

## Landscape protection – the challenge for sustainable planning

### Introduction

Sustainable spatial planning is seen commonly as referring to the specific elements of the environment: landform, water, air, fauna and flora, ecosystems, climate and built environment. But in many cases we forget that there is one more aspect, which brings together all these elements. It is the landscape, reflecting the state and condition of all elements of the environment and of the whole system. Thus, the state and character of the landscape is a real indicator of sustainable planning. That is why we should look for the tools to protect and enhance the landscape more effectively. In this matter spatial planning is not enough, as we can observe nowadays.

One of the tools enhancing the importance of landscape shaping and preservation within the physical planning system is Environmental Impact Assessment (EIA), and Landscape and Visual Impact Assessment (LVIA), as a part. But LVIA is not used properly in many countries, including Poland. In the opinion of many experts, landscape is the least important element of the environment, because it is not countable and undergoes only subjective assessments. Moreover, in many countries there is no legal definition of landscape, which results in optional interpretations and creates many problems with assessing landscape impacts, and consequently, mitigating them. Therefore there is a need to strengthen the tools protecting, managing and planning the landscape, like the LVIA within EIA.

### Landscape – threats and needs

*Chaos, disintegration, accidental mixture of form and functions, esthetic disturbance, littering the landscape, boring and schematic forms, ugliness, chaos of urban development, chaotic mixture without landscape identity, ecological barriers, rubbish heap of architectonic forms, ominous sky line, banal architecture of new forms, “captured” landscape due to urban sprawl, littered nobody’s land, urban creatures, suburbanization...* - these are only a few of the expressions used by professionals to characterize the state of the nowadays landscape. Why is the state of the landscape so critical? After all, the landscape is the interest of experts from many fields: geographers, biologists, architects, sociologists and economists. They all try to protect it. But every one of them defines the landscape in a different way. Maybe this is the reason for the lack of effectiveness in its protection? So we need one definition and a complex approach.

The European Landscape Convention defines landscape as an area perceived by people, “*whose character is the result of the action and interaction of natural and/of human factors*”. Landscape is treated as a “*basic component of the European natural and cultural heritage, contributing to human well-being*”. Such an approach relates closely to the idea and meaning of landscape, as it is used in LVIA within EIA.

### What is EIA

The low effectiveness of the physical planning system, which aims for sustainable development and spatial harmony, is the reason for searching for and developing the tools to complete the existing planning system. One of the available tools is Environmental Impact Assessment (EIA), considered worldwide to be one of the best instruments for implementing sustainable development in practice. EIA procedure is a formal requirement in the decision making process for harmful activities. Usually it is strictly connected with the existing spatial planning system. It is a multi-step process, aiming to gain all information concerning the planned activity, endangered environment and potential environmental impacts. It requires an interdisciplinary approach, complexity of information, a broad systematic approach in analysis and solution of problems, cooperation and public participation connected with the open flow of information. EIA enables prevention and choice of alternatives best for the environment.

It helps decision makers to make sound spatial decisions. Due to EIA the complex knowledge about the potential environmental impacts caused by activities, and the

knowledge of how to mitigate them, may be presented. That is why, using EIA, it is possible to protect the most valuable values of the environment, culture heritage and landscape, as well as to create new values. EIA creates possibilities for architects and urban planners to protect the natural and cultural heritage, landscape and the environment of human living. To make EIA complete, LVIA – the methodology related to the landscape – one of the elements of the environment – has been developed in many countries.

### **LVIA – a tool for the landscape**

In many countries *Landscape and Visual Impact Assessment* (LVIA) is one of the methods used within the framework of the EIA. LVIA is integrated with the process of planning and designing of the activity. Architects and urban planners play their important role within EIA procedures, cooperating closely with other experts, and influencing the decisions related to potential visual impact and ways to avoid them. However, in other countries, including Poland where such practices are uncommon, many spatial and visual problems are created. The main reason is misunderstanding the interrelation between spatial planning, sustainable development, EIA and landscape. All these aspects are often understood separately, while they should be treated as an integrated system, illustrated in the scheme 1.



