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# Integrating Environmental Considerations into Transportation Planning through Strategic Environmental Assessment

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## ABSTRACT

The present article analyzes the concept of strategic environmental assessment (SEA) and its role in the development of local transportation strategies and plans, investigating how SEA acts as an effective tool to integrate environmental issues into transportation planning. The paper provides local authorities with useful advice on how to comply with the European and national legislation requirements in the environmental permitting process for transportation plans. At the same time, it points out useful information for practitioners in the field of the strategic environmental assessment in the elaboration of the Environmental Report, as the key factor in SEA procedure.

## 1. INTRODUCTION

Strategic Environmental Assessment (SEA) is a systematic, pro-active and participative process aiming at a high-level integration of the environmental aspects into planning and decision making beyond the project level.

One of the most important development goals of the modern world is to succeed in building environmentally friendly societies, but even in the western countries, local administration still faces challenges of effectively incorporating environmental considerations into their planning systems. An efficient planning system should produce a balanced and transparent relationship between the economic, social and ecological interests. In order to legally ensure the planning systems within the European Union meets these requirements, the Council of the European Union adopted Directive 2001/42/EC (the SEA Directive) on the assessment of the effects of

certain plans and programmes on the environment, a procedure meant to document environmental interests more thoroughly [1]. The need for SEA appeared as a reaction of the disillusionment in the ability of the Environmental Impact Assessment procedure at project level (project EIA), which, although widely accepted as an useful tool in decision making, reacts extremely late to development proposals, after fundamental decision have been taken and resulting thus in a decrease of the number of possible alternatives to be considered and analyzed [2]. Thus, in order to stimulate an environmentally oriented decision making, from policy to projects, an environmental assessment at policy, program and plan level appeared to be more and more stringent. From this perspective, SEA has been evolving as a mechanism that attempts to assess systematically the environmental impacts of decisions made at what it conventionally called levels of strategic decisions [3, 4]. SEA is a systematic, on-going process for

evaluating at the earliest appropriate stage of publicly accountable decision making, the environmental quality and consequences of alternative visions and development intentions incorporated in policy, planning or programme initiatives, ensuring full integration of relevant biophysical, economic, social and political considerations [5].

The paper provides local authorities with useful advice on how to comply with the European and national legislation requirements in the environmental permitting process for transportation plans. At the same time, it points out useful information for practitioners in the field of the strategic environmental assessment in the elaboration of the Environmental Report, as the key factor in SEA procedure.

## 2. STRATEGIC ENVIRONMENTAL ASSESSMENT – THEORETICAL AND PROCEDURAL APPROACH

SEA refers to „a preliminary process for reviewing and evaluating policies, plans and programs as well as other draft proposals for large-scale projects and initiatives” [6] with the aim of assessing the foreseeable impacts they may have on the environment and thus facilitate their integration in the decision-making process. This is a rapidly developing field of research and practice that has become increasingly formalized since the early 1990s, and which may facilitate sustainable development [6, 7].

The fundamental objective of SEA is to integrate the environmental and sustainable development aspects in such a way that they become a central concern of the process of formulating policies, plans and programs with respect to land-use planning and development. Unlike the traditional process of Environmental Impact Assessment (EIA) dealing with specific projects, the SEA process takes place at the strategic planning and decision-making stage. Thus, SEA has three specific objectives [6, 7]:

- to promote sustainable development;
- to identify the cumulative, induced, synergic and global impacts;
- to rationalize the environmental assessments of specific projects.

The SEA Directive entered into force in 2001 and obliged the member states to implement its contents by July 2004. In Romania, the directive was implemented through GD 1076/2004 regarding the environmental assessment for plans and programs. The provision of the SEA Directive is mainly of a procedural nature, meaning that the Directive rules the procedural steps, requirements and consequences. Participation and consultation rights deserve a special attention in this context. The SEA Directive consists of 15 articles and two annexes, its main purpose residing in ensuring that environmental consequences of certain plans and programmes are identified and assessed during the

preparation stage and before they are adopted. The key element in SEA is the Environmental Report, a document in which the likely significant environmental effects of implementing the plan or the programme and the reasonable alternatives taking into account the objectives and the geographical scope of the plan or programme, are identified, described and evaluated. The information to be included in the Environmental Report is listed in Annex I to the directive and includes, among other things:

- the environmental objectives relevant to the plan or programme;
- the relevant aspects of the current state of the environment (biodiversity, population, human health, soil, water, air, cultural heritage, landscape etc.);
- the assessment of the likely significant effects on the environmental factors;
- analysis of the alternatives;
- the proposed mitigation measures;
- aspects regarding plan implementation monitoring.

Another important element in SEA is public consultation, as the Directive requires that the public and the authorities likely to be concerned by the environmental effects of implementing a plan or a programme are to be consulted. The purpose of the consultation process is to contribute to a more transparent decision making and to ensure that the information supplied for the assessment is reliable and comprehensive.

