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LANDSCAPE PLANNING FRAMEWORK IN THE ENVIRONMENTAL ASSESSMENT – LINKAGES AND MUTUAL BENEFITS

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Abstract

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Landscape planning instruments represent one of the most comprehensive planning mechanisms of landscape protection and development. At present, it is undergoing change due to new EU requirements towards sustainable development. In this context, implementation of preventive systems can be made considerably easier and can be coordinated with the help of landscape planning instruments and methods.
The article is intended to deal with possible linkages and co-ordination aspects between environmental assessment processes and landscape planning instruments. After a short introduction the rational and potential mutual benefits of both tools are explained considering their interlinks. Best practices and experience in EU member states are then described.
A special attention is given to analysis of landscape-ecological planning methods that can be helpful for environmental assessment processes. Finally, suggestions and recommendations for beneficial contribution of landscape planning framework to environmental assessment procedures have been explored.

Key words: landscape planning, environmental assessment, linkages and benefits, landscape-ecological planning methods and instruments

Introduction

Landscape/landscape-ecological planning usually represents a spatially relevant planning and management tool that can be understood as a basis of sustainable landscape development. Several landscape planning instruments in Europe are being applied based on different historical development context, planning and management traditions, background approaches and decision-making processes. They mostly differ in focus and contents. Many of them has ratified European Landscape Convention that defines landscape planning as "strong forward looking action to enhance, restore or create landscapes".

Landscape planning is frequently closely related to optimal and efficient distribution (allocation) of various land use based on landscape ecology conditions. Such spatial organisation of landscape results in a proposal for most suitable localisation of required human activities within a given territory and, also, in a proposal of necessary measures ensuring the ecologically correct operations of those activities in a given space. But in others, landscape-ecological planning is mainly focused on landscape character and landscape scenery or predominantly on cultural heritage and nature protection.

Landscape planning is nowadays undergoing change due to new requirements. Its previous main task of controlling spatial uses and the development of nature and the landscape has extended. Implementation of several European requirements (e.g. Natura 2000 network, the Water Framework Directive (WFD), the Floods Directive, Environmental Impact Assessment (EIA) and Strategic Environmental Assessment (SEA) can be made considerably easier and can be extensively supported with the help of landscape planning instruments and methods.

Regarding the sustainability as the new development concept the coordination of development proposals in order to reach or at least to come close to sustainable development is an obvious challenge. In this respect environmental assessment systems (EA further) can play an important mutual role.

The co-ordination of landscape planning and EA is understood as the inevitable condition for acceptable development and an important opportunity for enforcing approaches leading to sustainable development in the decision making process.

This can be achieved by several instruments when integrating into environmental assessment processes (Belčáková, 2001; Izakovičová et al., 2006). Application of the individual landscape planning instruments and methods in both – environmental impact assessment at project level and strategic environmental assessment at strategic documents level – can provide for a good database.

This paper is focused on pointing out the "added value" and potential benefits of linking EA processes with landscape planning instruments with a special accent to landscape ecology methods and techniques that can take place. In addition, it provides a summary of the experience in this field so far. This knowledge implies also conclusions and recommendations.

After introduction there is the theoretical part with the explanation of the relationship between EA and landscape planning, key issues of concern, what do they have in common, what are the potential benefits and overlaps of this link and how their combination contributes to an improved decision making towards sustainable development.

A special attention is given to landscape-ecological planning methods and techniques to be applied in environmental assessment procedures. Furthermore, it gives a summary of practical experience in this field based on available reference as well as on a number of published case studies and on personal experience. They are followed by the conclusions and proposals for future developments and future research.

Methods

Environmental assessment is the environmental management instrument which considers and evaluates environmental effects of decisions that are taken into account before these decisions are made. It can be undertaken for individual projects (Environmental Impact Assessment – EIA) and for policies, plans and programmes (Strategic Environmental Assessment – SEA).

EA can deliver environmental improveness and raise environmental awareness having a potential to reduce the negative and enhance positive environmental impacts associated with the implementation of a certain projects as well as relevant policies, plans and programmes (Jones et al., 2005).

Landscape planning instruments exist in a number of countries. In most systems these are normally baseline-led instruments that aim at outlining, evaluating and assessing the existing and anticipated status of the landscape, and frequently also of the bio-physical environment for a certain planning area. Frequently, anticipated conflicts and impacts connected with future potential land use are also identified. Furthermore, landscape planning normally deals with the establishment of compensation measures for identified impacts of projects, policies, plans and programmes (Schmidt et al., 2004).

