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Strategic Environmental Assessment in Germany — Practice and open questions

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ABSTRACT

Eight years after the enactment of the EU Strategic Environmental Assessment Directive (2001/42/EC) (European Parliament and the Council, 2001) it is time to investigate where and how SEA are being implemented in Germany in order to find out open questions and research needs. In this study, we analysed in which planning types SEA are common practice, and where can deficits be identified, and to what extent differences occur between spatial and sectoral planning with respect to carrying out SEA. Pressing challenges in performing SEA as well as open questions are addressed such as the handling of cumulative effects and the interrelationships between the environmental factors, and how the monitoring of environmental effects is considered by the practitioners. The results show that SEA is well implemented in local land-use planning, regional planning, and in local landscape planning, while the implementation in sectoral planning varies widely. The SEA in clean air planning is looked at in more detail, because this is discussed controversially in the specialist field, and obstacles against SEA are identified in this field. Finally some new topics are addressed for which solutions in spatial and environmental planning including SEA must be found, e.g. the consideration of biological diversity and the potential role of SEA in climate change. A European study on the identified open questions and their handling in different contexts and countries may allow for a qualitative amendment in practice.

1. Introduction

Since the enactment of the European SEA Directive (European Parliament and the Council, 2001), many environmental assessments have been carried out and documented in the Member States, and some practice guidelines have been developed. Undoubted progress is evident in the practice of SEA especially in urban, regional and landscape planning. But still important questions remain open. Cumulative environmental effects and the interrelationships between environmental effects pose serious methodical challenges. Monitoring environmental effects with regard to the implementation of plans portrays, at least in theory, a prerequisite for an effective and environmentally sound use of land and further resources, but is still not usual practice.

The status of SEA practice in sectoral planning varies indeed; while EIA already have a long history in transport planning, SEA have less frequently been carried out to date. In water resources management the first examples for SEA are available, while the SEA is still 'virgin soil' for clean air planning; it is still discussed controversially. Arguments 'pro' and 'contra' SEA in clean air planning are interesting here. Furthermore, several additional new topics require solutions in spatial and environmental planning including SEA, among others climate change.

2. Research questions and methods

Eight years after the enactment of the SEA Directive this paper investigates SEA practice and open questions in Germany. Documentations of SEA examples as well as expert opinions on SEA procedures and methods were taken into consideration.[1]

The following questions were subject to the investigation:

1. In which planning types SEA are common practice in Germany, and where can deficits be identified?
2. Do differences exist between spatial planning and sectoral planning with respect to SEA procedures?
3. What are the most pressing challenges in performing SEA?
4. What open questions in selected sectoral planning types can be identified?

The information required to answer these questions was obtained by three different methods:

1. Literature review: based on an extensive literature review planning types were identified and briefly characterized wherein SEA regularly are carried out.
2. Written survey of SEA specialists: with the help of the EIA association, eighty SEA experts were identified and received a

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[1] This investigation served as preparation for the Congress of the EIA-Association on Environmental Assessments in Germany in 2008 and was presented as keynote speech by the author; but is not yet published.

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semi-standardized questionnaire. The experts are either members of planning institutions on various levels experienced in performing SEA in land programmes and planning, regional planning, land-use planning and/or legally binding land-use planning, or they are researchers in the respective fields. Additionally, practitioners and scientists in transport planning, water and waste management, clean air planning and noise control were interviewed.

The questionnaire covered a.o. planning subjects considered in SEA, applied methods and considered environmental goods, projected monitoring measures, and positive as well as negative experiences of the interviewees with SEA. Finally, recommendations of the interviewees were asked. Out of 80 questionnaires sent out, 20 could be evaluated (return rate 25%). The majority of the answers were given by practitioners (75%), while a clear distinction between practitioner and researcher is not always possible because several interviewees do research while being consultant at the same time. The rest of the answers consisted of referrals to publications of the interviewee or further recommendations. Most of the interviewees addressed open questions and challenges very frankly. Due to the return rate of 25%, the results of the interviews additionally were drawn upon the literature review mentioned above.

