

DEVELOPMENT AND ASSESSMENT OF DEVELOPMENT STRATEGY ALTERNATIVES IN STRATEGIC ENVIRONMENTAL ASSESSMENT

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Abstract: Development and evaluation of alternatives is a key process in the strategic environmental assessment (SEA), which enables improvement of the environment, informed decision-making, greater transparency and better opportunities for public participation. It is also the most challenging part of the assessment, because the alternatives are often avoided or considered to the extent to meet the legal requirements. The absence of alternatives in the assessment process significantly diminishes the contribution of SEA to the environmental protection system. The paper will outline the generally applicable methodology for the development and assessment of alternatives in the SEA process, on the example of the Development Strategy of the City of Solin, which is based on the development of the environmental alternative, which significantly contributes to the development of sustainable strategic solutions.

Keywords: strategic assessment alternatives, environmental alternative, environmental assessment, environmental report

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1. INTRODUCTION

The Strategic Environmental Assessment (hereinafter referred to as SEA) is an analytical instrument, which through the integration of environmental protection requirements into the strategies, plans and programmes of a particular area, forms the basis for promoting sustainable development ([Environmental Protection Act, Official Gazette 2013., 2015., 2018.a and 2018.b](#)). Since the concept of sustainability is a critique of current policy-making practices and trends (strategies, plans and programmes), in its essence it entails the obligation to create alternatives that in the long term will be more sustainable and attractive to preserve ecological stability, and ultimately the well-being of people ([González et al. 2018](#)). The obligation to identify, describe and evaluate the likely significant impacts of reasonable alternatives of a strategy, plan and program on the environment is also legally regulated through the Regulation on strategic environmental impact assessment of the strategy, plan and programme ([OG of the Republic of Croatia 3/17](#)) as well as the Strategic Environmental Assessment Directive ([Directive 2001/42 / EC](#)).

The Guidelines on the Developing and Assessing Alternatives in Strategic Environmental Assessment ([González et al. 2018](#)) establish it as the key process in the environmental impact assessment, which is iterative and starts already in the scoping phase (**Figure 1**).

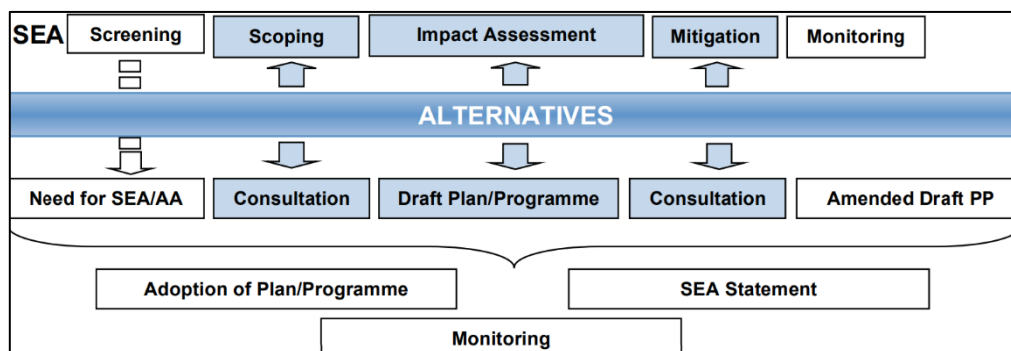


Figure 1. Consideration of alternatives during particular stages of the SEA procedure ([González et al. 2018](#))

The purpose of development and evaluation of alternatives is to find the most sustainable approach to meeting the objectives of the strategy, plan or program proposal, which is done in two ways: by maximizing the benefits for the environment, and by reducing or avoiding a potentially significant negative impact generated by the implementation of the documents under assessment (DEAT 2004).

Only by the development and comparison of alternatives can the information about the likely impacts be obtained that will enable decision-makers to determine which would be the most acceptable (optimal) way of achieving strategic goals by making trade-offs between biophysical, social, economic, historical, cultural and political factors, thereby achieving sound decision-making based on the principles of sustainable development (DEAT 2004).

Moreover, documenting the impacts of all variants and decision-making processes leads to the acknowledgement that policy decisions are shaped, channelled, learned, reasoned, and structured before they are „officially made” (Stinchcombe & Gibson 2001).