The main strength of majority of landscape planning instruments is the capability to provide for some comprehensive environmental baseline data for both EIA and SEA, despite of some overlaps.

The connection and/or co-ordination of landscape planning and EA is understood as the inevitable condition for acceptable development and an important opportunity for enforcing approaches leading to sustainable development in the decision making process.

Sustainability is the common objective for both landscape planning being the planning tool and also for EA being a preventive (assessment) tool. It is also assumed that landscape planning and EA have complementary objectives, that both are instrumental with their aims to achieve sustainable development (Belčáková, 2001; Schmidt et al., 2004).

EA can contribute to an improvement of a decision-making process since it is a comprehensive, systematic and transparent assessment of environmental, social and economic aspects and problem implications. The arising conflicts between landscape protection and sectoral interest requirements in planning (mostly in land-use planning) can not be solved within the assessment process. These conflicts require political solutions that are transformed into decisions about a certain planning alternative. In this decision-making process, EA can guarantee neither rational decision nor an appropriate consideration of environmental requirements. Its tasks are to contribute to such decision by its transparency and comprehensiveness. In a democratic society it is hardly possible to neglect or ignore the systematically gathered, well documented and objectively evaluated information on predicted environmental impacts of developments.

Thus, EA has, in relation to a a sectoral, land use or landscape planning, the function of influencing and mitigating predicted adversities. Its task is to contribute to such planning which is from environmental point of view not only bearable but also optimal, while at the same time it searches for different alternatives when considering environmental, social and economic impacts. These alternatives/impacts are evaluated by appointed value scales, their impacts are related to the best alternative and the possible risks revealed.

It is necessary to emphasise the added value of linking EA and landscape planning as a facilitator for sustainable decision-making. But we still have to look for the application of appropriate procedural, institutional and methodological framework and for the utilisation of relevant landscape/ landscape ecology criteria and indicators in EA – what are still issues under the discussion.

And, also, it is widely recognised that landscape planning and EA are prerequisites for achieving acceptable forms of development and that the combination of the two processes can greatly assist decision-makers in working towards sustainable development. There is, however, a continuing debate over the precise role and purpose of each activity.

The issue of flexibility, rationality and integration approaches are the main opportunities of effective EA in relation with landscape planning.

Results

Possible contribution of the different landscape planning instruments to EA in Europe

Several authors remarked that landscape planning instruments/landscape ecology instruments exist in a number of countries (e.g. Austria, France, Germany, Ireland, Italy, the Netherlands, Spain, Sweden and Switzerland) serving as baseline-led instruments that aim at outlining, evaluating and assessing the existing and anticipated status of the landscape, and frequently also of the bio-physical environment for a certain planning area (Herberg, 2000; Joao, 2004; Sheate et al., 2004). In these countries, instruments are designed differently, for example in terms of their objectives, legal status and scope of application.

The extent to which landscape planning requirements are applied in environmental assessment are significantly different between the EU countries. The differences are visible on the various aspects of landscape considerations in the assessment, i.e. between the requirements for environmental assessment. It means that efficient application of EA is always tailored to needs for better decision-making.

There is a big EA development now, especially after EIA/SEA Directives transposition and ELC implementation, what can result in better practice in this field.

Landscape is one of the environmental characteristics that is specifically identified in the above mentioned EC Directives focusing on environmental assessment. Others include human health, biodiversity, fauna, flora, soil, water, air and cultural heritage.

Landscape along with other environmental topics are often used to form the basis of EA objectives. EA objectives and related indicators provide a measure against which the effects of the project or policies, plans and programmes can be assessed.

In EU member states, based on the EC Directives it is now a legal requirement to consider the interactions between all environmental factors. Table 1 illustrates a possible contribution of landscape planning to EA elements in selected European countries.

There are many overlaps regarding the contents of an EIA/SEA environment report and regional and local landscape plans, particularly regarding the collection of environmental baseline data, the outline of environmental objectives and the assessment of the likely significant effects of the proposed plan on the environment .

On the other hand, landscape planning instruments can function as a comprehensive information source for SEA, potentially helping to save time and resources and reducing the efforts connected with producing an SEA. The greatest potential of landscape planning instruments lies in the collection and evaluation of environmental baseline data, as well as the setting up of environmental objectives. Furthermore, the methods used within landscape planning can also be used within SEA. Landscape planning also contributes to the development of mitigation measures.