3. Telephone interviews of clean air planning experts: because only partly experiences with SEA exist in sectoral planning and only a limited number of publications, additional telephone interviews were carried out in clean air planning. Of 61 Clean Air Plans, Action Plans and Combined Clean Air and Action Plans (see Metto 2007) 10 randomly chosen authorities were asked, 1) whether they had carried out one or more SEA and 2) for which reasons they were *not* carried out.

These three methods shall permit a) to give a review in which planning types the SEA Directive in Germany are both being implemented in practice and subject to scientific discourse, b) to go more in detail in specific questions that are considered pressing challenges in performing SEA and c) to provide an insight into planning types showing resistance against SEA and to reveal and discuss arguments against carrying out SEA.

All investigations for this paper are explorative and not representative; the persons asked are known to the author but remain anonymous.

3. SEA in spatial and landscape planning

SEA are carried out and published in Germany on various levels of spatial planning as well as in local landscape planning. The majority of SEA experiences and handbooks are available for land-use planning on local level (see e.g. BStMI/BStUGV, 2007; Jansen and Koch, 2007; Saad and Schneider, 2006; Spannowsky, 2006; Stüer, 2007). Also for regional planning exist a number of practice examples and studies (see e.g. Hanusch et al. 2007; IÖR et al. 2007; Schmidt, 2006; Spannowsky and Krämer, 2005). Intensive work is going on and much is published about the relationship of land-use planning–SEA–landscape planning (see e.g. Bielefeld et al. 2007; Haaren and Ott, 2006; Jessel, 2006; Louis, 2007; Scholles, 2006; Senatsverwaltung für Stadtentwicklung, 2007).

The status already achieved of the discussion in professional circles will not be referred to again here. Instead open questions will be gone into, which were addressed in the interviews. One interesting result of the inquiry is that it is not exactly known, which *quantitative* relevance the SEA has in land-use planning, that is which proportion of land area is planned with or without SEA. Many cities make use of Sections 13 and 13a of the Federal Building Code (BauGB), which allow the inner-city development without environmental assessment in a simplified procedure, mainly due to a lack of resources, but also due to low environmental consciousness. The positive appraisal that the SEA enables an optimisation of procedures and a comprehensive consideration of environmental matters in planning thus contrasts with the effort required taking into consideration the lack of resources in the administrations.

The consideration of the results of the SEA is also judged differently; environmental considerations lead partly to changes already in the development process of the planning drafts; on the other hand it has been mentioned that the results of a SEA show little effect in the political arena when the political will for it is lacking. The public interest in environmental assessment is assessed as small; only when an activating public participation is carried out within spatial or land-use planning does the SEA awake the interest of the public.

Uncertainties exist especially with respect to the methods of prognoses and evaluation, and different quality scales are drawn up. In particular it is often unclear how, or rather whether, *causal relationships* between the implementation of plans and 'the environment' can be determined, prognoses made and monitoring carried out. Also the differentiation between 'likely significant effects' and – as a consequence – dispensable environmental effects throws up questions. There is a lack of knowledge here, which cannot be solved by the practice alone.

Many interviewees support the further development of assistance; these working aids should include especially good examples and recommendations for indicators, evaluation methods, cumulative effects and interactions, about co-ordination between various SEA-levels, about methods of an active public participation in the SEA as well as about monitoring.

3.1. Cumulative environmental effects and interactions

Because the handling of cumulative environmental effects was addressed as challenge in a large number of interview answers, this issue will be discussed more in detail. Up to now there is neither sufficient scientific knowledge nor appropriate methods for dealing appropriately with cumulative environmental effects and interactions in the SEA, which portrays an important precondition for the effectiveness of environmental assessment.