Alternatives should be developed using a structured and transparent approach, and can be framed around one or several themes (González & Therivel 2014):

- strategic (high-level options that achieve a given objective)
- values-oriented (addressing policy priorities, cultural values or safety issues)
- effects-oriented (addressing the sources of any potential impacts identified during scoping)
- sectoral (formulated to address sectoral feasibility and needs or to promote one sector versus another)
- spatial (location options for the implementation of planning policies and/or objectives)
- modal (technologies/methods for achieving the same objective)
- temporal (timing of implementation of plan measures)

SEA Effectiveness Reviews in many EU countries (e.g. Ireland (EPA 2012), Germany (Geißler et al. 2019) have shown that the development of reasonable alternatives is one of the greatest challenges of the process. The following problems mentioned in the Reviews, are without exception also encountered in Croatian practice:

- higher-level plans can constrain the alternatives available for consideration in lower-level plans,
- alternatives for higher-level plans may be theoretical and academic because of the level of detail available,
- some alternatives being considered are purposely unrealistic and are put forward only to satisfy the requirements of the SEA Directive,
- alternatives are often developed retrospectively,
- political requests and instructions can limit the scope for developing alternatives,
- environmental reports justify why variants have not been considered at all.

The absence of alternatives and the documentation of their development process significantly diminishes the importance of strategic assessment in the environmental protection system, since in the Republic of Croatia, the measures to reduce the negative impacts arising from the SEA are basically optional for the proponent, i.e. decision makers.

Many countries have issued methodological guidelines for conducting strategic environmental assessment, which include the development and impact assessment of alternatives. While administrative implementation is clearly described through legislation and guidelines in Croatia, the methodology in the strategic process is left at the discretion of SEA practitioners. This paper therefore constitutes a contribution to the methodology in the part of development and evaluation of alternatives.

The main objective of the paper is to present the process of reasonable variants development, in situations where the alternatives have not been specified either by the draft document under assessment or by the scoping report, and finally, to determine the degree to which the process contributed to the way in which environment is treated by the document for which SEA is being conducted.

2. MATERIALS AND METHODS

The procedure of preparation and assessment of alternatives is demonstrated on the example of the strategic environmental assessment conducted for the Development Strategy of the City of Solin by 2025 (Official Gazette of the City of Solin 8/20) (hereinafter: The Development Strategy). The Development Strategy originally did not comprise alternatives, making their development the task of SEA practitioner in the procedure of preparation of the SEA report.

Since the reasonable alternatives represent diverse ways of addressing significant environmental protection issues, i.e. ways to achieve the objectives set by the document under assessment, in order to be able to ensure the comparability of the assessment, the alternatives also have to correspond to the scope and level of detail of the document under consideration. It was therefore essential to analyse in detail the structure and contents of the Development Strategy.

The analysis of the structure in the greater context regards establishing the position of the document in the vertical and horizontal hierarchy of documents in reference to its purpose, that is, its relevance in approval process

for the implementation of other documents or projects. In such a way, the appropriate level of detail of information comprised in the reasonable alternatives is established, which will further be reflected on the level of detail of the assessment in the following steps of the procedure.

By the analysis of the structure, that is the organization of the document, it was determined which elements of the environment may be affected and in what way. The way the individual elements were formulated and how they interacted as a part of a functional unit was identified. Generally, the analysis of the structure should answer the following questions:

- What is the smallest unit of the document concerned that can affect the environment?
- How does it relate to the other elements of the document (e.g. whether it depends on the hierarchy or not)? and
- Which is the smallest piece of information that may be used to determine the intensity of the environmental impact, when determining the magnitude of the impact?

The Development Strategy initially comprised the development vision supported through three general objectives with appertaining priorities as per individual sectors. In addition, measures were formed for each individual priority. Quantitative or qualitative outcome indicators with initial and target values were attributed to every objective, priority and measure, intended to serve as the criteria for regular monitoring and control of the Development Strategy implementation. The outcome indicators of measures, formulated as specific development activities, were identified as the smallest unit of the document that can affect the environment. It was therefore established that the alternatives have to rely on the hierarchy of indicators for the achievement of the vision established as: the measure → priority → goal → vision. The initial and target values of such indicators reflect the intensity of change, and represent the key factor in determining the significance of impact. Upon the analysis of the structure of the document, the next important steps in development of reasonable alternatives were to analyse the content of the Development Strategy and its likely environmental impacts.

The analysis of the content of the Development Strategy resulted in insights into how the document was taking into account environmental issues with a focus on existing environmental problems, and in relation to the environmental protection objectives established by international treaties and agreements, as well as other strategies, plans and programmes.