Table 1 illustrates that landscape planning instruments can contribute to varying extents to a number of EA elements. It indicates that each instrument has different strengths and weaknesses.

T a b l e 1. Possible contribution of landscape planning to EA elements.

Country	Legislation	Objectives	Contents	Possible contribution to EA elements
Germany	Federal Nature Conservation Act 2004, (comprehensive landscape plans at all planning levels)	– sustained availability of the natural resources for human use – integration of considerations of nature and landscape into decision-making (especially in terms of spatial planning)	– existing and anticipated status of nature and landscape – principles of nature conservation and landscape management – assessment and evaluation of the existing and anticipated status of nature and landscapes, possible conflicts – measures for avoiding , reducing or eliminating adverse effects on nature and landscapes – measures for protecting, managing and developing certain parts or component of nature and landscape	– strong contribution in provision of baseline data – significant contribution to impact assessment and preparation of compensation measures – indirect contributions to alternatives assessment, public participation and monitoring
Slovakia	Act on Town and Country Planning and Building Code (comprehensive landscape plans ar regional and local levels)	– optimal spatial arrangement of human activities based on landscape ecological conditions	– landscape ecological analysis of landscape elements and factors – syntheses of landscape ecological characteristics – interpretation of landscape conditions – ecological optimisation of land use	– strong contribution in provision of baseline data – significant contribution to impact assessment and preparation of compensation measures – indirect contributions to alternatives assessment, public participation and monitoring
Scotland	No formal requirements, (Landscape Character Assessment – Guidance for England and Scotland)	– landscape character assessment as a reference point in policy, plan and programme formulation – to inform decisions about change and development, so they are consistent with landscape objectives	– digital landscape character types database – provides a baseline against which change can be monitored and to inform decision-making – identification of critical areas – visualisation of the results for use in potential management regimes – recommendations regarding mitigation and design considerations	– strong contribution to impact assessment – Some contribution to monitoring and public participation – Indirect contribution to compensation measures
Sweden	No formal requirements (ecological landscape plans)	– sustained availability of the natural resources	– -existing and anticipated status of natural resources and landscape – principles of nature conservation and landscape management including health aspects – assessment and evaluation of the existing and anticipated status of nature and landscapes, possible conflicts – measures for avoiding , reducing or eliminating adverse effects on nature and landscapes – measures for protecting, managing and developing certain parts or component of nature and landscape – implementation of health aspects	– strong contribution in provision of baseline data and impact assessment – some or indirect contribution to alternatives assessment, compensation measures and public participation

Based on: Hoppenstedt, A., 2003; Schmidt, M. et al., 2004; Žigrai, F., 1996; Mörtberg, U.M. et al., 2007.

Early years of EA application saw the development of numerous methods designed to ensure that various stages of the EA process were carried out in a comprehensive and systematic way. In the context of project EA, for example, checklists and matrices were developed for pinpointing potential direct impacts. Networks were found to help consider indirect impacts. EA methods should allow to organise information and be beneficial for practitioners with limited experience. The most frequently used EA methods are listed in Table 2. Whilst the use of assessment methods and techniques would normally be left to the discretion of practitioners, they may also be prescribed in regulation or guidelines. EA methods and techniques will differ, according to the sector and tier of application. SEA of a regional land use plan, for example, will require the application of different methods and techniques as an EIA for a road.

The assessment of cummulative effects is an aspect of EA that requires particular attention. A range of methods are available, from the more analytical matrices, to

T a b l e 2. Methods used in EA.

Types of methods	Relative usage	
	EIA	**SEA**
Analogs	H	L
Checklists	H	M
Decision-focused checklists	M	L
Environmental cost benefit analysis	L	O
Expert opinion	H	M
Expert system	L	O
Indices or indicators	M	M
Laboratory testing	M	NA
Landscape evaluation	M	H
Literature reviews	M	L
Mass balances	H	L
Matrices	H	M
Monitoring (baseline)	L	O
Monitoring field	L	O
Networks	M	O
Overlay mapping	M	H
Photographs/photomontages	M	L
Qualitative models	H	L
Quantitative models	M	L
Risk assessment	L	L
Scenario building	L	L
Trend extrapolation	L	L

Notes: H = high usager, M = modera usage, L = low usage, O = limited usage, NA = not applicable
Source based on Canter, Sadler, 1997; Haaren et al., 2006

the planning oriented multicriteria analysis (Smit, Spalding, 1996; Sadler, Verheem, 1996). The majority of existing methods considers impacts only upon one aspect of the environment, for example a single species. The nature of assessment at strategic level, however, means that it is more appropriate for methods to focus upon area wide effects rather than upon details of the proposals. Generally speaking, the assessment of cumulative and synergistic effects requires a comparatively detailed analysis of space. In this context, for example, the *ecological comprehensive regional development model introduced* by Westman (1985).