Cumulative environmental effects and interrelationships between environmental factors provide people working on environmental reports with particular challenges. The terms 'cumulative', 'synergistic' effects and 'interrelationships' are used partly synonymously in practice, and there are also uncertainties with respect to the methods to be used for the analysis, description and evaluation of cumulative effects and interrelationships.

In Appendix I of the SEA Directive (2001/42/EC) the environmental effects to be considered are characterized in more detail as "secondary, cumulative, synergistic, short-, middle- and long-term, continuous and temporary as well as positive and negative effects". According to Appendix 1 of the SEA Directive not only the environmental goods themselves, such as water, flora, fauna or biodiversity, but also the 'interrelationships' between these shall be considered. According to Appendix II of the SEA Directive the cumulative character of effects also has an effect on their significance or seriousness.

Up to now, however, there is neither a legal definition of cumulative and synergistic effects nor a uniform understanding in the specialist world about what is really to be understood by these terms (Aschemann, 2005; Heiland et al. 2006; Siedentop, 2005); this statement is confirmed by Trinks (2008). In the Act on Environmental Impact Assessment (UVPG) "cumulative effects" are only named as criteria for the pre-examination of individual cases; "synergistic" effects are not mentioned. The consideration of "interactions" is only cited in the guidelines for the environmental impact assessment. Considering this lack of implementation in the legal basis of SEA, one

can only *conclude* that the early and in particular the comprehensive determination, description and evaluation of likely significant environmental effects according to Section 1 UVPG *should* also include cumulative, synergistic and interactive effects between environmental goods to be protected.

This lack is continued in the legal basis for spatial planning. In the German Building Code (BauGB) cumulative effects are only cited during the pre-examination of individual cases for binding land-use plans for interior development with a floor space (i.e. the part of the land that may be covered by buildings) between 20,000 and 70,000 m^2. Nevertheless the interactive effects between the individual interests of environmental protection are to be taken into consideration in the elaboration of land-use plans (Section 1 Para. 6 Nr. 7i BauGB).

In the literature cumulative effects are defined as the sum of *additive* and *synergistic* effects with respect to one environmental good to be protected. These can be the effects of several projects, like for example in regional and land-use planning, but do not have to be (see Heiland et al. 2006: 124). Thus it is possible to differentiate between two forms of cumulative effects on one environmental good:

- due to the spatial overlap and intensification of differing single stresses in one plan area (spatial compression, "hot spots"), and
- due to similar individual stresses in the whole planning area.

With this helpful definition a start is made; however questions remain. For one it should be clarified finally, which kind of "vertical grading" is to be seen here as "good practice". On the other hand it deals with no less than the recognition of *interactive effects* in *complex social–environmental systems*. In an investigation about the way of dealing with the causality in SEA guidelines it was portrayed that these are either ignored or simplified when they are too complex. Most of the European SEA guidelines do not provide much of a helping hand for the operation of interactive effects and they also do not require their consideration consequently (Perdicoulis et al. 2007: 6).

This reduction can also be ascertained in the legal implementation of the SEA guideline in German law, as portrayed above. On the one hand uncertainties (or insecurity) must be accepted in principal — it will never be possible to determine all of the environmental interactions of a system, rather usually only correlative interactions can be determined. On the other hand an improved understanding of interactive effects is necessary for the optimisation of environmental assessments. Trinks' (2008) suggestion to prepare available models for spatial planning practice and to make them manageable so that the complexity of the cause–effect relationships can be duly considered should be supported. The question about which models can be used to deal with uncertainties in environmental assessments in an appropriate manner is however still open. 30 years ago Holling (1978) developed the model of an adaptive environmental assessment and management, which portrays an approach for a systematic and changeable environmental assessment. It should be examined as to how far this model or which other models can be successfully used in environmental assessments.

