have been finally carried out, and their results are subject to the provisions of Directive 90/313/EEC¹¹ on access to environmental information. Thus, information about the monitoring measures and their results have to be made available on request.

With a view to the forthcoming implementation of the Aarhus Convention, it may be taken into consideration that the European Commission has issued a proposal¹² for a Directive on access to environmental information, amending Directive 90/313/EEC. In contrast to the former provisions, Article 7 of the directive, the proposal pursues a policy of “active supply of information”. It has turned out that greater public access to environmental information contributes to an increase in public awareness and acceptance and it might also lead to better results concerning remedial action. As far as the content of the information is concerned, the proposal requires the information to be clear and comprehensible. Thus, it might be sensible to take these requirements of the proposal into account when implementing the SEA Directive.

3.1.4 Monitoring of Transboundary Effects of the Implementation of Plans or Programmes

A plan or programme might have significant effects not only on the environment of the state, which has implemented the plan/programme, but also on neighbouring countries. The consultations mentioned in Art. 7 should therefore also address

¹⁰ For details see chapter 2.1.

¹¹ Council Directive 90/313/EEC of 7. June 1990 on the freedom of access to information on the environment, OJ L 158 23.06.1990, p.56.

¹² Proposal of the Commission for a Directive on public access to environmental information, COM (2000) 0402.

monitoring measures¹³. A Member State cannot provide for monitoring measures on a foreign territory. It makes sense, though, to adjust monitoring measures to each other and to provide for a cooperation of the respective authorities. In connection with the Espoo Convention, similar problems have been discussed. The solutions found there might serve as example for the monitoring of transboundary environmental effects according to the SEA Directive.

Article 7 of the Espoo Convention provides for a voluntary procedure for carrying out post-project analysis: *“The concerned Parties, at the request of any such party, shall determine whether, and if so, to what extent, a post-project analysis shall be carried out, taking into account the likely significant adverse transboundary impact of the activity for which an environmental impact assessment has been undertaken pursuant to this Convention.”* In case of a post-project analysis revealing significant adverse transboundary impacts, the parties shall inform each other and then consult on necessary measures to reduce or eliminate the impact.

The practical application of the mechanisms in Article 7 Espoo Convention, however, has shown certain difficulties. For instance, states may come to a different conclusion when determining the significance of environmental effects. Therefore, bilateral arrangements are sometimes being used as a basis when making the decision on significance. Within the context of European Law, however, the provisions on ‘significant environmental effects’ need to be interpreted by the European courts and applied by the Member States as uniformly as possible. So far, there is no room for bilateral agreements. Furthermore, difficulties may originate from the fact that procedures for environmental assessments and/or monitoring differ from country to country. This should be kept in mind when setting up new monitoring mechanisms or consigning authorities to carry out the monitoring. Bilateral arrangements might appoint the competent authorities, which should be informed in case that one Member State becomes aware of adverse environmental effects. Such agreements might also give guidance to the competent authorities of neighbouring Member States on how to cooperate in the field of monitoring these effects. At present, bilateral arrangements exist as regards the general spatial development of neighbouring Member States.¹⁴

3.1.5 Methods and Standards

As regards the mode of monitoring, the Directive does not contain any specific requirements. Since generally monitoring is closely connected to the environmental report, its requirements can serve as an orientation:

¹³ See chapter 2.

¹⁴ For further information see Hilden, Mikael/ Furman, Eeva Rebekka. *Assessment across borders – Stumbling blocks and options in the practical implementation of the Espoo Convention*. Environmental Impact Assessment Review, 2001 (Vol. 21), no. 6, pp.537-551.

The environmental report has to contain the information that it may be ‘*reasonably required taking into account current knowledge and methods of assessment*’. Furthermore, the Directive does not refer to best available techniques or similar standards, but only to ‘current knowledge’ and ‘methods of assessment’. Even if it does not oblige the Member States to use the newest scientific methods and techniques, ‘current’ contains a dynamic element. Hence, Member States might have to change their methods of assessment etc. whenever new developments have been established, and are thus no longer progressive, but ‘current practice’.

3.1.5.1 Specific Authority Responsible for Determining Indicators?

Since the directive contains almost no requirements as far as the mode of monitoring is concerned, it could be considered to determine a specific authority or body to be responsible for certain tasks of monitoring in order to avoid doubling efforts by multiple authorities and to ensure some common or minimum standards. Such an authority could for example be responsible for the selection of indicators or the regulation of minimum standards. Being asked in the questionnaire, if they favoured such a specific body or authority watching over the choice of indicators, the participants were divided into two groups of almost equal size. Five countries opted against such an additional body arguing that guidance and decisions beforehand would be the better means and that decisions should be made within the system itself. The six countries favouring the approach argued that such a committee might be more neutral and thus strengthen the environmental aspects and that it might help with consulting and guarantee more transparency.

3.1.5.2 Minimum Standards ?

The use of common or minimum standards is not addressed by the Directive. Member States can take individual and multiple approaches for their regulations on different plans and programmes or leave the question entirely up to the competent authorities. The answers in the questionnaire whether minimum standards should be used, showed a variety of opinions. Even though six countries opted for the idea, all of them made restrictions like that of non-binding standards. It was also considered important to relate these standards to a system of ground data. The scepticism might derive from the fact that minimum standards might be very difficult to realise, since they would have to cover a variety of plans.

3.1.6 Frequency of Monitoring

Unfortunately, no information or data on the frequency of monitoring is available from the case studies, which have been made of SEAs. It is therefore resorted to the experience which stems from the regular revision of plans and programmes.

As the questionnaire has shown, the frequency of revisions differs significantly in the different Member States, ranging in the field of land-use from every two years up to

twenty years, whereas six countries do not have specific regulations on the frequency but decide on it according to the respective plan. In the field of waste management the situation is similar. The differences clarify that it is not possible to determine how often and in which period of time monitoring should be performed.

An interesting approach has been presented by an accession country (Malta). For the frequency of the revision of waste management plans a graduated procedure has been introduced. According to it, in the first year revisions take place every six months, in the second and third year revisions take place once a year and after three years revisions take place every two years.

When considering similar graduated approaches, one should examine carefully the appropriate intervals. The intervals have to be adapted to the specific plan or programme, in particular to the process of its implementation and to the character of the environmental effects (e.g. long-term effects or immediate effects) to be monitored.

In the case of the Viennese Waste Management Plan, it has been decided to monitor the plan once a year. The first monitoring report was due in October 2002.

When legislation provides for a regular revision of the plan or programme within appropriate intervals, it may be considered to carry out monitoring jointly with the revision of the plan or programme. The results of the monitoring may be used in this case as a basis for the environmental report, provided that the revision of the plan or programme requires again an environmental assessment.

3.2 Methodological Aspects

In addition to the more practical issues in this chapter, some methodological aspects will be briefly explored. They reflect general elements of the scientific and systematic analysis of environmental monitoring without, however, entering in an extensive scientific debate on the various aspects (such as indicators). The consideration of methodological aspects is certainly no prerequisite for a proper implementation of the SEA Directive. However, the following explanations provide a systematic approach, which may give some useful ideas and practical assistance when establishing monitoring systems or assessing the appropriateness of existing monitoring systems.

3.2.1 Indicators as a Tool for Monitoring

Art. 10 does not contain any requirements on the mode of monitoring. The flexibility of Art. 10 is needed in order to develop solutions corresponding to the various plans and programmes. Nevertheless, it is helpful and a basis for effective monitoring to follow a certain structure when developing a monitoring mechanism for a plan or programme, since otherwise the genuine aim of monitoring might get out of sight. A

starting point for this structure might be the following questions¹⁵, which can be refined when more experience is available:

1. Topic of a specific monitoring: WHAT DO I WANT TO MONITOR?
2. Objective of the specific monitoring: WHY DO I WANT TO MONITOR THIS TOPIC?
3. Selection of an appropriate indicator along DPSIR: HOW CAN I MEASURE THIS OBJECTIVE?
4. Source of information (monitoring system): WHERE DO I GET THE NECESSARY INFORMATION?
5. Criteria of intervention (environmental goals): AT WHICH VALUE OF THE INDICATOR EXISTS A NEED TO INTERVENE?¹⁶

These questions show, on a very basic level, the steps when designing a monitoring scheme. Generally, a central task in this process is the appropriate selection and use of indicators to ensure an effective and sufficient monitoring. Hence, a couple of indicator-based models are presented below in order to show possible solutions for this specific problem. In the Annex further monitoring models are listed.

3.2.1.1 Definition, Use and Significance of Indicators

An abstract definition of indicators, which are generally seen as core elements of a monitoring scheme, is that they provide information on phenomena that are regarded typical for and/or critical to environmental quality. In general, they are used to detect and measure changes in the environment. In particular, environmental indicators communicate those aspects regarded critical or typical for the complex interrelation between natural species and abiotic components of the environmental system.¹⁷ While originally indicators were focused on measuring inputs and outputs only (being used to measure the process of implementing projects), today indicators are also used to measure the results of such processes. Thus, the definition of outcome and impact indicators has become extremely important.

Indicators aim at simplifying complex interrelations and they provide understandable and representative information about environmental issues. Apart from that, indicators function as decision-makers as there is a demand for targets in environmental planning.

¹⁵ This approach was presented by Jürgen Giegrich from the Institut für Energie und Umwelt, “ifeu”, Heidelberg (institute for energy and environment) at the 2nd workshop in Berlin on 11th and 12th of July, 2002.

¹⁶ Even though the Directive itself contains no obligation to take remedial action, this step is necessary when consequences are intended to be considered.

¹⁷ EEA, Environmental indicators: Typology and overview. Technical Report Nr. 25 (1999), p.5.

Environmental problems are diverse and complex, therefore it is not feasible to select or establish a universal or “correct” set of indicators. It is possible to present conceptual frameworks though, which distinguish between the different aspects of environmental problems (see DPSIR Framework below).¹⁸

Regardless of which set of indicators is selected, it is important for the purpose of Art. 10 of the SEA Directive to identify the link between the plan or programme, the likely significant environmental effects and the relevant indicators. A basic model, which might prove helpful in this respect, is presented in the following table¹⁹.

	<i>Type of Indicator</i>
Plans and programmes	Pressure indicator
Activities triggered by plans and programmes	Driving force indicator
Environmental problems	Pressure indicator
State of the environment	State indicator
Environmental impacts	Impact indicator
Measures	Response indicator

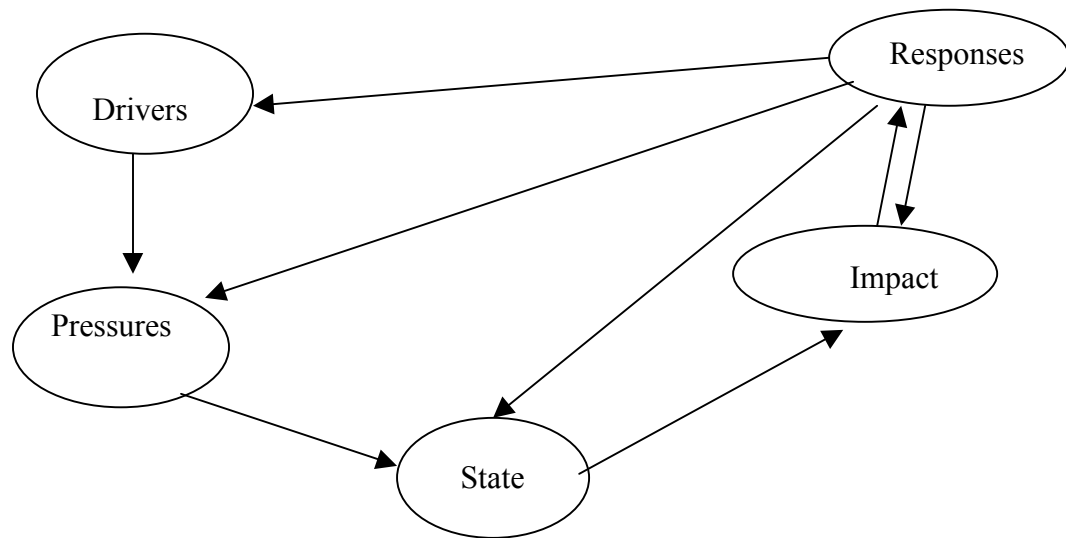
3.2.1.2 Methodological Framework: The DPSIR Framework (Driving Forces, Pressure, State, Impact, Response)²⁰

The success of indicator-based monitoring systems depends to a large extent on the selection of appropriate indicators. The European Environmental Agency (EEA) has developed a framework, which explains the relation and interrelation between environmental monitoring and indicators. It should be noted that the framework developed by the EEA is related to "policy-making". Although this approach goes beyond Art. 10 of the SEA Directive, it addresses various aspects, which are also of relevance for monitoring the environmental effects of plans and programmes. A very brief overview of this framework will be given, while it is impossible to describe the complex scientific discussion in detail within the scope of this project.