Furthermore, the proposed development solutions were screened for their genuine need or demand, or justification for their implementation, and subsequently whether environmental issues were properly prioritized, given the severity of their consequences and the requirements of the hierarchy of documents, as well whether the proposed solutions respected the latest insights into existing environmental measures and procedures, and whether the proposed sites were suitable for development with respect to environmental sensitivity (where applicable).

In parallel with the content analysis, the impacts of the solutions of the Development Strategy were assessed in reference to the existing environmental conditions ("null variant", i.e. the "do-nothing" alternative), and whether it was possible and in what manner, to amplify the effects of positive impacts, or to diminish the negative ones.

The main objective of document content analysis and its impacts was to identify the "missed opportunities" for improving the environmental conditions, then, to identify the parts of the document that, individually or cumulatively, were likely to cause significant negative or positive impacts on any element of the environment, as well as those the impacts which were conditional, that is, which may be negative, neutral or positive, depending on the circumstances of their implementation.

By structuring the results of the content analysis and its environmental impacts, a window was opened to significantly improve the Development Strategy by modifying the development solutions, which included:

- eliminating the solutions, the negative impacts of which could not have been mitigated by measures,
- change of approach in meeting the needs or demands (e.g. traffic congestion - construction of a new road vs. stimulation of the use of public transport),
- changing the priorities in response to the demand of the situation (e.g. tourism growth - construction of drainage and wastewater treatment systems vs. investment in tourist attractions),
- change of capacity, target values, locations, implementation time, etc. to minimize negative and / or amplify positive impacts,
- incorporating solutions that would maintain stable the present state of the environment or improve it,
- conditioning the implementation of specific activities, by conducting previous research, development of analyses, studies, protocols, etc. (for which no EIA is prescribed by law).

The process resulted in the creation of an "environmental alternative", which was based on the integration of all the proposed development solutions aiming at improvement of the existing the state of the environment. In this way, the environmental objectives of the environmental report have become fully integrated into the objectives of the Development Strategy.

The environmental alternative and the documented process of its development (impact assessment), was established as the option with maximum possibilities for preserving and improving the environment, which at the same time revealed the likelihood of negative implications of the implementation of the initial draft of the Development Strategy. Upon its presentation to the stakeholders, the environmental alternative was used as the

foundation for the discussion on aligning the stakeholders' interests, i.e. balancing their desires and needs when faced with limited environmental capacity. Through the process of interest coordination, during which the strategic framework was repeatedly changed, in cooperation with the developers of the Development Strategy, a new, in this case, the final, "alternative of an equitable development" was formed, which incorporated most of the proposals from the environmental alternative.

The final step of the strategic assessment was to test the alternative of equitable development against the environmental objectives of the environmental report, which resulted in environmental protection measures to mitigate its negative impacts, conceived to serve as a guidance at the project level. By including these measures in the final alternative, the final version of the document for public consultation was prepared.

3. RESULTS AND DISCUSSION

The strategic assessment process, with the development of alternatives and documentation of the whole process, was made possible by the positive cooperation of the SEA practitioners, the Development Strategy developers, the competent authority and the decision-makers from the very beginning of the preparation of the document. All the stakeholders mentioned agreed that the final document, which was created on the basis of the alternative of an equitable development, was significantly improved compared to the initial draft of the Development Strategy, as shown on **Figure 2**.