3.2. Monitoring of environmental effects

A lot of open questions were addressed with respect to the monitoring of environmental effects. Monitoring of the likely significant environmental effects, which are to be expected through the implementation of the plan, is required by the SEA Directive, but no concrete requirements are formulated and no consequences are foreseen. Consequently, in particular on the higher planning levels, monitoring often is completely transferred down to the next planning level. Through this, however, the chance is missed to determine cumulative and synergistic environmental effects, which could mainly be considered in the higher planning levels.

Meanwhile it is possible to fall back on various guidelines for monitoring and reports of experiences.[2] In practice, however, there are still a lot of unanswered questions in relation to the monitoring of the environmental effects. A repeatedly mentioned source for monitoring problems is insufficient data. Environmental data exist as results of iterative as well as extraordinaire measurements in many authorities for special tasks such as controlling water quality, nature protection, noise reduction etc.; but usually they are not directly applicable in SEA procedures.

Scepticism with respect to the results, in particular of negative monitoring results, was mentioned in the interviews as well as with respect to the methods and resources required for the implementation of monitoring. The potential of monitoring of environmental effects during the implementation of the plan as an instrument for an effective control of spatial or urban development is recognised more in the research field than in practice.

4. SEA in selected sectoral planning types

Environmental assessments shall also be carried out in a series of sectoral planning types, e.g. in transport planning, waste management and water resource management as well as in planning under the Federal Immission Control Legislation.

In *transport planning* EIAs have often been carried out in the past already. Specialist reports and recommendations about SEA in transport planning of the Government and the Federal States (Köppel et al. 2004; Terwey 2007) as well as for municipal transport planning are available (Balla et al. 2008; BMVBS, 2006; Gerlach and Conrad, 2008).

Up to now a debate about the SEA in *waste management planning* occurred mainly from a legal viewpoint (Erbguth, 2005; Rottmann, 2006; Schink, 2005), but documented SEA are not available.

For *water resource management* the environmental assessment laws and the Federal Water Act (WHG) make it clear that environmental assessments are to be carried out for flood protection plans according to Section 31d WHG, for programmes of measures according to Section 36 WHG and for management plans according to Section 36b WHG. Examples and experiences are documented (see e.g. Bruns et al. 2008; Dickhaut, 2008; Erbguth, 2008; Jessel 2005; Schweer and Stratmann, 2008; Willecke and Hurck, 2008).

Due to the decree of several European Directives on air quality and environmental noise (European Parliament and the Council, 2002, 2004, 2008), environmental assessments in *planning under the immission control legislation* are probably going to be carried out in large numbers in the near future, whereby the legal situation is still unclear and there is neither a scientific debate worth mentioning nor practical experience on the subject. In addition to the prognoses and judgements on the effects of these plans on the environment, effects on health are also to be considered, since the protection of human beings stands in the fore in this planning. Environmental assessments for these sectoral plans require thus the determination of other cause–effect relationships than those known, for example, from land-use planning and finally a further development of the SEA methodology. In the following, the state of and debate on SEA in clean air planning and noise action planning will be presented.

4.1. Clean Air Plans, Action Plans and SEA

Clean Air Plans shall serve to protect human health. Although in Germany they are an instrument introduced long ago for immission control they have obtained a new relevance through newer EU

[2] To name here are e.g. for the regional planning and land-use planning the work of Bovet and Hanusch (2006); Bunzel (2005); Bunzel and Jekel (2006); Hanusch et al. (2005, 2007); IÖR (2006); Köhler (2007); Kress et al. (2006); Jacoby and Zahn (2005); Porger (2006); Weick et al. (2007); and Zahn and Höhne (2005).

Directives on air quality. Throughout Germany there are now about more than a hundred Clean Air Plans in urban agglomerations and cities (Umweltbundesamt 2008). Clean Air Plans shall serve to reduce air pollution of a series of pollutants, including sulphur dioxide, nitrous oxide, lead, benzene, carbon monoxide and particles (PM_{10} and $PM_{2.5}$).[3] Air pollution through particles can lead to heart circulatory diseases (among others); the smallest particles are especially dangerous to health, since these can find their way right down to the alveoli.