¹⁸ Danida. Environmental Assessment for Sustainable Development. 1999, p.39.

¹⁹ Presented by Jürgen Giegrich from “ifeu” (FN 5).

²⁰ For detailed information see EEA, *Environmental indicators: Typology and overview*. Technical Report Nr. 25 (1999).



Source: EEA

According to the DPSIR framework, social and economic developments can exert pressure on the environment, which leads to a change in the state of the environment. As a result, impacts on human health, the environment and other goods occur. In order to mitigate or reduce these (negative) impacts, a response is elicited?'. Monitoring is a means to detect negative and positive impacts. The EEA states in its report that it is necessary to obtain specific information on

1. driving forces,
2. the resulting environmental pressures,
3. the state of the environment,
4. impacts resulting from changes in environmental quality and
5. the social response to these changes in the environment.

Whereas the whole array of factors may be important for policy-making, it would be neither necessary nor possible to cover all of them when monitoring the environmental effects of plans and programmes. However, the major benefit of the DPSIR scheme for the purpose of Art. 10 of the SEA Directive is that it shows the interrelationship between various factors within a cause-effect chain. The DPSIR scheme explains how environmental effects can also be monitored indirectly by using for example pressure indicators.

The different factors and their practical implication are illustrated below (bearing in mind that overlaps are possible):

Indicators for driving forces describe the social, demographic and economic developments in societies and the corresponding changes in life styles etc.

Pressure²¹ indicators describe developments in release of substances, physical and biological agents, the use of resources and the use of land.

State indicators give a description of the quantity and quality of physical, biological or chemical phenomena in a certain area. They may, for instance, describe the wildlife resources.

Impact indicators are used to describe, which impact results from the driving forces.

Response indicators refer to responses by groups and individuals in society, as well as government attempts to prevent, compensate, ameliorate or adapt changes in the state of the environment.

The DPSIR scheme, whose starting-point is the interrelationship between various factors, is completed by a classification of indicators according to the kind of answers they give (overlaps are possible):

Descriptive indicators - deal with the question of what is happening to the environment and to humans

Performance indicators – compare the factual conditions with a specific set of reference conditions

Efficiency indicators – provide insight into the efficiency of products and processes

Total welfare indicators – provide measures of total sustainability

Efficiency and total welfare indicators are not relevant for the implementation of Art. 10 of the SEA Directive and thus not within the scope of the IMPEL Project. However, descriptive and performance indicators are very common in environmental monitoring. Descriptive indicators reflect the situation as it is, without reference to how the situation should be. In contrast, performance indicators compare factual conditions with a specific set of reference conditions. Performance indicators often relate to reference conditions or values such as environmental quality objectives.

The OECD has developed a similar framework for the work with indicators. Contrary to the EEA model, it consists of only three components: ‘pressure indicators’, ‘state indicators’ and ‘response indicators’. It was decided to present the EEA model, since it allows a refined gradation within the system of monitoring.

²¹ It should be added ‘that the same indicators can serve as measures of pressure or state depending on where they are measured (e.g. discharges of human and industrial waste vs concentrations of pollutants in water bodies). Indicators of pressure alone are often inadequate. Danida. *Environmental Assessment for Sustainable Development*. December 1999, p.40.

It has to be pointed out though, that the DPSIR system is well suited to following up development up to now. The indicators used there are needed to find out what the current situation is and to compare it with earlier monitoring results. Thus, DPSIR indicators aim at detecting problems in the current situation and the near future.

From a planning point of view, however, it is more helpful to use “planning indicators”, which allow predicting and preventing environmental problems in the long term.²² Since the purpose of this project is the monitoring of environmental effects, which have been caused by plans and programmes, the DPSIR approach is an efficient tool in this respect.

3.2.2 Different Monitoring Approaches

The following section tries to classify existing monitoring schemes according to their main characteristics. Although a clear and unambiguous typology of monitoring schemes is impossible due to their overlaps, the following presentation of different approaches may give some ideas of how to design monitoring systems when implementing Art. 10 of the SEA Directive. The choice of the appropriate approach(es) will mainly depend on the type and content of the plan or programme in question.

3.2.2.1 Impact-Related Monitoring on a Project Level

While monitoring in the field of plans and programmes is a relatively new instrument, monitoring has been successfully performed on the level of projects. A multitude of national and EU regulations requires monitoring of the impacts of a specific project including its emissions and the changes in the environment. In general, data is collected at different stages of a project. Before a permit is granted, the proponent has to provide information about the possible environmental effects (in particular when an EIA is required). After the project was realised (e.g. construction of the plant) and the plant has started operating, sectoral laws require the monitoring of eg. the amount of emissions, the disposal of waste etc.. All these monitoring regulations aim at measuring the impact of an activity in contrast to state-related monitoring, which focuses on the state of the environment in general without reference to a concrete activity.

3.2.2.2 State-Related Monitoring (General Environmental Monitoring)

State-related (or general environmental) monitoring is performed in all Member States and Accession Countries. Usually, general environmental monitoring schemes

²² The term was coined in Sweden. The distinction in field and planning indicators was used in one particular project (SAMS). Planning indicators are for example the availability of public transport, the accessibility of recreational areas or the re-use of exploited land. Planning indicators are used to facilitate the inclusion of environmental objectives in comprehensive planning. They allow to compare very well how various alternatives would lead to environmental change in comparison to the present situation. For further information of the concept, see *Planning with environmental objectives! A guide*. P.72 ff.

are used to observe and describe the state of the environment (including changes) independently from programmes and plans. It is the basis for a variety of environmentally-related activities of all kinds. The results obtained may be used afterwards to describe progress in environmental protection, to identify weak spots in the national environmental legislation or to formulate environmental objectives²³. A bio-monitoring system established to control the air quality in urban areas can be regarded as a state-related monitoring system (see also 5.3).

3.2.2.3 Performance-Led Monitoring

Performance-led monitoring consists mainly in controlling the implementation and effectiveness of certain measures foreseen in a plan or programme. The measures in question usually are intended to produce positive environmental effects. It may be relevant for controlling the effectiveness of mitigation measures foreseen in a plan or programme, e.g. to control whether the protection measures against traffic noise of a newly constructed road have been implemented and led to the foreseen relief for the neighbours etc. In the context of plans and programmes co-financed under the Structural Funds Regulation performance-led monitoring seems to be very common.

3.2.2.4 Objective-Related Monitoring²⁴

Objective-related monitoring focuses on controlling whether specific environmental quality objectives or environmental targets are attained within a given amount of time. Environmental quality objectives (EQO) describe how the quality of air, water, soil etc. has to be constituted in order to attain environmental sustainability.²⁵ The Swedish model is a good example for objective-led monitoring (see 5.2.2). Objective-led monitoring can often be found in context with policies. Regarding Art. 10 of the SEA Directive, it is obvious that objective-led monitoring makes only sense if the plan or programme in question contains environmental objectives or targets.

3.2.2.5 Combined Approaches

As the different approaches show, monitoring can be used to fulfil many different tasks. Each of them is equally important. While the impact-related approach and the state-related approach may result in protective measures for activities from the past, the objective-led approach for example is especially useful to follow the progress of long-term effects especially in areas like climate change. Since a plan or programme consists of different elements, approaches, which combine several of the above named, may be more efficient than those which focus on one perspective only. Thus, the impact and the performance-led approach may be mixed each corresponding to

²³ The following summary is based on the presentation of Ms. Knetsch from the UBA, held at the 1st IMPEL workshop in Munich on 11th and 12th of April, 2002.

²⁴ For more details see 5.2.2 and 5.6.2.

²⁵ As defined in *Defining an Environmentally Sustainable Transport System*. Commission Expert Group on Transport and Environment, Working Group I, p.7.
<http://europa.eu.int/comm/environment/trans/reportwgl/pdf>

the respective part of the plan. As far as environmental effects from emissions are to be monitored, the impact-related approach can be used, while for the effectiveness of mitigation measures the performance-led approach might be followed. The Viennese Waste Management Plan exemplifies this. It contains a mixture of these two approaches: An impact indicator is needed to measure the waste quantity, while you need a performance-led approach for controlling whether the waste quantities correspond to the ones prognosticated.

4 Overview of the Current Practice/Situation in Member States and Accession Countries

It was tried to depict the current practice of monitoring in the Member States and Accession Countries with the help of a questionnaire. Twelve participants including federal states and one ministry answered. In view of the variety of replies, only the main results are presented below. Several chapters will refer to the results of the questionnaire as well and a detailed list of the replies can be found in Annex I.

It is important though to be aware of the fact that these answers present the opinion of the authority or its representative that answered to the questionnaire. Other authorities possibly would have answered some of the questions differently or might have focused on other issues. In addition, local, regional and national level were not distinguished in every question. The results presented in this chapter and annex I give an impression of current practice in some of the Member States and Accession Countries. Despite the rather small database, this chapter and annex I put a spotlight on the main elements which are characteristic for monitoring. In this respect, we would like to stress that carrying out a similar compilation on a more extensive database, which unfortunately was out of the scope of this IMPEL Project, would be of great value.

As far as monitoring of plans and programmes is concerned, only two participants have systematic monitoring experience, while the others fall back on experience stemming from occasional cases, monitoring of projects and from regular revisions of plans. Furthermore, there are additional instruments like reporting and supervision mechanisms. Since the end of the 1990s several countries have begun to develop monitoring systems for waste management and land use plans. It has to be pointed out, however, that these at least partly pursue an approach different from the one required by the SEA Directive.

One important outcome is the considerable discrepancy between the collection of environmental data of all kinds and the integration of this data into monitoring systems. Even though almost all countries collect environmental data on all relevant environmental issues or specific environmental policies, the data in general has not been used for systematic monitoring yet. A more intense cooperation between monitoring experts and competent authorities seems therefore to be beneficial to the efficient implementation of Art. 10. In any case, the possibility to fall back on a multitude of collected data will simplify the implementation of Art. 10 considerably. It might be useful to get an overview of the collected data in each Member State when starting the implementation process. With regard to the collection of data, no clear statement for a majority of states is possible on the predominant kind of information collected. This is particularly the case for the field of land-use. As far as the area of waste-management is concerned, the quantity of waste as well as information on waste management sites is considered crucial for monitoring. Only

one respondent confirmed that the information collected is being related to a set of indicators. Due to the rather thin data-base, conclusions on this issue are not possible, however. For a better overview of the current situation, it would be useful to take a closer look on the question on whether and to what degree indicator-based data collection is carried out currently.