The most commonly used landscape planning/landscape ecology methods and techniques for impact analyses and assessment are listed in Table 3.

Landscape planning methods are all useful for environmental assessment procedures, especially for baseline data collection informing on the current state of biodiversity, nature and environment or identification of aims and objectives and evaluation of potential conflicts. They can work as a beneficial mechanism to describe, analyse and compare environmental effects. One of frequently landscape planning method used in EA is a so called "ecological risk analysis" where environmental impacts are assessed for a number of factors and interrelations between them. Factors should be identified, described and evaluated.

In addition, landscape ecology provides methods and tools for addressing effects on landscape scale, such as effects of habitat loss and fragmentation, for example ecological modelling and other GIS based tools (Piscová, et al., 2011; Mortberg et al., 2007).

Furthermore, overlay maps are commonly used for the preparation of plans and, also, they can be used for the assessment of environmental factors in order to identify environmental

T a b l e 3. Landscape planning methods and techniques used for impact analysis and assessment.

Type of method	Description
Scenario analysis	scenarios are used for projections to outline and compare means and conditions of the implementation of a a proposed action based on reasoned assumptions
Computer modelling	used for calculation of impacts of strategic actions on environmental indicators (e.g. habitat supply analysis in Canada and US)
GIS	useful for assessment of cumulative effects of several projects in the same area
Ecological risk analysis	assessment of strategic risks, regarding trends that may undermine objectives and quality standards generating potential relevant damages and costs
Compatibility analysis	analysis and assessment of compatibility of different alternatives
Sensitivity analysis	analysis and assessment of policy options using factors of common analysis that enable an interpretation of sensitivity and effectiveness
Forecasting and simulation	analytical calculation or simulation of potential changes generated by the development of actions and the consequent potential impact of strategic options
Carrying capacity	good for setting development thresholds according to the sensitivity of the environmental and social systems. This method is useful in the assessment of cumulative impacts and sustainability thresholds

Source based on Canter, Sadler, 1997; Haaren et al., 2008

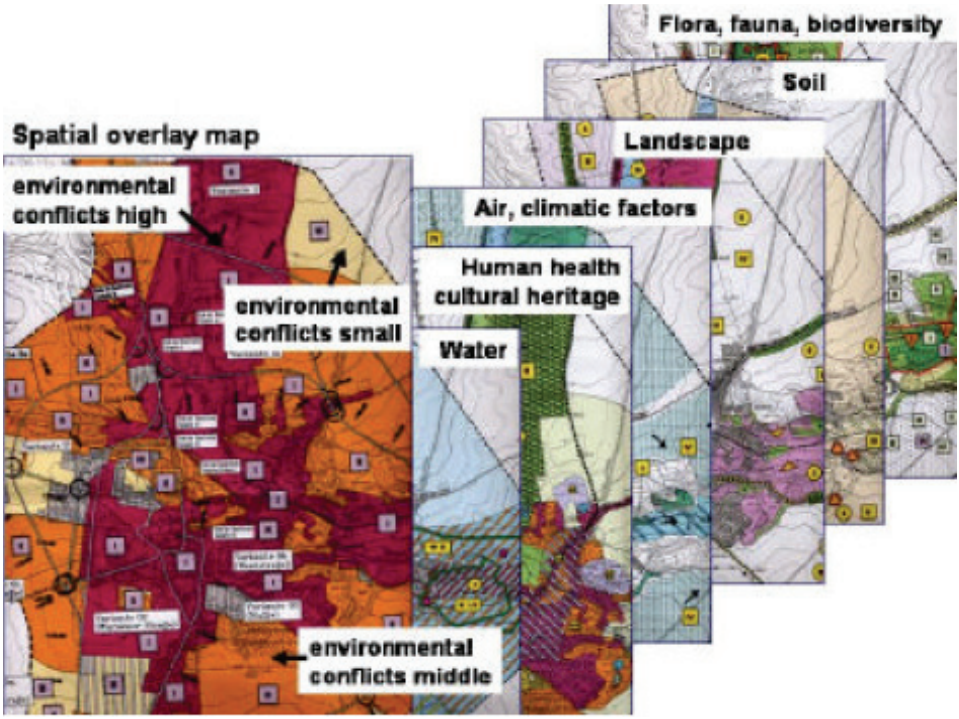

Fig. 1. The spatial analysis and the spatial overlay map at an example – the construction of a new road. Source based on Haaren et al., 2008

conflicts (see Fig. 1). In order to resolve conflicts, GIS based scenarios for site alternatives are developed, e.g. regarding residential developments.