Clean Air Plans serve to implement the EU's air quality. The EU Directives were implemented in national law through the amendments to the BImSchG (Federal Immission Protection Law) and to the 22nd BImSchV (Federal Immission Control Ordinance) in 2002. Section 47 BImSchG includes the guidelines for the elaboration of Clean Air and Action Plans, whereby combined plans are also possible. According to this a Clean Air Plan *must* be drawn up as soon as the daily average value (24-hour-average) for the PM_{10}-pollution 50 µg/m^3 air on more than 35 days/year is measured or exceeded. The annual average which must be adhered to for PM_{10} is 40 µg/m^3. Critical today are mainly nitrous oxide and particle pollution; the boundary levels often exceeded these.

With increasing knowledge about the health issues relating to the smallest particles the EU has drawn up binding limits for $PM_{2.5}$ in the EU Directive *2008/50/EG about air quality and clean air in Europe*. The implementation of this new EU Directive must take place by the 11th of June 2010 and the limits for $PM_{2.5}$ must be complied with by the 1st of January 2015.

Clean Air Plans (CAP) should foresee measures which ensure, among others, the adherence to the above-named limits in the long term. Action Plans (AP) are to be drawn up when it is to be expected that the limits and/or alarm limits are not going to be kept to; they plan for short-term measures for the improvements of air quality. An AP can be integrated into a Clean Air Plan (Sparwasser and Stammann, 2006: 141). According to the BImSChG Clean Air Plans must be "accountable for an integrated approach to the protection of air, water and soil (Section 47 Para. 5 Sentence 1 together with Section 45 Para. 2 (a) BImSchG)" (Bunge, 2007: 104).

Clean Air Plans usually include the following details:

- Portrayal of the planning area, the location where the limit is exceeded and the measurement network,
- General information about the urban climate and the protection goals of the Clean Air Plan,
- Naming of the authorities responsible for clean air planning,
- Portrayal of the type and assessment of the air pollution (immissions, measurement procedures, and assessment values),
- Details of the origin of the pollution, i.e. the source of the emissions and proportion of emission (for instance broken down according to installations requiring authorisation, transport and background pollution),
- Details of the measures carried out and planned for the improvement of air quality (measures related to installations and transport),
- Portrayal of public participation.

Traffic related measures should mainly reduce the burden on the inner-cities which are stressed by traffic. Clean Air Plans often plan measures to support public transport, bicycle and pedestrian traffic, parking management, the production of vehicles with less exhaust fumes for the urban transport fleet, speed limits and the introduction of environmental zones to limit traffic in the inner cities. In addition large building projects are also planned which help to relieve the inner-cities, e.g. the construction of part of a motorway, the building of goods' distribution centres and building of tunnels as part of the extension of inner-city rings or the construction of by-passes or arterial roads.

Up to now Clean Air and Action Plans have – as far as is known – been drawn up without SEA. Although there is a "conditional" SEA obligation for "obligatory" Clean Air Plans according to Section 47 Para. 1 BImSchG and Action Plans integrated in the Clean Air Plans, the legal basis for the SEA in clean air planning is interpreted in different ways. Bunge (2007) calls for a further explanation for the SEA relevant regulations in BImSchG and UVPG (Act on the Assessment of Environmental Impacts) comes to the conclusion that in practice many new drafts of Clean Air Plans and Combined Clean Air and Action Plans should undergo a SEA. According to Section 14b Para. 1 Nr. 2 UVPG (European Parliament and the Council, 1985) "obligatory" Clean Air Plans and integrated Action Plans must undergo an environmental assessment when they

- set the framework for the authorisation of projects listed in Annexes I and II to Council Directive 85/337/EEC that require an environmental impact assessment or are required to undergo a preliminary examination,
- set the framework for the authorisation of other projects and probably will have significant environmental effects (This is always to be assumed in the case of Clean Air Plans) or
- must undergo a FFH assessment (Bunge, 2007: 104).