In addition to the multitude of collected data, for many cases an infrastructure is also already available for transferring and processing data according to the respective tasks and/or authority. The evaluation of the questionnaire has shown that a variety of authorities is involved in the process of monitoring, therefore an effective infrastructure for information transfer can be considered as important. The questionnaire distinguished between two main elements²⁶ for the process of monitoring: the collection of data and the process of evaluating these data. The results showed that in the majority of cases data-collecting and monitoring authorities are not identical, even if responsibilities may overlap in some fields of work. In the area of land-use, a variety of institutions such as competent authorities, environmental agencies, research institutes, statistics offices and even the plan-giving authorities were responsible for data-collection. The collected data is evaluated by a quite similar group of organisations and bodies, but in most cases they do not correspond. In the area of waste management, data is collected by all of the above named with the exception of the plan-giving authority. The evaluation is carried out by environmental authorities, local entities or special authorities.

It is necessary to point out that the responsibilities for these tasks depend significantly on the administrative organisation as well as the size of the respective countries. As far as the regular revision of plans and programmes is concerned, the evaluation of the questionnaire showed that environmental authorities are generally involved in the area of land-use as well as in waste management. When looking at the form of involvement, however, there are significant differences. In some countries, environmental authorities take only part in consultations or provide support for certain issues, while in others they also take part in decision-making.

As far as the frequency of monitoring is concerned, it is very difficult to draw conclusions from the answers received. With regard to the frequency of regular revisions, it can be stated though, that in the area of land-use flexible rules are considered important. The frequency of monitoring depends largely on the type and scope of plan. In most cases, a revision is usually carried out after a set period of time. In the field of waste management, strict rules are more common. Nevertheless, the frequency of regular revisions differs significantly among and in the Member States.

Regarding the aim of monitoring, it became apparent that priority is given to the question whether the objectives of the plan or programme have been fulfilled. The

²⁶ See 3.1.3.

identification of significant environmental effects was named by considerably less respondents(3). This might emphasise the necessity to reconsider relevant monitoring aims when implementing Art. 10 of the SEA Directive.

As far as the instrument of remedial action is concerned, very little experience is available. In the field of land-use the existence of remedial action was only affirmed in five answers, resulting possibly in an adjustment of a regional development plan or of plant permits. As regards waste management plans, there exists a legal obligation to take remedial action according to two answers to the questionnaire. A possible result of remedial action might be the adaptation of the waste management plan. Very little experience also exists when it comes to remedial action as foreseen in Article 6 of the Habitats Directive. With regard to the thin data base, it can only be concluded that remedial action has been rather project-related than plan related so far.

Concluding, monitoring is already performed in all covered Member States and Accession Countries. Considerable differences exist in scope and there is a variety of mechanisms and methods being used. Experience with systematic monitoring in the field of plans and programmes is very rare, though. More case studies and model projects to close the gap of knowledge and to test routines would be extremely helpful for an effective and practicable implementation of Art. 10.

5 Practice and Case Studies

5.1 Guidance on Selecting Environmental Performance Indicators from Danida²⁷

Danida has elaborated some criteria for the selection of indicators, which might be worth considering.

- Simplicity, Pragmatism, Feasibility and Cost

Indicators should highlight key factors in a concise manner. Additionally, they should be practical and realistic in terms of the costs of collection. Whenever possible, information and data should be used that is already collected and available. It is suggested to ensure that the indicator quantifies and simplifies information in a manner that promotes the understanding of the environmental issue to both decision-makers and the public.

- Spatial and Temporal Coverage

Careful consideration needs to be given to the choice of indicators to reflect direct, indirect and cumulative and residual impacts. The use of component-level indicators which either facilitate the aggregation of environmental information or are comparable to national-level indicators are promoted.

- Stakeholder Involvement

To what extent will the indicator(s) allow environmental resource users and/or the key polluters (i.e. the primary stakeholders) to set objectives and monitor progress themselves at the local level?

5.2 Sets of Indicators

5.2.1 The Bavarian Approach²⁸

The Bavarian Environmental Protection Agency developed a set of twenty-four environmental indicators with special regard to the strategic environmental planning of the Bavarian State Ministry of Regional Development and Environmental Issues. Scientific support was performed by the Technical University of Munich. The DPSIR framework of the EEA was used for the indicator classification and for the description of the coherences between the environmental problem fields and the responsible driving forces (sectors) along the causal chain. A combined development procedure of “bottom-up” and “top-down” was applied. While the bottom-up approach was based on available data and indicators, which were then selected

²⁷ The Danish Ministry of Foreign Affairs. Danida. *Environmental Assessment for Sustainable Development*. 1999, p.40.

²⁸ The following section is based on the presentation of Mr. Frieß from the Bavarian Environmental Protection Agency, given at the 2nd IMPEL workshop in Berlin on 11th and 12th of July, 2002.

according to specific criteria, the top-down approach started with the ministry's environmental objectives, which address the essential environmental problems. The selection criteria are the following: Availability and quality of required data, relevance (time, spatial, factual reference), coherence to environmental problems, orientation to policy targets, sensibility on remedial action, suitability for communication, compatibility with other indicator sets and suitability for assessment and valuation.

By determining their main significance the twenty-four indicators obtained were attributed to the following environmental fields. Functional coherences to other problem and precaution fields are described in the indicators documentation itself. Some examples will be given for each field.

- Nature and Landscape: Loss of natural and biological diversity, impacts on ecological processes and the landscape; indicators: "areas reserved for nature protection"; "farming preserving nature"; "endangered species"; "fragmentation of areas".
- Ecosystems: Impacts on ecosystems, eutrophication, acidification, accumulation of hazardous substances; Indicator: "Biological water quality of rivers and streams"; "Development of atmospheric input of hazardous substances"; "Nitrate contamination of groundwater".
- Climate: Anthropic climate change with impacts on ecosystems, economy, social conditions (e.g. human health); Indicator: "Carbondioxid emissions from energy use".
- Human Health: Impacts and risks on human health caused by substances, noise, radiation; Indicators: "Air quality index regarding NO₂, SO₂, CO, O₃ and PM₁₀", "Development of noise emissions caused by road traffic"; "Index of hazardous substances in human milk". Resources: Lack of resources (soil/land, energy and raw materials) with economic, ecological and social impacts (sustainability); Indicator: "Land take for settlement and traffic"; "Primary energy consumption and ratio of renewable energies"; "Companies operating environmental management systems (EMAS)"; "Amount of urban waste and recycling ratio".

Today the developed indicators are already applied in the ministry's strategic planning and they will also be a helpful part of monitoring sustainability in Bavaria²⁹. Other applications, like regional benchmarking based on indicators or integrated environmental reporting, are presently being prepared. Many of the indicators chosen are similar to or identical with indicators agreed on by the OECD, the European Council³⁰ or Sweden. When choosing sets of indicators for monitoring according to

²⁹ Sustainable Development in Bavaria, Bavarian State Ministry for Regional Development and Environmental Affairs; Munich, August 2002.

³⁰ Analysis of the 'open list' of environment-related headline indicators; REPORT FROM THE COMMISSION TO THE COUNCIL; COM(2002) 524 final; Brussels, 20.09.2002.

Art. 10 of the SEA Directive, it might be useful to compare the different sets and to select, if possible, indicators, which are used by other organizations as well.

5.2.2 The Swedish Approach³²

In April 1999, the Swedish Parliament adopted 15 environmental quality objectives: reduced climate impact, clean air, natural acidification only, a non-toxic environment, a protective ozone layer, a safe radiation environment, zero eutrophication, flourishing lakes and streams, good-quality groundwater, a balanced marine environment, flourishing coastal areas and archipelagos, thriving wetlands, sustainable forests, a varied agricultural landscape, a magnificent mountain landscape, a good built environment. For 14 of these goals, the environmental quality described is to be attained by 2020; for the fifteenth, the climate objective, the target date is 2050. The Government has also formulated interim targets for each objective, indicating the direction and timescale of the action to be taken. The Government has set up an Environmental Objectives Council to assess and each year report on the overall progress towards the objectives. Every four years the assessment will be especially thorough.³³

In Sweden, there is also a National Monitoring System which aims to document the state of the environment. The Swedish Environmental Protection Agency is responsible for the collection of data being supported by data-hosts like research institutes etc. The data is generated in many different places, one example is the University of Agriculture Sciences hosting chemical and biological measurements in freshwater. The data is collected in ten different programme areas like air, freshwater, forests and landscape.³⁴

Within a Swedish project on the use of environmental objectives in land use planning, an approach was developed, which deals with the monitoring of environmental effects. In the project a special kind of indicators was presented. These so-called planning indicators shall facilitate the assessment of the environmental effects of the plan.³⁵

³¹ The following section is based on the presentation of Mr. Frieß from the Bavarian Environmental Agency, given on the 2nd workshop in Berlin, 11th and 12th of July, 2002.

³² This summary is based on the presentation of Mr. Adolfsson from the Swedish Environmental Protection Agency held on the 1st IMPEL-Workshop, Munich, 11th and 12th of April 2002.

³³ For further information see also the Swedish Environmental Protection Agency SEPA, The Fifteen Environmental Objectives, *De Facto*. 2002.

³⁴ More information can be found on SEPA's website www.naturvardsverket.se ("Environmental Monitoring").

³⁵ National Board of Housing, Building and Planning in Sweden & Swedish Environmental Protection Agency. *Planning with environmental objectives! A guide*, 2000.

³⁶ The terms comprise either the demarcation of land for specific uses and the coordination and long-term control of spatially effective activities.

5.2.3 Results of the Questionnaire as regards Requirements for Indicators

Being asked which requirements parameters or indicators have to be fulfilled, the participants considered the following aspects the most important.

Transparency was named most often. It became clear that it is important to enable the stakeholders to follow the process of monitoring and to actually understand what is going to be monitored and why. The importance of this aspect was also emphasized in the case study of the Viennese Waste Management Plan. The second feature, which was named several times, was flexibility, which is probably due to the fact that monitoring according to Art. 10 does not ask for a general and common monitoring system, but for the monitoring of a concrete plan. Hence, indicators have to be adjusted to the respective plan and not vice versa, otherwise the specific relation between the monitoring and the plan will not be achieved. Simplicity was considered equally important by the replying participants. The term was defined as comprising comprehensibility as well as an easy handling. An extremely important aspect is also the appropriateness between the factors which are measured and what is being monitored.

5.3 Bio Monitoring³⁷

Bio monitoring is an indicator-based method of general environmental monitoring. The goal of bio monitoring is to evaluate the environmental conditions due to emissions (air-pollution). This is being undertaken with the help of systematic studies of especially suited organisms (bio indicators). From an organism, which is bound to a particular time and place, trends and status can be obtained.

Bio monitoring is used to assess the overall sensitivity of air pollution and the accumulation of pollutants in plants. The objective named first is usually achieved by using lichen. The advantage of lichen is that it can live almost everywhere, that it is sensitive to environmental influences and shows distinct changes. Lichen monitoring has been successfully used for more than 100 years in several European countries such as Belgium, Italy, France, and the UK. The same applies for monitoring by using moss. The advantages of these bio-monitoring methods over chemical monitoring ones are that they cause lower costs, are ideal for accumulated effects and good passive collectors.

In order to show the accumulation of pollutants in plants, ex-situ plantations (in standardized soil) are used. The standardization is subject to a certain procedure:

- Agreement of experts on method and expert guidance.

³⁷ This summary is based on the presentation given by Mr. Erhardt from the Centre for Environmental Measurement, Surveying and Equipment safety, Baden-Württemberg, held at the 1st IMPEL Workshop in Munich on 11th and 12th of April, 2002.