Experience and practice demonstrate that SEA is not a substitute for project EIA, but rather a complement to it. The added value of a SEA process can be summarized as follows [5]:

- *helps* to incorporate the principles of sustainable development in the decision making process and in the process of formulating policies, plans and programs;
- *contributes* to the development of a context in which the economic, social and environmental dimensions are integrated into the process of formulating policies, plans and programs;
- *facilitates* a sequential programming of environmental actions;
- *provides* a better context for the assessment of cumulative, induced, synergic and global impacts;
- *provides* a scoping context for the EIA of specific projects;
- *makes it possible* to anticipate the potential impacts at the project scale, and thus to improve the subsequent EIA of specific projects

## 3. CASE STUDY: THE ROLE OF SEA IN TRANSPORTATION PLANNING

Transportation planning is perhaps better equipped to face the challenges posed by Strategic Environmental Assessment (SEA) than other

development sectors. However, it faces many unique challenges due to its heavy reliance on quantified modelling techniques and cost benefit analysis. This has often led to the understanding of the problem and the objectives being somewhat secondary to the pursuit of pre-defined solutions promoting particular interests.

SEA is also being introduced at a time when the forces for change in transportation planning are evident and perhaps in some countries have begun to decline as the need for quick solutions becomes more imperative. Nevertheless, a cultural change is taking place. While individual countries have adopted different approaches to transportation planning, the basic elements tend to be similar, although some models may operate on more of a bottom-up than a top-down approach. Given the common elements, SEA is able to be easily fitted into the rational transportation planning model.

At the same time, as transportation planning often operates at a variety of planning scales, it is imperative that SEA does not introduce additional burdens that may further delay the development in transportation infrastructure and services that are needed. Indeed, it should be set out to reduce the burden and improve the efficiency of the decision making process by providing decision makers and the public with meaningful information about the trade-offs to be made.

The major benefits of the SEA in transportation planning is related to the fact that the environmental assessment in transportation planning at project level analyzes a single project, whereas the transportation plan or strategy is not the object of an Environmental Impact Assessment procedure and thus issues of less polluting modes of transportation are not brought into analyze and the only alternatives to be considered remain in fact the road possible routings.

SEA in the transportation sector is conducted at different administrative levels of decision making:

- SEA at policy level: assessing strategic options in a cross-sectoral manner with respect to the achievement of overall environmental and broader sustainability aims and objectives;
- SEA at plan level: evaluating network and corridor options in terms of an overall identified need;
- SEA at programme level: ranking of possible infrastructure projects in terms of benefits and costs.

Taking into consideration the requirements of the SEA Directive and the specificity of the transportation sector, main aspects that should be taken into consideration in the elaboration of the Environmental Report for a SEA in the transportation sector are as follows:

- description of the transportation strategy/plan (objectives, interrelationships with other plans, traffic forecasts etc.);
- scenario analysis (description of all considered alternatives and reasons for selected one

(system-alternatives, site-alternatives, design-alternatives);

- sustainable development and environmental protection objectives (justification of the project, established objectives for each environmental factor considered relevant for the strategy/plan, indicators, targets, environmental quality standards);

- description of the state of the environment in the absence of the analyzed plan (environmental assessment of the current planning area, likely evolution of the environment and of the human health in the absence of plan implementation);

- environmental effects of the current traffic network (current network and current evolution);

- environmental effects of the new traffic network including all the projects (identification of the relevant environmental factors, establishment of the most appropriate environmental assessment methodology, identification of all likely significant impacts, positive and negative, direct and indirect, cumulative or synergic, identification of the best mitigation measures, identification of the conflicts between environmental and other interests etc.);

- monitoring (objectives, indicators, temporal requirements, responsibilities, remedial actions in case of unforeseen adverse effects, measures to monitor the transportation network on various planning stages);

- non-technical summary;

- recommendations (for decision-making process and for traffic planners).

As regarding the targets to be followed in SEA transportation strategies and plans, they are usually established at country level and differ from one country to another. Some relevant examples are shown in Table 1.

The scenario analysis should be undertaken in relation with the proposed objectives, which should be at least the following:

- maintain and enhance air quality;
- minimise land use;
- minimise impact on protected areas and conserve biodiversity;
- reduce noise impact;
- minimise impact on landscape (fragmentation, visual impact);
- efficiency of the proposed mitigation measures.

The impact categories are also to be established by specialists, but the most used key performance are:

- positive – negative – neutral;
- minor – major;
- short – medium – long term;
- direct – indirect – synergic.

As regarding the assessment of the environmental effects of transportation strategies or plans, a proposal for the main issues to be approached is set out in Table 2.

Table 1. Environmental targets followed in SEA for transportation plans in various European countries.