Fig. 1. SEIA, EIA, Landscape (Author: A. Sas-Bojarska)

Strategic Environmental Assessment (SEA), related to plans, politics and programs - is the most important element supporting a spatial planning system. It should be strictly connected and superior to the EIA system, related to individual activities. SEA and EIA together make the system of Environmental Assessments. Within EIA, LVIA methodology has been developed. Landscape and Visual Impact Assessment is one of the main tools supporting the spatial harmony. SEA, EIA and LVIA, seen as an integrated system, may have a crucial impact on sustainable development in spatial planning, management and development. Landscape is related to all these aspects.

### **Main aspects and steps of LVIA**

Landscape and Visual Impact assessment requires many steps. They are presented in a form of a schema, related to three main aspects: **society**, **landscape** – where both are the receptors of potential impacts, and the planned **activity** – which is the source of these impacts (Fig. 2). Each of these aspects requires many steps. They all are interrelated to each other. Some steps, like the description and the assessment of landscape, may not be related to the activity, because they may be done independently in other planning documents. But most steps are strictly related to specific activity. First steps are: the description of different alternatives, identification of the sources of impacts (visual: buildings, technical objects and

infrastructure, characterized by their location, scale, color, material; non-visual, like noise, emissions, vibrations), prediction of the impacts on the different elements of the environment (soil, landform, flora, fauna, ecosystems, water, air, climate, monuments, material assets, landscape), identification of all endangered groups and their attitude to the affected environment, activity and possible impacts. It is important to understand, that impacts on specific elements of the environment in consequence will cause visual and landscape impacts, because landscape is the synthesis of the on-going processes and the environment as a whole. Then we can assess the significance and magnitude of visual and landscape impacts. Knowing their scale, character and significance, we may define adequate mitigation measures, due to the hierarchy of mitigation suggested in EIA: first try to avoid impacts, then to minimize them, at the end – to compensate. We should not forget about the possibility to enhance the existing state of landscape. The construction of the planned development does not finish the procedure. The final step is monitoring, sometimes aiming to define additional activities (so called “follow-up”), when real impacts occur more danger than those predicted.