- The method has to be published by an institution or commission to define rules of technology, e.g. Federation of German Engineers.
- The draft is subject to public discussion and objection.
- After a certain period of time, the draft is developed into a guideline, taking into account the public opinion.

Prerequisites for standardization are a scientific background and practical experience. The approach has been successfully employed for monitoring the emissions of a landfill for hazardous waste, which was presented as an example.

In the following discussion the participants agreed on bio-monitoring being a considerably cheap and suitable instrument for monitoring air pollution and background concentration. It was questioned though whether bio monitoring was suitable to show a cause and effect relationship, which was considered important for taking remedial action in an appropriate way.

As regards the latter issue, the European Environmental Agency has pointed out that the DPSIR framework is a useful tool for describing the relationship between the origins and consequences of environmental problems. In order to understand their dynamics it is necessary to focus on the links between the elements. Whether society responds to impacts for example depends on how these impacts are perceived and evaluated. Thus, it is not only necessary to develop suitable frameworks for indicators but also for evaluation and assessment. In this respect, the EIA Guidance on screening, scoping and evaluating might prove to be helpful as well.³⁸

5.4 Management of Monitoring – Using Environmental Management Plans

Sweden has published an introductory report³⁹, which outlines a method for the strategic environmental assessment of natural gas grid extensions in the EU. The report focuses on presenting analytic tools for environmental analysis, consultative processes and the boundaries for an SEA. This explains why the section on monitoring is relatively short. Nevertheless, it is going to be presented hereafter.

Sweden continues to support its model of environmental quality objectives. Similar to the example of Nauen, it is considered important to ‘monitor[ing] [of] a number of indicators for the national environmental quality objectives in order to study the effects of the extension.’ The necessity ‘to identify indicators that are programme-specific on both the national and regional level’ is pointed out.

Another suggestion of the report is to develop an Environmental Management Plan (EMP) for the follow-up and monitoring of the key issues in the SEA. The EMP ‘is a

³⁸ For further information see <http://europa.eu.int/comm/environment/eia/eia-guidelines/g-screening-full-text.pdf>.

³⁹ For further information please see Naturvårdsverkets rapport 5161, 2002

practical, action-oriented management document which will be updated continuously.⁴⁰ It has been originally developed for Environmental Assessment in general, which might make modifications in case of SEAs necessary. According to the model presented by Danida, the EMP comprises three parts: mitigation and enhancement plan, a monitoring plan and a capacity and development plan. The monitoring plan ‘should provide guidance on how environmental monitoring will be conducted of relevance to each mitigation (or enhancement) measure proposed.’ In case of a SEA the EMP would have to include guidance on monitoring of the significant environmental effects, in the first place, since it is controversial whether mitigation measures are subject to monitoring or not. Danida proposes as well that the EMP should include ‘specific reference to the institutions responsible and the means to rationalise data collection between agencies and, if necessary, strengthen institutional capacities and procedures.’⁴¹

It might be worth considering integrating such Environmental Management Plans into the SEA process. The idea of providing for procedural elements (responsible authority, frequency etc.) in the individual plan rather than to elaborate on national guidelines may be worth considering. Nevertheless, providing guidelines seems to be an important tool to guarantee a successful implementation and to make it easier for the respective authorities.

5.5 Waste Management Plans

5.5.1 Waste Management Plan of Vienna (WMP)

The Viennese WMP contains long-term prognoses and strategic concepts concerning the treatment of Vienna’s waste up to the year 2010 including measures on avoidance, recycling and collection. The following issues are central to the WMP:

- How can the waste problem be solved from the start provided that priority was given to the avoidance of waste? Which measures of waste prevention and material recycling have to be taken in order to achieve this aim?
- Is there a need of additional waste treatment facilities in Vienna up to the year 2010?
- Which methods of waste treatment are the best for the specific situation in Vienna?
- How should the waste be treated? How should the capacities of the present treatment facilities be used? Which treatment capacities should the necessary new facilities provide for?

⁴⁰ Danish Ministry of Foreign Affairs. Danida. *Environmental Assessment for Sustainable Development*. 1999, p.27.

⁴¹ Danida, p.28.

The Waste Management Plan of Vienna was, for the first time ever in Vienna and Austria, drawn up according to the requirements of the SEA Directive. The aim of the SEA process was to achieve secured results concerning the ecological and economic optimum for the treatment of waste.

The Waste Management Plan and the environmental studies were conducted in an integrated procedure and thus completely linked. The waste department of the municipality of Vienna managed the SEA process and carried out the whole process in cooperation with a team of other environmental departments, representatives of the qualified public and external experts.

Since monitoring is of the utmost interest in the context of this IMPEL Project, the following exposition concentrates on the monitoring-related aspects. It comprises other issues when necessary for understanding the overall context.

5.5.1.1 Environmental Report

Since there is a close connection between monitoring and the requirements of the environmental report, in particular those of Annex I f) and g), a short summary of the respective provisions of the Viennese SEA is given.

As the waste management plan does not contain a decision on possible locations of landfills or waste incineration facilities, it was neither possible nor necessary to describe a certain area in detail.⁴² Regarding the requirement of Annex I f) to describe the likely significant effects on the environment, the environmental report contains several statements.

A comparison of different scenarios including inter alia the future organisation of waste incineration facilities has been made. The analysis contains the following scenarios:

⁴² The description of the current environmental state (Annex I c) has been considered less important on this general planning-level by the planners.

<i>Scenarios</i>	<i>On the basis of</i> ⁴³
Trend-scenario 1	The prognosticated (likely) development without any measures concerning waste avoidance building of waste treatment facilities
Trend-scenario 2	Measures of waste avoidance and recycling, which can be implemented on a realistic basis no additional waste treatment facilities
Trend-scenario 3	Measures of waste avoidance and recycling, which can be implemented on an optimistic basis no additional waste treatment facilities
Scenario 4	Measures of waste avoidance and recycling on a realistic basis additional 3 rd waste incineration facility with a capacity of 250.000 t/a industrial incineration of 19,000 t/a
Scenario 5	Measures of waste avoidance and recycling on a realistic basis additional 3 rd waste incineration facility with a capacity of 180.000 t/a industrial incineration of 84,000 t/a
Scenario 6	Measures of waste avoidance and recycling on a realistic basis 2 additional mechanical-biological treatment facilities with a capacity of 245.000 t/a industrial incineration of 211,000 t/a
Fermenting-scenario	Measures of waste avoidance and recycling on a realistic basis an additional fermenting facility with a capacity of 25,000 t/a

In a first step, all the scenarios were evaluated concerning their impact on the Viennese waste management organisation. The analysis showed that new incineration capacities were needed in order to solve the waste problem. In addition, it was decided to build a fermenting facility independent from the scenario, which would finally be realised.

All the scenarios were evaluated with regard to the objectives of

- Flora, fauna, human health
- Development of society
- Sustainability – long-term effects
- Acceptance

⁴³ See Arbter, Kerstin. Strategische Umweltprüfung Wiener Abfallwirtschaftsplan. Endgültiger Umweltbericht. 2001. p.18 table 3.

The chosen objectives refer not only to the ones named in Annex I f) but also to social and economical objectives. As regards the development of society e.g. the approximate land-usage was used. One issue investigated in the context of sustainability was among others the medium and long-term development of pollutants.

Each objective was related to a set of indicators, which had been developed by the expert team, including concentration of pollutants, recycling rates, costs per ton etc. With this close examination and analysis, it was possible to come to a decision, which takes the possible environmental impacts into account.

Having evaluated the scenarios as regards their environmental impacts, optimised scenarios were built based on the results of the evaluation. It showed that the trend scenarios 1 and 2 as well as the fermenting scenarios were not suitable for solving the Viennese waste problem. Since all three scenarios would result in the deposit of untreated waste, they do not comply with the Landfill Regulation and are thus illegal. Hence, it is necessary to build one or several treatment facilities in order to solve the Viennese waste problem. Nevertheless, the evaluation showed also that building a fermenting-facility as well as integrating measures of avoidance and material recycling would have a positive effect. Thus, they were integrated into all of the optimised scenarios.

Trend-scenario 3 was eliminated as well, since all the experts considered its prognosis up to the year 2010 unrealistic. For it is unlikely that all possible measures of avoidance and material recycling are going to be fully accepted by politicians, the industry and the citizens.

These considerations resulted in four optimised scenarios⁴⁴. All of them contain the recommendation to include long-term avoidance measures, even though they will not have any effect before the year 2010.

⁴⁴ The table was taken from Arbter, Kerstin. *Strategische Umweltprüfung. Wiener Abfallwirtschaftsplan. Endgültiger Umweltbericht*. 2001, p.20; for further information see also Schmidt, Alfred. *Strategische Umweltprüfung "Wiener Abfallwirtschaftsplan"*. Waste magazin 3/2001 p.13.

<i>Parameters</i>	<i>Scenario 5, optimised</i>	<i>Scenario 4, optimised</i>	<i>Scenario 6, optimised + industrial incineration</i>	<i>Scenario 6, optimised + FBF 5 & 6</i>
Waste minimisation and recycling measures	Realistic waste minimisation and material recycling measures as well as long-term minimisation measures			
New treatment facilities and capacities	1 WIP ⁴⁵ with 406,000 t/a capacity	1 WIP with 250,000 t/a capacity	2 MBTP ⁴⁶ with 401,802 t/a capacity	2 MBTP with 401,802 t/a capacity, 2 FBF ⁴⁷ with 129,000 t/a capacity each
	1 fermenting facility with 25,000 t/a capacity			
Mass flow and treatment facilities to capacity	Σ 700,000 t/a into 3 WIP; 270,000 t/a into new WIP 430,000 t/a into existing WIP 81,000 t/a into mechanical sorting	Σ 680,000 t/a into 3 WIP 250,000 t/a into new WIP 430,000 t/a into existing WIP 29,000 t/a into mechanical sorting 21,000 t/a into industrial FBF 2,000 t/a into solification	335,000 t/a into 2 MBTP 358,000 t/a into existing WIP (1 line of Flötzersteig shut down – extra capacity) 259,000 t/a into 2 new FBF outside of Vienna	335,000 t/a into 2 MBTP 358,000 t/a into existing WIP (1 line of Flötzersteig shut down – extra capacity) 259,000 t/a into 2 new FBF within Vienna
Extra capacities in case of emergency	305,000 t/a: 136,000 t/a into new WIP, 169,000 t/a into sorting unit in multi shift operation	221,000 t/a into sorting unit in multi-shift operation	127,000 t/a : 60,000 t/a into existing WIP, 67,000 t/a into both MBTP	127,000 t/a : 60,000 t/a into existing WIP, 67,000 t/a into both MBTP

⁴⁵ WIP – waste incineration plant.

⁴⁶ MBTP – mechanical-biological treatment plant.

⁴⁷ FBF – fluidised bed furnace.

The Viennese SEA contains information on the requirements of Annex I g) to provide information on the measures envisaged to prevent, reduce and as fully as possible offset any significant adverse effects on the environment. The suggested measures refer to the project level and contain for example compensation measures of the following kind:

- Reduction of mercury and cadmium emissions: usage of activated charcoal filters or equivalent technologies in waste incinerations facilities
- In the course of the licensing process measures concerning noise and traffic reduction have to be foreseen.
- The licensing authorities have to take measures for smell reduction a condition for the operator.

As a conclusion, it can be stated that the requirements of the environmental report have been fulfilled. Since the waste management plan does not contain a decision on the setting of the waste treatment facilities, the description of environmental characteristics of areas likely to be significantly affected (Annex I c) has been neglected.