Landscape indicators that are based on pressure–state–response framework has been quite often used within the framework of the so called Landscape Heritage Assessment (LHA) and Landscape Characterisation Assessment (LCA), especially in England, Scotland, Wales and Ireland. Indicators need to be targeted on measurable attributes. In this context, it is possible to define landscape characteristics that are measurable in a qualitative if not quantitative way. Landscape is taken to include both countryside and townscapes. Indicators need to provide a good indicator of change in character, have resonance (capture public attention), be capable of measure and use meaningful data. The setting of objectives, targets and indicators should take place as part of the scoping stage of EIA/SEA before baseline surveys are completed.

Table 4 gives an example of relevant baseline information and the types of indicators that may be used for local transport plans.

T a b l e 4. Example of landscape indicators used for the assessment of transport local plans.

Subject area: Landscape			
Objective 1: To protect landscape features and assets from inappropriate transport-related development.			
Examples of baseline information	**Potential SEA indicators**	**Target**	**Sources of data**
Designated landscape protection areas, Landscape character areas, Important woodlands, Open grasslands, Features of geological importance (e.g. scarp slopes, limestone pavements, drumlins), Historic parkland and gardens, Archaeological sites and battlefields, Prominent buildings of historical and/or archaeological interest, Monuments, follies, and other landmarks	Assessment of the landscape or other environmental effects of LTP policies or proposals resulting in major construction within identified areas such as airport extensions, new flight paths, new road/ rail routes, road widening, transport interchanges, car parks, park and ride sites	No significant adverse landscape effects from transport-related development in sensitive landscape areas	EIAs of major projects Monitoring of development control planning decisions
Subject area: Townscape			
Objective 1: To avoid damage to and, where possible, enhance the visual appearance and aesthetic qualities of settlements through transport-related development with particular emphasis on designated heritage and conservation areas			
Examples of baseline information	**Potential SEA indicators**	**Target**	**Sources of data**
Significant urban vistas, and important views for local residents, Tree lined avenues and streets, Squares, roundabouts and other traffic intersections with extensive landscaping, Urban parks and open space, Important building facades in terms of architectural quality or historical interest, Important Streetscape with prominent buildings, monuments or street furniture of historical and/or archaeological interest	Number and type of LTP policies and proposals that have the potential to alter the appearance and qualities of important townscapes, Number and size (area covered) of pedestrianisation schemes, traffic calming measures, etc., Number of development schemes accompanied by detailed landscape and townscape design	Achievement of goals set out in relevant Local Development Framework Documents	SEA of the LTP Routine monitoring by Planning Department

Source based on Environmental Assessment , Vol. 11, 2005

Conclusion and recommendations

Following the analysis of landscape planning instruments in selected European countries, it is suggested that landscape planning can make a significant and beneficial contribution to EA.

The main strength of all landscape planning instruments is the capability to provide for some comprehensive environmental baseline data for both EIA and SEA. Furthermore, all instruments can contribute extensively to impact analysis and evaluation, the assessment of alternatives, identification of compensation measures, public participation and monitoring.

A range of landscape planning and/or landscape ecology methods are readily available for impact prediction and evaluation. These range from methods and techniques that are applied frequently over those that are use moderately to those that are limited according to specific landscape planning context.

During recent years of EA development, several EA systems/approaches and several EA interpretations have been established depending on different context and political issues, procedural and methodological factors.

In most cases the implementation of EA requirements are specified within the frame of particular sectoral or comprehensive planning legislative frameworks. Formal requirements are variable – from ministerial decisions to official regulations at national, regional and local levels. The importance of those three levels differs from country to country and often depends on the degree of centralisation/decentralisation of landscape planning process.