Since Clean Air Plans and Action Plans are sectoral plans, which should protect human health, it must be avoided that the measures foreseen for this do not influence other environmental goods (such as habitats and ground water); the integrated approach of the Clean Air Plan (according to Section 47 Para. 5 Sentence 1 together with Section 45 Para. 2a BImSchG) can be realised best and most simply with the SEA procedure. Thus the implementation of a SEA simplifies the required early determination and management of potential environmental conflicts.

In contrast to this, according to Verwiebe (2008), Clean Air Plans (according to Sections 47 Para. 1, 47a Para. 2 BImSchG) do *not* fall under the user area of the SEA Directive, since they do not make any demands for projects requiring environmental assessments. Also on the practical side there is the view – at least up to now – that Clean Air Plans and Action Plans do not require a SEA. In ten Clean Air Plans investigated from the years 2004 to 2006 a SEA was not mentioned. In newer Clean Air Plans such as the Clean Air Plan for the Ruhr area (Partial Plan West and Partial Plan East from 2008) a statement about SEA justified that a SEA was not necessary since the Clean Air Plan includes no legal planning guidelines for projects in Appendix 1 of the UVPG (Act on the Assessment of Environmental Impacts).

Further reasons for not implementing SEA were given in telephone interviews (see Table 1)[4]:

A. A SEA is not necessary since the measures in the plan do not fulfil the criteria according to Section 14b Para. 1 Nr. 2 UVPG.
B. The timeframe for drawing up a CAP is too short to carry out a SEA as well.
C. There was no valid law requiring a SEA when the planning process started.
D. The measures were not developed for the plan alone but originated within other plans and underwent an environmental assessment there.
E. A well conceived plan is a plan for the environment and thus has no negative effects on other environmental areas.

[3] Particles are described as air-borne particles or fine dust; since other particle sizes are sometimes described with the same terms the use of the term "particle" without a precise size description leads to confusion. PM_{10} are particles under 10 µm, $PM_{2.5}$ are particles with a diameter under 2.5 µm. In addition there are ultra-fine particles of less than 0.1 µm, which are, however, not yet covered by the regulations.

[4] Interview method: Of 61 CAPs, CAP-APs and APs legally binding in May 2007 (see Metto 2007) 10 randomly chosen authorities were questioned, a) whether they had carried out a SEA and b) for which reasons they were *not* carried out. The investigation is explorative and not representative; those questioned are known to the author but remain anonymous.

Table 1
Arguments 'contra' SEA in Clean Air and Action Planning from telephone interviews.

Plan in question	Reason A	Reason B	Reason C	Reason D	Reason E
CAP 2004	X				
CAP 5/05	X	X			
CAP 7/05	X	X			
CAP 7/05			X		
CAP-AP 8/05				X	X
CAP-AP 10/05			X		X
CAP-AP 8/06			X		X
CAP-AP 2006				X	
AP 6/05 + 12/05	X	X			
AP 1/07					X

CAP: Clean Air Plan; CAP-AP: Combined Clean Air and Action Plan; AP: Action Plan.

It is not difficult to contrast these arguments against SEA in Clean Air and Action Plans with reasons *for carrying out* SEA ('Pros' in Table 2). At this point no final judgement about the validity of the arguments can be made. It can be assumed that not all of the reasons for not carrying out environmental assessments would stand up to examination.

A further questionable point in the drawing up of the legal basis for the so-called "conditional SEA obligation" is the differing interpretation of the term "to set the framework". According to Bunge (2006) the term "setting the framework" is not limited to projects obliged to undergo an environmental impact assessment, rather it can be derived from the legal basis that *all* projects are meant, which have a large (negative or positive) effect on the environment. Since Clean Air Plans have to name measures to reduce air pollution the Clean Air Plans also usually lay down "the framework" for projects, which can have a large environmental effect.