5.5.1.2 Monitoring Group

A monitoring group has been established in order to conduct the continual monitoring. It consists of members of the waste and environmental protection department of the Viennese municipality, the Viennese Umweltschutzverein and the Ökobüro (an umbrella organisation of environmental NGOs). Once a year, the monitoring group draws up a monitoring report, which is based on the criteria of the agreed monitoring checklist (see below). The monitoring report is then sent out to the SEA team and to the politicians of the environmental department of Vienna. With the help of the monitoring checklist, it has to be analysed whether or not the WMP is still up to date or whether it has to be changed. When in need of external experts, it was agreed to fall back on the ones who had already participated in the SEA process.

In case of finding out if developments have taken place, which the WMP did not foresee, the SEA team is responsible for making the necessary adjustments to the plan. As a consequence, the complete SEA team is kept informed about the monitoring process.

Furthermore, the SEA team meets whenever important decisions concerning waste management are to be made, but at least every three years in order to exchange information on monitoring issues.

5.5.1.3 Monitoring Measures of the Vienna WMP

The participants agreed that the aim of monitoring is:

- to check whether the implementation of the WMP was successful

- to check whether or not the prognoses and assumptions, on which the WMP is based, are correct and whether or not they have to be adjusted.

The SEA team agreed on certain monitoring criteria, which were laid down in a checklist:

1. Does the implementation process allow the implementation of the WMP until the year 2010 on a realistic basis?
2. Do the current waste quantities correspond to the ones prognosticated?
3. Which measures of avoidance have been implemented? Which avoidance effects have been thereby achieved? (on a three-year-basis)
4. Are the waste streams still going to flow according to the prognosis in 2010?
5. Is it realistic that the presumptions concerning the emission standards of the planned facilities are still valid in 2010?
6. Have the provisions of the Viennese WMP for the realisation of the agreed facilities (e.g. emission standards etc....) been met?
7. Have there been essential technological developments since the WMP was agreed on which make it necessary to adjust the plan?
8. Have essential framework conditions changed since the WMP has been agreed on, which make it necessary to consider new alternatives (scenarios)?
9. Is it necessary to adjust the capacities of the treatment facilities, which were agreed on?
10. Have the prognosticated number and sort of buildings been connected to district heating? Have the prognosticated emission reductions taken place?

Since the pollutants from waste treatment facilities and landfills are subject to regular monitoring and the dates are publicized, it was decided not to provide for additional monitoring requirements on the level of the WMP. Being project-related effects, they were considered less important on the high planning level of a SEA. The existing monitoring arrangements concern emission surveys of the waste incineration facilities and landfills. There is also regular monitoring of wastewater.

5.5.1.4 Scope of Monitoring

The SEA team decided on a concrete procedure and on criteria for performing the monitoring requirement of the SEA Directive. Since the WMP does not decide on locations for future waste treatment facilities, but deals with a higher level of planning and strategic decisions, more weight was put on the question of possible emissions. But it has been pointed out that the impact of future developments on the environment has to be taken into account more , when a WMP comprises also a

decision on the location of a waste management facility.⁴⁸ The focus was clearly set on the implementation and adjustment of the WMP. It was considered extremely important to find monitoring solutions, which were actually going to be implemented. Controlling possible environmental effects has been neglected, since it was agreed on falling back on already existing monitoring measures (see above). It has been pointed out by the SEA team that single measures, which would also mean monitoring-measures, should be decided on a lower level of planning, since they are in most cases related to a specific project. Nevertheless, the SEA team made suggestions for the following planning level concerning technological improvements, compensation measures etc.⁴⁹

5.5.1.5 Environmental Effects - Indicators

The SEA team aimed at reducing the description of the environmental effects to the essential ones, based on 15-20 indicators. Finally, they ended up with 37 indicators, from originally 60.⁵⁰ It has been pointed out that expert knowledge is needed as regards the fixing of indicators. Even though, the approach chosen was mainly based on expert knowledge, the sets of indicators were set up in cooperation with the whole SEA team. A systematic approach, which might start with checking the relevant laws for monitoring requirements, was used as a crosscheck.

Furthermore, it was considered important that the participants understood that SEA data differs significantly from data of a project-EIA in terms of methods and exactness of the analysis used. It was also stressed that the analysis of environmental effects should not be burdened with complex and less transparent models. Transparency was considered one of the central elements of the SEA. As a consequence, simple, understandable methods were preferred to more precise but less transparent ones.⁵¹

5.5.1.6 Summary of the Essential Monitoring Arrangements of the Vienna WMP

- Establishing a monitoring group consisting of representatives of the local authority (waste department), which is responsible for drawing up the WMP, representatives of other environmental departments of the local authority and representatives of two environmental NGOs.
- Setting up a monitoring-checklist and criteria.
- The monitoring group has to make a report once a year applying the monitoring checklist. This report is then issued to the members of the SEA team. While the

⁴⁸ See Arbter, Kerstin. Wissenschaftliche Begleitstudie zur Strategischen Umweltprüfung. Wiener Abfallwirtschaftsplan (SUP Wr. AWP), p.56, 46.

⁴⁹ Arbter, p.61.

⁵⁰ Arbter, p.58.

⁵¹ Arbter, p.74,75.

monitoring group decides on whether or not an adjustment is necessary, the SEA team decides on the specific measures which decide whether or not an adjustment of the plan is necessary.

- The focus of the monitoring arrangements is clearly set on the control of the implementation and adjustment of the plan.
- Monitoring arrangements concerning project rather than strategic decisions are to be provided for at a later (subordinate) stage of planning.
- Suggestions concerning subordinate planning stages are being made in order to make the tiering of plans easier.

5.5.1.7 Assessment of the Monitoring Arrangements of the Vienna WMP

The most striking feature of the Monitoring Arrangements is probably the fact that there are no statements to be found as regards the naming of concrete monitoring methods. Instead, the environmental report lists criteria, which have to be checked once a year. The SEA team put a strong impact on the question whether or not the chosen monitoring methods were feasible and easy. A high possibility of realisation and the intention to control the prognoses and presumption, which are inherent in a plan on a ten-year basis, were the driving forces for the arrangements chosen.

Keeping in mind that monitoring is to be provided for the implementation of the plan, the general approach seems to be consequent. Since the WMP does not contain any decisions concerning the setting of waste treatment facilities, it would not have made sense to provide for specific monitoring arrangements for those effects deriving from waste treatment facilities, since they are strongly connected to the definite location. Even though recital (9) ? concerns assessment on different levels, it might as well be applied to monitoring methods:

This Directive is of a procedural nature, and its requirements should either be integrated into existing procedures in Member States or incorporated in specifically established procedures. With a view to avoiding duplication of the assessment, Member States should take account, where appropriate, of the fact that assessments will be carried out at different levels of hierarchy of plans and programmes.

The decision against concrete monitoring measures was an intentional one, considering later planning levels. Thus, the arrangements found are suitable. It might be necessary though to stay within a close time frame concerning the following planning procedures. Otherwise, a lot of synergies might get lost.

The environmental report is a good example as regards a central problem of an SEA. While an SEA of politics, plans and programmes is very often situated on an abstract basis, monitoring asks for concrete and specific requirements (e.g. certain parameters

etc.) It is questionable whether the expectations towards monitoring, deriving from monitoring on a sectoral basis, can be fulfilled on the level of an SEA monitoring.

Apart from the lack of concrete monitoring measures, the environmental report contains suggestions for the following subordinate planning levels. Referring to the necessary tiering of plans of different levels, the SEA team named issues, which they considered of high importance on a later planning level (noise protection measures as soon as the routes of the refuse lorries are known, measures against smells, mainly measures, which were important in terms of reducing emissions from future waste treatment plants).

The composition of the monitoring group is also remarkable, since it does not only comprise representatives of the local authority responsible for drawing up the plan, but reflects the composition of the original SEA team. While the monitoring group performs monitoring once a year, it is the monitoring-team, which decides on the question of the adjustment of the plan. Apart from the monitoring arrangements found, the monitoring group and the SEA team keep contact and cooperate whenever questions of common interest are touched.

As regards the availability of the relevant data for monitoring, the composition proves to be extremely useful. Since representatives of all local authorities responsible for collecting the relevant data are part of the group, they introduce the data into the group. Thus, the communication flow is optimised.

5.5.1.8 Results of the Discussion on the Viennese Waste Management Plan

The case study of the Viennese Waste Management Plan was seen positive because of its pragmatic approach, which puts an impact on monitoring the implementation of the plan. The use of a catalogue of questions (see above) was considered a good means for monitoring. It was questioned, however, whether such a catalogue was transferable to other planning fields, e.g. land-use plans, as well. The participants agreed on the fact that Art. 10 is flexible enough for similar systems to that one chosen in Vienna. As far as the question of indicators was concerned, the example confirmed the perception of the earlier workshops. The choice of the 'right' indicators and the reduction to a sensible number is one of the most difficult tasks in the field of monitoring.

5.5.2 Current Situation in Member States and Accession Countries

In the field of waste management plans only a few Member States have developed systematic monitoring mechanisms. But there is experience available from the regular revision of waste management plans and the single issues relevant for waste management plans such as the quantity of waste or information on sites are monitored. Environmental authorities are involved in most cases, but their tasks vary

significantly from country to country. A number of different authorities are responsible for the collection of relevant data (environmental protection agencies as well as statistics offices or research institutes). A lot of variety is to be found also as regards the frequency of revisions. Concerning the frequency of monitoring, the majority of the respondents answered that monitoring was performed once a year.

5.6 Land-Use

Land-use planning comprises a variety of scopes. It has to be distinguished between regional, spatial and urban planning, which differ significantly as regards the scope and content of the respective plan. Moreover, a variety of approaches can be found in Member States and Accession countries. The following paragraph describes some specific types of land-use plans inspired by the German system, which can be found in different shades in many EU Member States.

Regional planning is a particular form of public planning embracing both economic and physical planning. It is applied at a sub-national but supra-urban scale. Spatial planning comprises the demarcation of land for specific uses as well as the coordination and long-term control of spatially effective activities. Zoning plans are instruments of spatial planning containing a local planning authority's main objectives for land-use in its area over a period of years. In contrast, urban or town plans (detailed local development plans) determine building zones in a smaller social and/or economic unit. They contain compulsory regulations on the development and use of land.

5.6.1 Regional Monitoring in the Field of Land-Use Planning and Spatial Planning in Bavaria⁵²

A monitoring system, which works with two different sorts of descriptive indicators, is used in the sector of regional monitoring in Bavaria.⁵³ Regional Monitoring has been conducted since 1972, based on the Regional Planning Act, which provides for the collection and evaluation of major regional facts and data. The Bavarian legislation also requires that the government reports every four years to the Parliament on the implementation of the regional development plan. Monitoring is conducted with the help of the Regional-Information-System (RISby), which deals with the following aspects:

- Show regional disparities
- Discover different trends
- Show interdependencies

⁵² The terms comprise either the demarcation of land for specific uses and the coordination and long-term control of spatially effective activities.

⁵³ Presentation given by Dr. Koch from the Bavarian State Ministry for Regional Development and Environmental Affairs at the 1st IMPEL Workshop, Munich, 11th and 12th April, 2002.

- Assess political measures

For the identification of different trends, indicators for driving forces are used which show for example developments in demographic issues such as population growth in a certain area, a rise in unemployment etc.

Response indicators are being employed for the assessment of political measures. They provide information on the effects of certain measures, e.g. subsidies for enterprises, which operate in those parts of a country with less well-developed infrastructure etc.

The participants of the first workshop agreed on the fact that the Bavarian approach is a very helpful tool for obtaining the data necessary for an effective monitoring as required by Art. 10. It was mentioned however that the system might need to be extended on areas, which have not been integrated so far. Another problem was identified as regards the availability of data on the local level of communities, since the system works with a lot of data obtained on a regional or federal state level. The situation of data availability might not be comparable in some Member States.