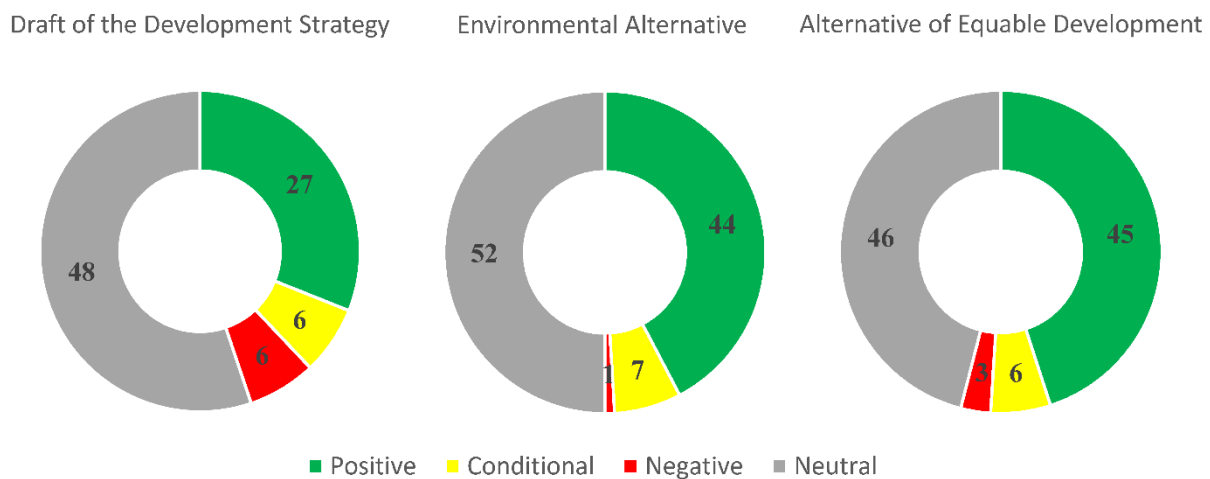


Figure 2. Comparison of alternatives with respect to the number of identified environmental impacts according to their course of action

Although the presentation of quantified impacts of alternatives is only informative, since it does not show their full intensity, scope and duration, it may nevertheless give us an impression on the improvement the equitable development alternative made as regards the initial draft of the Development Strategy. The improvement is not only measured by the reduced number of development solutions with negative impacts and mitigated negative impacts (by 50 %), but also by the introduction of a new environmental protection priority, and the integration of a series of measures and development activities targeted at environmental and nature protection into all other priorities, which consequently significantly increased the number of positive impacts (by 40 %).

It is certain that the contribution of customary impact assessment that results only with mitigation measures, without the process of developing and comparing alternatives, to the environmental protection system would be considerably smaller.

In the process of strategic assessment, the decision maker was unwilling to give up or find a compromise for some of the indicators, for which the likely significance of negative impacts had been identified, and for which mitigation measures were proposed by the environmental alternative. Such political decisions are legitimate, and made transparent through the environmental report where decision-making process is recorded as the evidence that the decision maker was well aware of the implications at the time of the decision. Also, that way the public participating in the process is given all the information available at the time, which adds to the extraordinary value of this procedure.

Based on the conclusion of all the stakeholders that the SEA procedure conducted for the Development Strategy presented in this paper significantly contributed to the improvement of the environmental protection system in the City of Solin, the methodology for the development and assessment of the environmental impact of the development strategy alternatives in the strategic assessment has been established in the text below (**Figure 3**).

The methodology involves a two-stage analysis and consists of several steps:

1. Initial analysis of the structure, content and impact assessment of the proposed document on the environment, i.e. with respect to the null variant of the plan or the do-nothing alternative (V0),
2. Forming the most environmentally sound alternative within the structure and objectives of the document being evaluated, and integrating in the draft document modifications that reflect the maximum conservation and improvement opportunities for the environment,
3. Development of one or more new variants in the process of aligning stakeholder interests with biophysical factors, based on the documented development process of the alternative most favourable for the environment,
4. Deciding on the selection of the final alternative,
5. Conclusive assessment of the environmental impact of the final alternative, which results exclusively in measures to be used as guidelines for reducing negative impacts at a lower level,
6. Preparation of the final document by including mitigation measures into the selected alternative.