On the other hand Verwiebe (2008: 202 et. seq.) interprets the term so that "setting the framework" "does not mean the drawing up of the legal preconditions for authorisation, but rather the production of "facts" which enable the later authorisation of projects obliged to undergo an environmental impact assessment." He negates that the foreseen measures in the Clean Air Plan can have negative effects and that it could come to a "transfer of environmental problems to other locations". Thus the author shows that he obviously does not know of the whole spectrum of possible measures for clean air planning and does not have a well-founded specialist knowledge about likely significant environmental effects of projects.

In the end, the public participation required according to Sections 47 Para. 5 and 5a BlmSchG provides a serious argument to carry out SEA within the elaboration of Clean Air Plans and Action Plans. Public participation should lead to an increase in transparency of the authorities' decisions. Alone *because* it is possible to include active public participation in clean air planning, it is recommended and it possibly shortens the procedure when from the start all likely significant environmental effects of the foreseen measures are anticipated within a SEA and possible conflicts are dealt with *before* a possible escalation.

4.2. Noise Action Plans and SEA

Noise Action Plans (NAP) are new instruments for the implementation of the Directive relating to the assessment and management of environmental noise (Directive 2002/49/EC). They will be drawn up in the next few years mainly in areas affected by traffic noise. Noise Action Plans come under the same conditional SEA obligation as the Clean Air and Action Plans. There are also differing legal opinions here: while Bunge (2007) calls for a wide interpretation of the legal basis, Mitschang (2006) argues that a SEA for Noise Action Plans is only necessary "when due to its establishment in individual cases a framework is set for projects required to undergo an environmental impact assessment." (Mitschang, 2006: 201 et seq.; c.f. Rottmann, 2006) There is also the question about how the term "setting the framework" is to be interpreted with respect to Noise Action Plans.

In contrast to the clean air planning, which according to the BlmSchG must be accountable for an integrated approach to the protection of air, water and soil according to Section 47 Para. 5 Sentence 1 in connection with Section 45 Para. 2a BImSchG, Noise Action Plans are sectoral plans, which serve only to reduce noise at locations that are heavily affected by noise. One measure foreseen by a Noise Action Plan to reduce noise at a particular location, such as the building of a by-pass can, however, affect the environment at another location (Verwiebe, 2008: 204). Finally current knowledge also speaks here for a wide interpretation of the legal regulations: it is only possible to ensure that the measures of a Noise Action Plan do not lead to unacceptable pollution at another location through a SEA procedure.

Also the obligatory public participation in the noise action planning provides an argument for the implementation of SEA. The foreseen public participation in noise action planning extends far beyond a simple "hearing".

It should include four phases:

(1) a hearing in an early stage of planning about the suggestions of the NAP,
(2) a further participation during the elaboration of the plan,
(3) and, after five years, during the assessment.
(4) Finally the public is to be informed about the decisions made.

The results of the public participation are "to be taken into consideration"; if the authorities deviate from the results of the participation they have to justify this (Mitschang, 2006: 197 et seq.). The following is also valid here as in clean air planning: *because* an active public can partake in the noise action planning, the procedural time can be reduced when from the start all likely significant environmental effects of the noise reduction measures are anticipated within a SEA.

Table 2
Arguments 'pro' and 'contra' SEA in Clean Air and Action Planning.

Arguments 'contra' SEA in Clean Airand Action Planning	Arguments 'pro' SEA in Clean Air and Action Planning
A SEA is not necessary since the measures in the plan do not fulfil the criteria according to Section 14b Para. 1 Nr. 2 UVPG.	If one follows the legal opinion of Bunge (2007) the argument is not valid.
The timeframe for drawing up a CAP is too short to carry out a SEA as well.	In order to draw up a Clean Air Plan including environmental assessment at least 22 months are available — a time period, which should suffice.
There was no valid law requiring a SEA when the planning process started.	The plans taken into account here became valid 2–4 years after the amendment of the legal regulations in 2002; there is the question of the validity of the argument.
The measures were not developed for the plan alone but originated within other plans and underwent an environmental assessment there.	The limitation of "double assessment" could be a valid argument.
A well conceived plan is a plan for the environment and thus has no negative effects on other environmental areas.	This argument can be applicable, but does not have to be, as the above-mentioned measures in the Clean Air Plans (for instance planning of a road) allow it to be assumed; without SEA the statement is not verifiable.