5.6.2 Monitoring in Land-Use Planning – Project of a “Model SEA” of the Municipality of Nauen⁵⁴

5.6.2.1 Content of the Project

The project’s objective was to investigate whether or not the landscape plan is a suitable tool for fulfilling the requirements of the SEA Directive. Thus, the project team drew up an environmental report for a land-use plan of the municipality of Nauen in Brandenburg, based on the landscape plan. (§§ 13-18 Federal Nature Protection Act)

Landscape plans are sectoral plans, whose stipulations are to be integrated into land-use plans or open space plans. Landscape plans contain among others the following provisions:

- Description of the state of nature and landscape
- Description of the concretised objectives and principles of environmental protection and landscape conservation
- Evaluation of the existing and expected state of nature and landscape according to these objectives and principles including the conflicts arising out of them
- The requirements and measures:
 - For avoiding, mitigating and removing adverse effects on nature and landscape

⁵⁴ This summary is based on the following project report, which may also be used for further information: Hauptstudienprojekt 2001/2002, Institut für Landschafts- und Umweltplanung, *Ist der Landschaftsplan zukunftsfähig als Plan-UVP? –Modell-Gemeinde Nauen* (CD-ROM).

- For protecting, conserving and developing certain parts of nature, biotopes and communities of wild flora and fauna.

The landscape plan served as a basis for the environmental report. Comparing the landscape plan with the requirements of the SEA Directive, the researchers aimed at finding out whether or not the landscape plan fulfilled the provisions of Annex I of the SEA Directive.

The model environmental report was drawn up according to the requirements of Annex I of the SEA Directive. For registering and evaluating the likely significant effects, environmental objectives were developed, which take the specific characteristics of the region into account.

5.6.2.2 Information on the Municipality of Nauen

The criteria for choosing Nauen were the following:

- Existence of a practicable and up-to-date landscape and land-use plan
- Willingness of the municipality and the lower nature protection authority to cooperate
- Need of development within the municipal area

Nauen largely fulfils these criteria. The town with its 11.000 inhabitants is situated about 50 km north-west of Berlin, which leads to potential pressure as regards the future development: an expansion of the motorway and the building of a by-pass are currently in progress. Nauen has the status of a 'type-1-community. Type-1-communities are distinguished by junctions of public transport with high-grade supply and potential for further concentration. As regards further development the area of Nauen has a potential growth rate of 50 %. The city is of high importance for the region of Westhavelland and is supposed to be further developed into a middle-centre.

The municipal area comprises valuable landscapes, which are of supra-regional significance. Because of its rural character and the fact that it can be easily reached from different directions, it is a potential recreational area for the population of the surrounding towns and cities.

5.6.2.3 Procedure

The environmental objectives of the SEA Directive have been related to suitable indicators. The environmental report makes use of environmental quality objectives. With the help of national and environmental quality objectives of overriding importance it has been possible to develop specific ones for the municipality of Nauen.

In order to develop different scenarios, the population development has been analysed. The current state as well as prognoses of 15,000 and 20,000 inhabitants have been investigated concerning the avoidance of significant environmental effects. Furthermore, the building areas of the current land-use plan have been analysed as regards their potential environmental effects. Since the expansion of housing is of high interest for Nauen and significant environmental effects have to be expected from further development, the evaluation is restricted to this topic.

The single building areas are evaluated as regards effective environmental precautionary measures. Alternative concepts for urban development have been elaborated, taking the specific number of inhabitants as well as possible environmental effects into account. Mitigation measures could not be provided for, though.

5.6.2.4 Monitoring Measures

The proposed monitoring measures are based on the following criteria:

- Cost-efficiency
- No specific knowledge necessary for data collection
- No special equipment necessary for data collection
- Meaningful data
- Ability to show trends
- Reproducibility and accuracy
- Possibility of easy information and data transfers
- Use of existing data
- Availability of background values

A twofold approach is pursued as regards the implementation of the monitoring system:

1. On the one hand, all the available data, which are collected by the federal state, environmental authorities and/or environmental organizations and which are relevant for the municipality of Nauen are listed. The municipality is responsible for requesting the data regularly (depending on the parameters) and for processing it afterwards.
2. On the other hand, the municipality is obliged to collect the relevant data itself and to process them statistically. The aim is to promote environmental education in schools and to raise the population's interest in the objectives and problems of land use planning.

The approach aims at creating a monitoring system, which is apt for investigating whether or not the environmental quality objectives are being fulfilled. You find the detailed monitoring arrangements in the following section.

Environmental Objective	Data Source	Existing Data	Data to be collected
Clean air	<ul style="list-style-type: none"> Measuring points of the air quality net of Brandenburg in Nauen⁵⁵, Annual air quality report Nature Association (NGO) 	<ul style="list-style-type: none"> Ozone, NO Floating dust Arrival/ departure of crane and stork 	<ul style="list-style-type: none"> Observation of potential changes in urban climatic conditions/ establishment of spot-check areas in different parts of town: <p><i>Indicators: blooming of flowers, sprouting of trees</i></p> <ul style="list-style-type: none"> <i>Observation of lichen (indicator for SO)</i> <i>Observation of singing birds</i>
Sustainable use of ground and drinking water	<ul style="list-style-type: none"> Waterworks and sewage authorities 	<ul style="list-style-type: none"> Statistics on water usage and amount of dirty water Quality of drinking water 	
Sustainable use of surface water	<ul style="list-style-type: none"> Public health department Water quality inventory⁵⁶ Fishing association 	<ul style="list-style-type: none"> Existence of blue-green algae and coli Water quality (bio indicators) Classification according to water quality classes Occurrence, kinds and 	<p><i>Observation/ measurement:</i></p> <ul style="list-style-type: none"> <i>Water level (spring, summer, autumn)</i> <i>Medium annual draining off</i> <i>Examination of water samples as regards</i>

⁵⁵ These nets exist nationwide; see <http://www.umweltbundesamt.de/immission/>.

⁵⁶ Results of the measurement stations of the LAGA are available in the „ÖKOBASE Atlas“ (www.umweltbundesamt.de/hid/).

		numbers of sensitive/rare fish	<i>indicators like algae</i> - <i>Water measurements concerning pollutants</i>
Environmental Objective	Data source	Existing Data	Data to be collected
Biodiversity/ protection of valuable landscapes	<ul style="list-style-type: none"> • Map of biotopes • Nature Association (NGO) 	<ul style="list-style-type: none"> • Biotopes • Occurrence, kinds and numbers of endangered species 	<ul style="list-style-type: none"> • Observation of existing and potential nature reserves by CAs or Nature Associations
Sustainable settling development			<ul style="list-style-type: none"> • Observation of other than planned usage of areas, consequences of compensation measures
Good urban environment	<ul style="list-style-type: none"> • Guidelines for building recreational and sport facilities, playgrounds • Noise reduction plan 	<ul style="list-style-type: none"> • Approximate value for green areas, playgrounds, cemeteries, swimming-pools etc. 	<ul style="list-style-type: none"> • Measurement of noise-emissions in different parts of town in particular building areas • Comparison of these values with guidelines
Sustainable use of soil	<ul style="list-style-type: none"> • Information system for soil protection • Calculation of rainfall charges 	<ul style="list-style-type: none"> • Evaluation of the state of soil in Brandenburg • Public street areas • Public tilled and paved areas 	<ul style="list-style-type: none"> • Drawing up a checklist of indicator plants/ setting up spot-checks: <ul style="list-style-type: none"> - <i>Indicator species for ph-values of soil</i> - <i>Spot-checks on</i>

			<i>representative areas (urban greens, road-side, forest)</i> <i>– Annual examination as regards changes (schools)</i> <i>– Soil samples</i>
Environmental Objective	Data Source	Existing Data	Data to be collected
Environmentally friendly recreation	Tourist association See also air and water quality		<ul style="list-style-type: none"> • Preservation and creation of recreational facilities (swimming-pools, parks etc.) and infrastructure (public transport, cinemas, libraries, museums, bicycle paths etc.)
Richly structured landscape	See protection of landscapes		
Sustainable use of energy and resources	See above soil, water		

(Italics: additional measure for environmental monitoring)

5.6.2.5 Criticism of the Project

It is questionable, however, whether this approach comes up to the preconditions set up by the SEA Directive, since Art. 10 requires to monitor whether or not the implementation of a plan or programme has inter alia significant environmental effects. Thus, monitoring must always refer to the plan itself. The model-case study, however, aims at monitoring the fulfilment of environmental quality objectives in the first place. It is indispensable though to focus monitoring on a concrete plan or programme. Art. 10 names criteria, which have to be fulfilled whenever monitoring is performed: monitoring has to concentrate on the implementation of a plan or programme and on significant effects. General and abstract monitoring of the fulfilment of environmental objectives might result in information, which can be used for monitoring, but it is not the genuine aim of monitoring according to Art. 10.

Despite of this criticism, it may not be forgotten that environmental quality objectives can be a good means to strengthen environmental concerns in the respective plans. Since environmental quality objectives have not been used for such a long period of time, it might be worth considering improving the integration of environmental quality objectives into plans instead. The Swedish approach, which tried to develop planning indicators, is a very good example and may serve as a model. Nevertheless, it is important to distinguish between the process of planning, where environmental objectives are of high importance and the process of monitoring the effects of such a plan. There is no denying the fact that it should be controlled whether or not the environmental objectives, which were decisive for the planning decision, were fulfilled or not.

5.6.3 Art. 10 within the Context of Urban Planning – Suggestions of a German Expert Group

Implementing Art. 10 in the field of land-use planning has to take account of the specific characteristics of planning law in each country. In Germany, for example, the local land-use-plans are legally binding, so that if a certain kind of land-use is permissible according to the plan, the citizen has the right to be issued a building permit. This right is legally enforceable before the courts. As a consequence, if an adjustment of the plan or the drawing up of a new plan has negative consequences on an existing right of land-use, the citizen may have a claim to indemnification. There is no time-limit in the validity of land-use plans in Germany.

The Federal Ministry of Transport, Building and Housing has set up an Expert Committee, whose discussion resulted in the following principal (preliminary) ideas:

1. The local communities in Germany are in charge of drawing up the local land-use plans or changing them (constitutionally granted planning-authority), so that they are already involved in the surveillance of the plans. Thus, they should also be in charge of carrying out the monitoring.

2. Outside the urban planning system in German law, there are already a lot of regulations on monitoring and reporting about the state of the environment by specialized authorities, on project-level as well as in the sense of a general environmental monitoring. If drawing on this expert knowledge, the local communities would generally be well informed about the state of the environment, so that they could rather easily compare their prognosis for the development when drawing up the plan with the actual state of the environment.
3. There is no general rule, how long it takes for the implementation of a local land-use-plan, as the time when the actual building takes place depends on private initiative. Thus, monitoring has to be flexible and cannot be fixed to a time limit as far as land-use planning is concerned.
4. So, for the urban planning law in Germany it would be the best way to establish a system of monitoring by requiring the local authorities to monitor the significant environmental effects of the implementation of their local and land-use-plans, inter alia to identify at an early stage unforeseen adverse effects. For this purpose, the local authorities would have to draw on the information of the competent environmental authorities. The competent authorities would be obliged to pass all the environmental information with relevance to the land-use-plan on to the local communities. The local communities would have to decide on their exact monitoring arrangements themselves and state them in the environmental report when drawing up the plans, so that they would be subject to public participation.

5.6.4 Current Situation in Member States and Accession Countries according to the Questionnaire

As far as monitoring in the field of land-use is concerned, a variety of approaches can be distinguished. Most of the participating countries have not established special monitoring⁵⁷ systems for plans and programmes in the field of land-use. If they have, they have not been established for a long time. The experience available stems from the regular revision of land-use plans and from monitoring of single projects. The rules dealing with the frequency of monitoring are characterized by a great flexibility. Rather than setting up strict rules, the authorities are free to decide on the necessity of a revision on an individual basis. Environmental authorities are usually involved. The form of involvement differs significantly, however, ranging from mere consultations to an active role in decision-making.