The experience gained so far indicate still open unresolved issues in the following areas:

- limits in the existing planning practise that could slow down the effective integration of EA approach into this practise,
- maintaining the application of legally guaranteed tools, mainly at the level of national policies,
- possible additional costs in the planning process and time delay resulting from EA application,
- enhancement of the scope of landscape planning in order to improve the support of EA,
- promotion of a better integration and co-ordination of strategic action, landscape planning and EA,
- testing the practical application of contents and methods of landscape planning within EA in form of pilot projects,
- awareness raising of the strength of landscape planning in order to overcome the missing political will and to promote formalised landscape planning approaches.

It is obvious that both – landscape planning and EA procedures were built on the same principles of better decision making. At the same time they represent many variations in methods and in the individual steps of the assessment process. These differences are mostly linked to a concrete application of environmental assessment within the entire planning process, to individual phases of the assessment within the planning process as well as to different conditions for EA implementation.

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References

Belčáková, I., 2001: Strategic environmental assessment (in Slovak). In Drdoš, J. et al., (eds), Geoekológia a environmentalistika. II. Environmentálne plánovanie. FHPV PU, Prešov, p. 88–99.

Canter, L., Sadler, B.,1997: A tool kit for effective EIA practice – Review of methods and perspectives on their application. A supplementary report of the International Study of the Effectiveness of Environmental Assessment, Environmental and Ground Water Institute of the University of Oklahoma (USA), Institute of Environmental Assessment (UK) and International Association for Impact Assessment.

Design Manual for Roads and Bridges. Environmental Assessment, Vol 11, Highways Agency (as amended, 2005).

Haaren, C.V., Warren-Kretzschmar, B., 2006: The interactive landscape plan – Use and benefits of new technologies in landscape planning, including initial results of the interactive Landscape plan Koenigslutter am Elm, Germany. Landscape Research, 31, 1: 83–105.

Haaren, C.V., Galler, C., Ott, S., 2008: Landscape planning. The basis of sustainable landscape development. Publ. Federal Agency for Nature Conservation, 51 pp.

Herberg, A., 2000: Umwelt und Landschaftsplanung in den Ländern der EU und der Schweiz. Arbeitsmaterialen zur Landschaftsplanung, Heft 15 (CD-ROM). Technische Universität Berlin.

Hoppenstedt, A., 2003: Strategic environmental assessment (SEA) in Germany – Case study regional planning. Paper presented at International workshop on environmental impact assessment, Teplý vrch, Slovakia.

Joao, E., 2004: SEA outlook – future challenges and possibilities. In Schmidt, M., Joao, E., Albrecht, E. (eds), Implementing Strategic Environmental Assessment. Springer, Berlin, Heidelberg, p. 691–700.

Jones, C., Baker, M., Carter, J., Jay, S., Short, M., Wood, C. (eds), 2005: Strategic Environmental Assessment and Land Use Planning. Earthscan, London.

Izakovičová, Z. (ed.), 2006: Integrated landscape management II (in Slovak). Ústav krajinnej ekológie SAV, Bratislava, 232 pp.

Mörtberg, U.M., Balfors, B., Knol, W.C., 2007: Landscape ecological assessment: a tool for integrating biodiversity issues in strategic environmental assessment and planning. J. Environ. Manag., 82: 457–470.

Landscape Character Assessment – Guidance for England and Scotland, Carys Swanwick and LUC, 2002.

Piscová, V., Kanka, R., Krajčí, J., Barančok, P., 2011: Short-term trampling experiments in the *Juncetum trifid*i K r a j i n a 1933 association. Ekológia (Bratislava), 30, 3: 322–333.

Sadler, B., Verheem, R., 1996: Strategic Environmental Assesment. Status, Challenges and Future Directions, Ministry of Housing, Spatial Planning and the Environment, The Hague, The Netherlands.

Sheate, W.R., Byron, H.J., Smith, S.P., 2004: Implementing the SEA Directive: sectoral challenges and opportunities for the UK and EU. European Environment, 14: 73–93.

Schmidt, M., Joao, E., Albrecht, E. (eds), 2004: Implementing strategic environmental assessment. Springer, Berlin, Heidelberg, 234 pp.

Smit, B. and Spalding, H., 1995: Methods for Cumulative Effects Assessment. Environmental Impact Assessment Review, 15: 81–106.

Westman, W.E., 1985: Ecology, impact assessment and environmental planning. Wiley, New York, 183 pp.

Žigrai, F., 1996: The relationship between basic and applied landscape-ecological research in Slovakia. Ekológia (Bratislava), 15, 4: 387–401.