5. Conclusions and outlook

To sum up, the state of the implementation of SEA in Germany is judged as ambivalent. The legal implementation is quite far advanced, but remains in some aspects, as shown in the examples, behind the SEA Directive. Some legal regulations are interpreted differently. Most of the experiences with SEA, publications and expert reports exist in spatial and landscape planning on local and regional level. But aside from the non-debateable progress in the work on SEA there are still unanswered questions, especially concerning cumulative effects and the monitoring of environmental effects.

The sectoral planning types are delaying somewhat with the implementation of the SEA. Thus, the current status of the implementation of the SEA Directive can be described as 'work in progress'; too many questions remain unanswered to be able to lean back satisfied with the achievements up to now.

A more intensive debate about the SEA methodology and the SEA practice of other European member states would be particularly profitable for the discussion of open questions. In the meantime several empirical investigations are available on the environmental assessments of plans and programmes in European countries which allow for a comparison on a very abstract level (see e.g. Dalal-Clayton and Sadler, 2005; Fischer, 2006, 2007; Jones et al. 2005; Sadler et al. 2008). On the other hand, SEA procedures *in* European countries are documented, e.g. in Great Britain (see Aspinwall, 2005; Sadler et al. 2008; Therivel, 2004; Therivel and Walsh, 2006; Therivel and Wood, 2004). But there can be identified a 'missing link': methodical comparisons of SEA methods more in detail could help to identify not only common questions, but also common solutions. Even when the planning processes differ between the EU Member states — the SEA procedures should have obtained a uniform standard through the SEA Directive and must be set out in a similar fashion. In addition similar methodological questions have to be solved in the SEA process since e.g. the 'likely significant environmental effects' of the implementation of plans basically throw up similar questions throughout Europe.

In addition there are some topics, which have only been touched upon up to now and which are not yet reflected in the SEA practice. The consideration of the likely significant environmental effects on the *biological diversity* occurs in practice mostly using a species inventory, target or key species and/or habitats. In this way, however, the complex concept of biodiversity is not fulfilled, since in order to operationalise biodiversity for planning interests it is also necessary to consider ecosystem and functional interactions, according to Jessel et al. (2008). Additionally the development of a spatial–functional comprehensive concept and a target species concept agreed throughout the country is necessary, which extends beyond current area and species protection.

Climate change can be seen as a typical cumulative environmental effect; it results through the coming together of many individual factors. Since in many areas, also in spatial and environmental planning, appropriate answers must be found to climate change, the question also has to be asked, which role can SEA play in climate change? How far can SEA contribute to a mitigation of negative effects of climate change, and how far can adaptation measures be planned with the help of SEA? In Germany this is still little heard (Heiland, 2008; Schomerus et al. 2008). In Great Britain management guidelines exist for practitioners with respect to dealing with climate change (e.g. Land Use Consultants, 2006) — a first step, but the complex interactions between the portrayal of plans and climate change are not penetrated by this. The question about dealing with the effects of climate change in SEA throws up the question as well about how risks can be dealt with that are brought about by climate change. The effects of climate change do not only have destructive extents that are difficult to predict, but they also occur with a probability that is very difficult to determine and affect societies or social groups with differing vulnerability or resilience. In the near future there are exciting questions to be answered, which require an understanding of social–environmental interactions in complex systems, and appropriate models and methods. Co-operation between research and practice is required here.

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