The aim of monitoring respectively revising is not the identification of environmental impacts, but rather to control whether or not the objectives of the plan have been fulfilled. The data collected shows a great variety ranging from information on land-use only to information on all environmental fields?. This may be due to the fact that

⁵⁷ A lot of the participants did not clearly distinguish between the monitoring and revising a plan or programme.

in the field of town planning there does not exist a ministerial control in many countries, which leaves a lot of discretionary power to the competent authorities.

5.7 Structural Funds

5.7.1 Indicators for Monitoring and Evaluation in the Field of Structural Assistance⁵⁸

Since monitoring has been of high importance in the field of structural assistance for quite some time, a short survey is given below. It is indispensable, however, to be aware of the fundamental differences, which exist between monitoring as required by Art. 10 of the SEA Directive and monitoring in the field of structural funds.

Art. 36 of the General Regulation⁵⁹ contains the main provisions on monitoring, in particular on monitoring indicators. According to Art. 36 No. 1 the ‘indicators shall relate to the specific character of the assistance concerned, its objectives and the socio-economic, structural and environmental situation of the Member State concerned and its regions.’ Besides the provision mentioned, the regulation contains several references to evaluation procedures in Articles 40-44, of which Art. 41 (2) b (ex-ante evaluation) and Art. 42, 43 are of special interest. The aim of monitoring, as concerns structural funds, is to establish the effectiveness of the implementation and the resources used by means of indicators defined at an appropriate level.⁶⁰ This is contrary to the SEA Directive, where monitoring aims at identifying unforeseen adverse effects, but not at controlling the implementation of the plan. (*It could be argued though that monitoring aims also at monitoring the effectiveness of the mitigation measures, which have been part of the plan, but this interpretation is controversial*). Since the aim of monitoring as regards structural funds is relatively clear, the discussion has concentrated on the question of indicators, which is not the main topic of this project. Nevertheless, some conclusions might be also valid for monitoring according to the SEA Directive.

The Working Paper of the European Commission *Indicators for Monitoring and Evaluation* sets out that the choice of suitable indicators, so-called core indicators, is of high importance. It has been pointed out that “it is necessary to use a set of indicators,⁶¹ which must be decided in advance or early on in the programme’s implementation, so that data on them can be collected”.⁶² This corresponds to the findings of the workshops of this IMPEL Project, where it has been pointed out that

⁵⁸ Based on the Working Paper The New Programming period 2000-2006: methodological working papers. Indicators for Monitoring and Evaluation: an indicative methodology. European Commission. Directorate-General XVI – Regional Policy and Cohesion. 2000.

⁵⁹ Council Regulation (EC) No. 1260/1999 of 21 June 1999 laying down general provisions on the Structural funds OJ L 161, p.1.

⁶⁰ See Working paper, p.4.

⁶¹ For the indicators used see Working paper, p.29, 36, 37 and 54.

⁶² Working paper, p.8.

the indicators, if possible, should be decided on when drawing up the environmental report, which is in a very early stage of planning. The Commission has pointed out as well that it is extremely difficult to establish a clear causal relationship between a plan and programme and the (negative) effects, which are observed.⁶³ This corresponds to the experiences made in the course of this project.

It has been already mentioned that monitoring in the field of structural assistance does not focus on environmental effects of the concerned programmes so far. Recently, this attitude has changed significantly. As a result, France and Austria have developed monitoring systems, which integrate environmental effects as well. Therefore, the two models are presented below.

5.7.2 The French Model O.S.E.E. – An Instrument for Monitoring Environmental Evaluation

France has developed a monitoring system, which allows an ex-post analysis in the field of environment (for the measures with financial support of the Ministry of Environment) as well as to monitor other measures (without financial support) according to the requirements of Art. 10. The monitoring tool is called O.S.E.E. and has been developed by a committee consisting of several environmental authorities on the regional level (DIREN) and representatives of the central administration of the Ministry for Ecology and Sustainable Development (MEED) and the French Institute for the Environment (IFEN). O.S.E.E. is a computer programme, whose final version is going to be presented within the course of the year 2002. It is conceived as a monitoring tool for the national as well as the regional level. For reasons of completeness, it should be added that it is not sure yet whether O.S.E.E. is finally going to be implemented. At this point of time, it is just a proposal. Nevertheless, it presents an interesting approach, which might also be of use for other Member States.

For the programmes in the field of the environment three groups of indicators are available: indicators for realization, indicators for the effects and financial indicators. A group of 50 indicators, so called common basis data ('tronc commun'), has been developed as regards the indicators for realization and effects. These indicators have to be used by any region in order to be able to compare them on equal terms on the national level. It is, however, possible to choose additional indicators, which correspond to a specific regional measure or problem.

For the measures or programmes which are not primarily designed to improve the environment two kinds of indicators are used. The first group of indicators identifies, to which degree the environment is taken into account by the respective programme (e.g. whether buildings are built in an environmentally friendly way, mitigations measures etc.) The second group of indicators is used to identify the significant

⁶³ Working paper, p.8.

environmental effects, which derive from these programmes. The indicators have been proposed by the Ministry of Ecology and Sustainable Development and are to be discussed on the level of the regions between the regional authorities responsible for the environment (DIREN) and representatives from other authorities e.g. transport, tourism, energy etc.

With O.S.E.E., it is also possible to compare the programmes and their effects⁶⁴ on the environment as well as to analyse whether the environmental measures of the regions meet the requirements of the environmental profiles⁶⁵, which have been elaborated before.

Even though O.S.E.E. was conceived as an instrument to detect positive environmental impacts in the first place, it offers a deeper insight into monitoring mechanisms of environmental effects in general, including negative ones. If the system proves to work out fine, it might serve as a model for developing similar schemes in other Member States, which might also focus on negative effects. Finally, monitoring systems, which are based on a single model, might even allow comparing the results of different countries on a European level.

5.7.3 The Austrian Approach for Evaluating Environmental Effects of Programmes Subsidised by the Structural Fund

Austria has developed a monitoring model for evaluating the environmental effects of structural funds' programmes as well.⁶⁶ In order to achieve a meaningful intermediate evaluation of environmental effects of structural funds' programmes, the monitoring process as well as the indicators have been amended and specified. The approach is based on the assumption that the programmes aim primarily at economic targets and fulfil environmental objectives only in so far, as legal requirements (e.g. emissions) have to be met. In order to find out whether and to which extent such programmes have positive environmental effects, a set of questions (indicators) has been developed. The number of questions asked depends on the volume of the specific project: the higher the project's volume, the more and precise the questions to be answered. According to Regulation 438/2001 (EC)⁶⁷ an environmental indicator for four environmental dimensions (pollution, consume of

⁶⁴ It should be added that the impacts monitored are mainly positive ones, while Art. 10 demands negative effects in the first place.

⁶⁵ The 'environmental profile' aims at defining the important issues and the related indicators in a region or other area. Other environmentally related aspects are not taken into account. The indicators used are different from the ones used in O.S.E.E..

⁶⁶ See Österreichische Raumordnungskonferenz (ÖROK). Methode zur Evaluierung von Umweltwirkungen der Strukturfondsprogramme.

⁶⁷ Commission Regulation (EC) No 438/2001 of 2 March 2001 laying down detailed rules for the implementation of Council Regulation (EC) No 1260/1999 as regards the management and control system for assistance granted under the Structural Funds, OJ L 063, p.21.

resources, waste and biological diversity) has been developed, which has to be answered for each topic separately, following the criteria of the Regulation, which foresees the following categories: ‘under the regulations’, ‘positive environmental effects’ and ‘very positive environmental effects’. The projects are then classified according to a refined guidance, which provides qualitative criteria for different areas of intervention. In case of a positive environmental evaluation for medium-sized and bigger projects, an additional written substantiation is required as well as additional indicators of the operator such as certificates and activities, which exceed the ones required by law. Furthermore, in case of a positive evaluation for a bigger project (more than 3.5 million € of subsidies) an additional detailed description of the environmental effects is to be provided by the operator.

Because of the short term of application, the results are only of a preliminary nature. It has turned out though, that in principle the chosen questions (indicators) are feasible and useful. The uniform questions and the for the most part standardised replies as well as the guidance make it possible to compare the respective sponsored projects, regions and periods, which are the basis for further analyses. Even though the approach focuses on positive effects, it might be a helpful tool when developing monitoring systems.

5.8 Elements of Monitoring on Local Level: The Example of the EcoBudget System

The ecoBudget system⁶⁸ tries to consciously imitate the financial budgeting procedure of municipalities. Its scope extends that of the SEA Directive and is not connected to a specific plan or programme. It does comprise parts of planning procedures in municipalities though, and shows that methods closely related to the monitoring of plans and programmes already exist on the local level. Numerous aspects developed in the ecoBudget system could be used for the purposes of monitoring according to Art 10. It applies a periodic management cycle to allow local authorities to predict, plan, control, monitor and report the use of natural resources. It does not aim to give a monetary evaluation of the environment, but through the use of environmental indicators it aspires to keep the environmental spending within the limits of the environmental budget. The environmental budget contains targets oriented towards the sustainable management of environmental resources.

⁶⁸ The EcoBudget system, presented by Victoria Bull of ICLEI at the third workshop, was developed by ICLEI (International Council of Local Environmental Initiatives) and the municipalities of Dresden, Heidelberg, Bielefeld and the county of Nordhausen in Germany in a pilot project. The method is presently being adjusted to a European scale in an additional project including a variety of municipalities in different countries. For further information see www.ecobudget.com.

The ecoBudget cycle consists of three phases, following the routine of financial budgeting. The use and state of natural resources is monitored throughout, using indicators:

1. Development of an environmental budget: This first phase involves all the different departments in order to choose indicators and set targets for the environmental budget. Each resource portrays one budget line. The environmental budget and an explanatory report are submitted to the decision making body (local council) for approval.
2. Implementation: The second phase must implement the budget by following the course of “environmental spending” and implementing measures to ensure targets are met.
3. Analysing results: The third phase compiles results of the implementation phase, balancing the accounts and highlighting the success and necessary efforts for the next budget period.

The environmental budget is passed by the council, making the targets politically binding. Political decision makers and senior urban managers are systematically and periodically involved in the ecoBudget cycle, steering the use of environmental resources. It focuses on all environmental media, all the environmental effects (both caused by local activities and by global trends) and concerns the entire community (local government, industry, households, transport etc.). One of the first priorities is seen in the setting up of the necessary structures and organisational routines. EcoBudget can start simple and be extended as required. The number of eco-accounts (indicators) may be limited to 5-15 initially.

6 ANNEX I

Results of the 2nd Questionnaire

Participating Countries:

Italy, Austria, Finland, Latvia, Malta, Poland, Sweden, Germany (Bavaria, Brandenburg and the Federal Ministry of Transport, Building and Housing (on selected questions of land-use only)), Spain, UK, France.

N.B.: Not every question was answered by all the participants. Thus, the total number of answers may vary. We would also like to stress that the answers given are not representative for the state as a whole. The answers given present the opinion and view of the representative of the respective authority. Thus, the following overview does not claim to be complete or binding in any respect.

Q 1.1-1.3: Monitoring Experience:

With the exception of Finland (land use planning) and Bavaria (regional planning, waste management), no systematic monitoring experience exists; thus monitoring experiences stem from occasional cases.

Conclusions are drawn from experience gained through regular revisions and general monitoring on the project level. Furthermore, there are additional mechanisms in some countries, e.g. reporting system (goals achieved) or instruments of supervision.