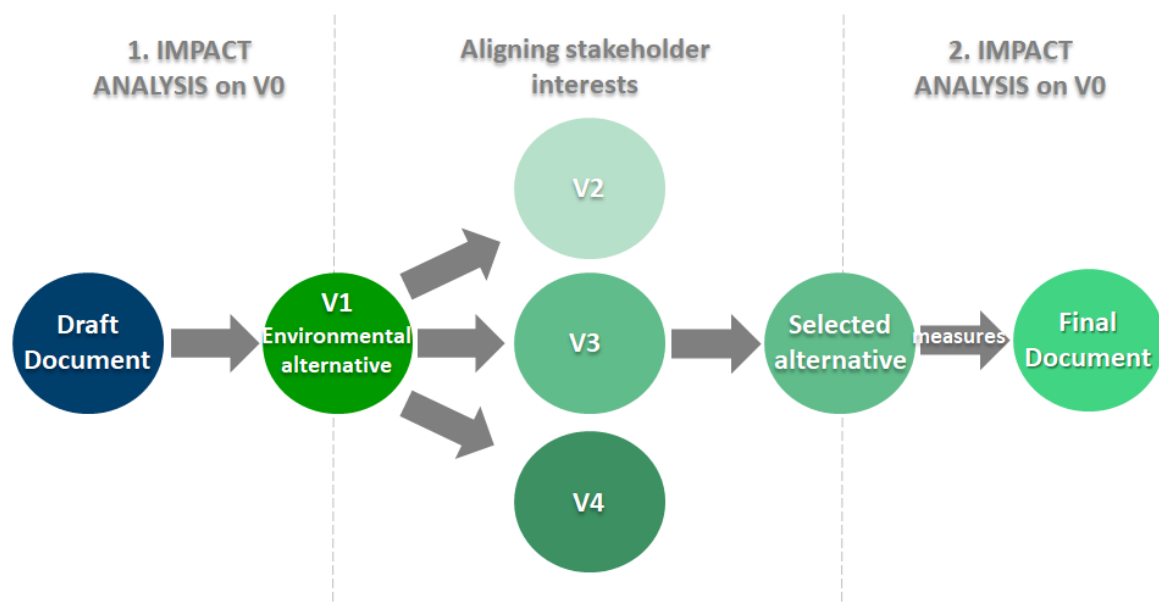


Figure 3. Development and assessment of impacts of the Development strategy alternatives in strategic assessment

Since it is intended that the decision makers used the environmental alternative as the background document in reviewing the interests of various stakeholders, documenting the process and development of an environmental alternative proves to be crucial in the process. Thereby, the quality of the final document will also depend on the quality of data used in the assessment, interpretation of impacts and creating the environmental alternative development solutions. In the past work, the problematic part of the impact assessment has been identifying the information that is used to determine the intensity of environmental impact, without which it is difficult to make a valid impact assessment, and consequently, the creation of alternatives.

In the case of the Solin City Development Strategy, this was simple because all the outcome indicators had an assigned initial and target value, however often documents of the same type do not contain this information. In such situations, the level of uncertainty of the estimate is very high, quality of the final results may be compromised, and the alternatives are mostly not considered.

Documenting the process of assessment and developing the environmental alternative builds the framework for environmental protection aimed actions, through which environmental improvement options, that would otherwise go unnoticed, may be put forward, and the alternatives for individual solutions with greater environmental benefits, opportunities for economic use of neglected natural resources in conditions of their maximum conservation, etc. may be identified. On the other hand, harmful consequences of implementation of certain proposed solutions or sets of solutions are described, and environmentally friendly alternatives are proposed, if possible. In view of the above mentioned, it is important to emphasize that other reasonable alternatives, potentially developed on the basis of the environmental one, need not to be further evaluated before selecting the final one, since through the process described all the implications are already known. The final impact assessment results in measures to mitigate the negative environmental impacts of the selected alternative which, in relation to the procedure described earlier, have no strategic significance.

Regardless of the alternative selected, all the information remains permanently recorded in the Environmental Report, which by presenting detailed information on likely positive and negative implications of implementation

of policies, directly ensures transparency of the process which may, consequently, stimulate a more significant involvement of the public in environmental issues.

Also, the procedure is sufficiently general and simple that it can be applied in a broader context, at other levels and for other types of documents, using other assessment tools. Thus, in the process of drafting a spatial plan, the environmental alternative for the layout of e.g. tourist zones may be easily created by using spatial multicriteria analysis tools. The environmental alternative, in the form of a high suitability environmental map for the arrangement of tourist zones, will further serve as the basis for balancing the interests of other stakeholders, i.e. the development of other reasonable alternatives.

4. CONCLUSION

In case the development of alternatives is the task of the SEA practitioner, creating an "environmental alternative" has proved to be an effective approach to presenting all the positive and negative environmental implications of a document under assessment, and consequently an excellent background for further discussion on adopting sustainable development solutions.

Given the fact that the inclusion of strategic assessment findings in a draft document is not compulsory in the Republic of Croatia, and that most projects comprised in the strategic level documents are subject to environmental impact assessment, it is evident that mitigation measures resulting from the customary impact assessment of project-level interventions on the strategic level contribute only to a smaller degree to the environmental protection system, while the true value lies precisely in the process of development and acknowledgement of alternatives.

The approach to strategic assessment in which the assessed document is addressed as an integral issue, rather than a collection of individual projects for which the environmental protection measures are prescribed on the project level, shows that the concept of strategic environmental assessment can be moved away from the concept of environmental impact assessment at the project level, and that in this way it may significantly contribute to the state of the environment at the strategic level.

The limiting factor in performing a high-quality environmental assessment and the possibility of development of alternatives is also the quality of the structure of the document for which SEA is being conducted. Therefore, it is highly recommended that during the preparation of strategies, programmes and plans, indicators based on the initial and target status be considered for all planned activities within the given planning period.

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