Country	Environmental targets followed in SEA for transportation plans
Finland	<p>Integration of environmental considerations into the preparation of transportation system plans with the aim to reduce growth of transportation, to maintain the market share of environmentally sustainable modes of transportation and to decrease the adverse environmental impacts of transportation.</p> <p>Maintaining transportation-related greenhouse gas emissions at the level of year 1990.</p> <p>Reduction of NOx and VOC emissions from road, air and rail transportation by approximately 75 % by 2010 in comparison with the level of 1990.</p> <p>Reduction of particulate pollutants from road transportation and minimisation of adverse effects on health.</p> <p>Prevention of new traffic noise pollution and reduction in exposure to traffic noise.</p> <p>Reducing the number of people living in areas where daytime traffic noise level exceeds 55 dB by at least 20% by 2020 compared to 2003.</p> <p>More efficient use of natural resources in land and water engineering and prevention of waste and surplus of soil generation.</p> <p>Prevention of water and soil pollution by minimising entry of transportation-related hazardous substances into the environment.</p> <p>Investigation and processing of previously contaminated soil and sediments.</p> <p>Protection of marine environment by minimising the risks of transportation related hazardous substances, vessel traffic substances and spreading of alien species through vessel traffic ballast waters.</p> <p>Preserving natural diversity in the planning and implementation of transportation infrastructure projects.</p>
United Kingdom	<p>Enhance natural and built resources and minimise negative impacts on landscape, biodiversity, heritage and built environment.</p> <p>Minimise pollution of fresh and marine surface waters and groundwater.</p> <p>Avoidance of exposure to levels that endanger health or quality of life.</p> <p>Protection against recognised health risk for air pollution.</p>
Austria	<p>Reduce greenhouse gases, air pollutants and energy consumption.</p> <p>Minimise land use.</p> <p>Minimise impact on areas.</p> <p>Minimise impact on protected areas.</p> <p>Minimise impact on recreation areas.</p> <p>Reduce noise impact.</p> <p>No risk to important water resources.</p> <p>Minimise impact on landscape.</p> <p>Minimise fragmentation on areas.</p> <p>No exceeding of impact limits.</p>
Germany	<p>Reduction of transportation costs.</p> <p>Reduction of travel times.</p> <p>Improvement of safety.</p> <p>Improvement of spatial structure.</p> <p>Improvement of environment.</p> <p>Conservation of nature and landscape.</p> <p>Promotion of other benefits outside the traffic system of inland waterways for water supply.</p>

Table 2. Issues to be approached in the assessment of the environmental effects of transportation strategies and plans.

<b>Relevant environmental factor</b>	<b>Variables that may cause environmental problems</b>	<b>Indicators showing the current environmental condition</b>	<b>Indicators describing likely environmental effects</b>	<b>Mitigation measures</b>
Biodiversity	Deterioration of the living environment (fragmentation or partial sealing of habitats, soil, water, air, noise etc.)	Number of endangered species	Remaining habitat areas capable of carrying the population with the existing biodiversity	Compensatory areas, bridges-tunnels for animals, noise barriers, collection of eluates Modal shifts Speed limitations Access restrictions to some sensitive areas
Population and human health	Number and type of vehicles passing by, emission, acoustic quality of the infrastructure	Persons affected by certain imission levels	Changes of the exposure	Modal shifts Speed limitations Access restrictions to some sensitive areas
Soil/substrate	Usage for infrastructure Eluates Triggering of some slope processes	Soil usability Geological parameters	Changes of soil usability Geological parameters	Collection and treatment of eluates Minimise soil usage Minimise topographical interventions
Air	Emissions Infrastructure as wind shield	Immissions Exceeding threshold	Deteriorated air quality	Planting vegetation Allow air exchange
Water	Usage for infrastructure Eluates	Water quality standards	Deteriorated water quality Depletion of fresh water	Proper collection and treatment of the eluates
Cultural heritage	Sealing Deconstruction Vibration Acid rain	Number, state and size of archaeological sites which the plan/strategy interferes with	Reduction/damage of archaeological sites	Preserving archaeological heritage sites Decoupling of vibration
Landscape	Build infrastructure	Visual quality	Deteriorated visual quality	Adequate architecture Adopt techniques to screen road infrastructure from sensitive sites (tourist attractions, recreation sites)

#### 4. CONCLUSIONS

Although at the beginning Strategic Environmental Assessment was considered a generalised variant of the Environmental Impact Assessment at project level, the integration of the environmental concerns into the decision making process has led to a much more complex view. Rather than being an assessment of a given policy, programme

or plan, in many countries SEA has become a part of the plan making. This way, SEA will have a significant impact at a strategic level, but this demands a strong commitment to sustainability goals on the behalf of decision makers. As regarding the strategic view in transportation planning, it means dealing with all transportation modes together, with infrastructure and non-infrastructure, soft and hard measures in order to achieve good management mobility.

## 5. ACKNOWLEDGMENTS

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