Q 2.1: Kind of monitoring systems:

With the exception of Finland, the UK, and Germany, no specific system has been provided for the monitoring of waste management and land-use plans. The existing monitoring systems deal for the most part with questions of waste management and land use; since the end of the 1990s several Member States have developed monitoring systems (France, Spain).

These monitoring systems pursue an approach different from that of the SEA Directive, however, in particular an assessment whether the measures of the plan/programme support the goals of the respective plan/programme.

Q 2.2: Aim of monitoring:

Objectives of PPs ⁶⁹ achieved:	10
General monitoring, without relating to PPs:	2
Conformity with regulations:	3
Implementation of certain measures:	3
Identify relevant regional trends:	2
Conformity with autarky principle:	1
Identify environmental effects:	3

Q 2.3: authority responsible for monitoring

	Land-use	Waste
Environmental authority:	1	2
Plan-preparing authority:	3	1
Ministry of Environmental Protection:	1	1
Chief Inspectorate/ Central Statistical Office:	1	1
Environmental Protection Agency:	1	1
Special board:	1	
Ministry for Resources and Infrastructure:	2	
Ministry for Regional Development and Environmental Affairs:	1	1
Autonomous regions:	1	
Local authorities:	1	
All kinds of authorities:	1	

⁶⁹ Plans and Programmes

Q 2.4: Frequency of monitoring:

	Land-use	Waste
After 6 months, once a year, every 2 years (after 3 years):		1
Once a year:	3	7
Every 2 years:		1
Every 4 years:	2	1
Every 5 years:	1	
Depends on plan:	3	
Every 4 years (EQO):	2	
Continuous evaluation:	2	

Q 3.1: Involvement of EAs in regular revisions:

	Land-use	Waste
EAs involved:	8	7
Involvement not mandatory:	2	1

Involvement has various forms from mere consultations to an active role in decision-making.

Q 3.2: Frequency of revisions:

	Land-use	Waste
6 months, once a year, every 2 years (after 3 years):		1
usually every 2-3 years:	1 (u)	
Every 3 years:		2
Every 4 years:	2	1
Every 5 years:	1	2
Every 10 years (at least):	3 (u)	1
Every 20 years:	1 (Structure Plan)	
Depends:	7	1
no regulation:		1

Rules/ mechanisms dealing with the frequency of monitoring are characterized by a great flexibility. The authorities decide on an individual basis (usual period of revision (u) rather than setting up strict rules.

Q 4.1: Data collected when monitoring PPs:

Land-use

Information relating to a set of indicators:	2
Information on all environmental compartments including land-use:	2
Information on land-use only:	2
Information relating to nat. monitoring system and EQOs:	1

Waste

Quantities:	5
Information on waste management sites:	3
Information relating to a set of indicators:	1

In case of sectoral monitoring (waste), the data collected is very uniform and limited to data, which is easily obtained, environmental effects are neglected, so is the reference to indicator-based approaches.

In the field of land-use the picture is a lot less uniform, possibly based on the fact that there is not a lot of experience as far as monitoring of land-use is concerned. Especially in these fields guidance might prove to be helpful.

Q 4.2: Data collected independently from PPs:

Environmental data on all relevant environmental issues:	7
Data collected in general in relation to specific policies:	1

Q 4.3: Authority responsible for gathering the environmental data:

	Land-use	Waste
Planning authorities:	2	
General environmental authorities:	2	
Env. Protection Agencies:	2	1
Other agencies/ institutes:	2	2
Inspectorate for Env. Prot.:	1	1
Statistics Office:	2	2
Research institutes:		1
Different authorities:	1	1

Q 4.4 a) Methods and sources for getting information:

	Land-use	Waste
Indicators:	2	1
Statistics:	3	2
General monitoring:	1	
All/ several of them, depending on the plan:	7	2

Q 4.4 b): Data formalized:

A variety of data-processing methods and systems are used. Approaches, which might be useful for the harmonisation of the monitoring process, are e.g. storage and collection of data according to industrial classification (NACE), O.S.E.E., RISby, CORINE. Some of these models are presented in detail in the 2nd Interim Report.

Q 4.5: Link between implementation and environmental effects:

	Land-use	Waste
Connection, coordination of databases:	2	
Board of EQO:	1	
Working groups:		1
Guidelines:	2	2
Technical standards:		1
Protocols for monitoring:	1	
No help for interpretation at all:	3	

Q 4.6: Do environmental data/conclusions relate more to objectives or measures?

	Land-use	Waste
Both affected:		1
Both affected to same degree:	3	2
More to objective:	3	3

Note: 5 out of 11 participants (the three German answers were counted as one) could not give (specified) answers, since legislation concerning the Habitats Directive is still under preparation.

Q 5.1: Which authority does carry out surveillance?

Environment and Planning Authority

Regional Environment Boards, State Environmental Inspection, Environmental Agency

The regions

Nature conservation agencies

Q 5.2: Kind of data/information collected?

State of biotope and species per Annex I, II

Very broad set of information

Biotope-mapping (flora), species mapping (fauna)

Q 5.3: Methods used to obtain these data?

Inventories, population trends, vegetation, field visits, surveys, visual monitoring, vegetation mapping, orthophoto maps, indicators

Q 5.4: Are the data collected/ processed in a formalized way?

Data catalogue

Software programmes have been developed, a programme has been produced to visualize the data and maps

Q 5.5: Remedial action?

No provisions are laid down

Reference to Article 6 of the Habitats Directive

Nature protection plans may foresee them

Remedial action on case-by-case basis

General provision on prohibition of certain activities and compensatory measures, which could also apply to Natura 2000, sites the conservation status of which is getting worse.

Q 5.6: Use of information gained from surveying the conservation status of Natura 2000 sites for plan preparation or regular revisions?

Used for the revision of other plans (local plans and the Structure Plan).

Q 6.1: Remedial action in case of unforeseen effects

	Land-use	Waste
May be considered:	2	1
Legal obligation:		2
Adjustment of Plant permits:	2	
Revision of regional development P:	1	
Adaptation of waste management plan:		1
No provisions:	2	1

Q 6.2: Additional provisions concerning remedial action

	Land-use	Waste
No:	2	1
Yes:	3	2*
No specified answer:	2	

*: Provisions comprise compensations for the costs of reasonable measures taken to prevent/ limit environmental damage and for clean up and restoration of the environment to previous state, criminal law

Q 7.1: Control mechanisms as regards PPs

	Land-use	Waste
Yes:	7	1
No:	1	
Report before higher authority:		1
No specified answer:	1	1
Guidance:	1	

Q 7.2: Are sectoral plans compiled/ adjusted to each other?

	Land-use	Waste
Yes:	6	2
In some sectors:	2	

Q 7.3: Independent authority watching over the choice of indicators?:

No: 5

- Decisions should be made within the system itself.
- Guidance/ negotiations before are better means.
- In principle no. As regards nature protection and the monitoring Natura 2000 sites a certain form of cross-sectoral co-operation of different authorities (ministries) can be noticed. In the field of waste management it might be useful to set up a working group which prepares some methodological guidelines.

- Not demanded by the directive, SEA has enough procedural elements e.g. scoping, screening, public participation, which guarantee an external control, additional financial and administrative expenditures
- Would be better to use protocols and models of environmental pressures resulting from economic activity.

Yes: 6

- Environment must not be negotiated away
- Committee/authority, which may help with consulting
- Government Waste Committee already exists
- Could guarantee more transparency
- Better control of transboundary effects and contentious cases
- Such an institution is helpful for the organisation and harmonisation of the different elements of monitoring, but monitoring must remain in the hands of the competent authorities

Q 8.1: Should there be minimum standards?

Yes: 6

- but non-binding
- but must be related to a system of ground data, preferably a system of periodical reporting
- but only when they can readily be quantified (not land-use plans e.g.)

Maybe: 1

No: 3 (town planning)

- Certain regularity of spatial monitoring in the field of regional development is useful, a minimum set of standardized criteria/ requirements/ methods is considered as useful as well as a certain regularity
- Differences are too big, decision has to be made on case-by-case basis
- Monitoring system must be defined at the level of the plan; only these indicators are relevant; consultations among authorities and stakeholders are preferable

Q 8.2: Is it useful to set up certain parameters for specific implementation measures of plans and programmes, which have to be used in each case no matter which level of hierarchy is concerned? Or would you rather opt for

setting up environmental objectives, which have to correspond to different parameters depending on the respective level of hierarchy? (local, regional, national)

7 opted for environmental objectives, since

- parameters should be adjusted to the needs and the degree of detail of each planning level
 - Additional statements
 - but only in some quantifiable circumstances
 - guidance needed
 - In any case for general plans like waste management plans

2 opted for parameters

1 opted for both depending on the nature of the plan

2 opted for neither objectives nor parameters

- Not required by the Directive
- Monitoring process has to be defined in every situation

Q 8.3: Requirements for parameters:

Transparency:	6
Flexibility:	4
Simplicity: (comprehensible, easy to handle)	4
Support sustainability:	1
Reflect state/ changes of environment:	1
Reliability:	1
Time-correlation between results and planning periods:	1
Appropriateness: (<i>between factors which are measured and what is being monitored</i>)	2
Relevance: (reference between objectives and plan):	1

7 Annex II

EU Legislation

Directives	Kind of data collected and Data-records available	Type of indicator
Directives taking a project-related approach:		
IPPC Directive (96/61/EC)	Emission release data of industrial installations; Pollution emission registers (PERs) to be published by the European Commission Compliance with permit conditions	Pressure indicators Performance indicators
Seveso-II Directive (96/82/EC)	Information about dangerous substances present in an establishment, Environmental characteristics of the location of the establishment; Information to be found in the safety-report produced by the operator	Pressure indicators, State indicators
Combustion Plants Directive (88/609/EEC)	Emissions into the air from large combustion plants (compliance with emission limit values)	Pressure indicators
Landfill Directive (1999/31/EC)	Emission data (leachate and gas), Water samples to check water quality; Registers kept by the operator	Pressure indicators, Performance indicators

Waste Framework Directive (75/442/EEC)	Quantity, nature, origin, destination, frequency etc. of waste; Records kept by the operator	Pressure indicators
Groundwater Directive (80/68/EEC)	Discharges of substances on groundwater (compliance with authorization conditions); Inventories of the authorizations of discharges of substances	Pressure indicators
EIA	Data on flora, fauna, soil, water etc. (depending on the case in question)	Pressure and State indicators
Directives taking a plan/programme/policy-related approach:		
Water Framework Directive (2000/60/EC)	Data on water status (monitoring programmes are part of the water management plan)	State indicators
Habitats Directive (92/43/EEC)	Conservation status of the natural habitats and species	State indicators
Directive on atmospheric pollutants (2001/81/EC)	Data on atmospheric pollution in order to ensure compliance with emission ceilings (linked with national programmes for the reduction of emissions); Emission inventories on national and EU-level	Performance indicators Pressure and state indicators
Directive relating to ozone in ambient air (2002/3/EC)	Data on concentrations of ozone in ambient air (linked with programmes for certain areas to attain the target value)	State and performance indicators

Drinking Water Directive (98/83/EC)	Quality of water intended for human consumption (partly for checking compliance with specific quality standards)	State and performance indicators
Environmental Noise Directive (2000/0194 COD)	Levels of noise created by human activities; Noise maps of given areas	Pressure and state indicators
Legislation announced or in preparation:		
Proposal for a regulation on waste statistic (C 5/2001/661)	Statistics on the production, collection, processing and disposal of waste	State indicators
Announced legislation on soil protection	Community information and monitoring system on soil threats (data on soil parameters); Databases to be extended or newly established	State indicators