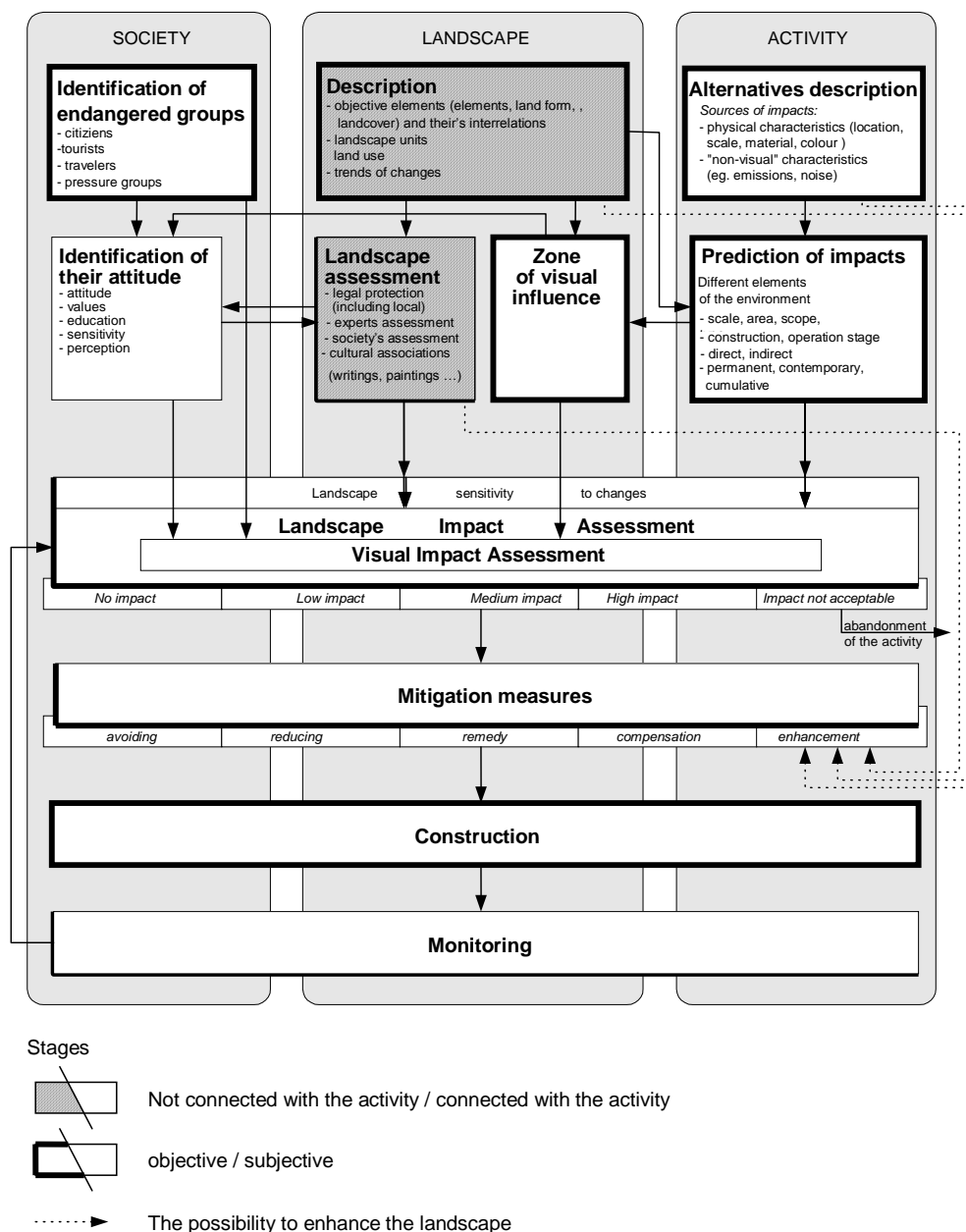


Fig. 2. Main aspects and steps of LVIA (Author: A. Sas-Bojarska)

It should be stressed, that some of these steps are more subjective than others. Thus, it should always be stated by the experts what methods have been used to assess these subjective aspects in order to enable independent verification.

The presented diagram shows the importance of a complex and broad approach in landscape and visual impact prediction, and the need for the interdisciplinary approach and cooperation with experts from many fields. It is not enough to predict landscape impacts related to physical aspects only within the specific site, in the surrounding neighborhood. Many other aspects should be taken into account, like the whole zone of visual influence, non-visual impacts and social aspects – like reactions of endangered people and interested users to the possible impacts. Only such an approach may balance the relationship between the planned activity, environment and the social needs and expectations.

### **The weaknesses of EIA – problem of landscape**

In spite of how useful the idea of EIA is, in many countries we can observe weaknesses that lessen its potential. In Poland the idea of EIA is often treated only as a formal requirement, needed to gain building approval. Analyses mostly are concentrated on countable aspects, like air, water, soil and noise pollution. Indirect impacts, as well as uncertainty of prediction, are not usually being recognized. “Non-material” aspects are seen to be unimportant and not objective, so they are usually ignored. That’s why so many problems are observed with EIA-LVIA relations. Architects, urban and spatial planners don’t usually participate in EIA, because experts from other fields don’t see such a need. Landscape is treated as a less important, totally subjective aspect of the environment.

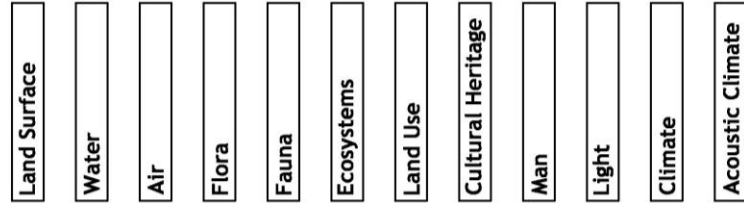
That’s why we can observe so many new activities harmful to the spatial harmony and the landscape. This is mostly the result of strong development pressure, but also the result of misunderstanding the idea of EIA. That’s why the education in this scope is so important, especially among the people connected with spatial planning, as are architects. The coordination of planning, designing and investment processes together with EIA/LVIA, enables the practical use of guidelines from environmental studies to develop the planning process. Such an integrated approach is most effective, economic and less time consuming, as experience shows in developed countries. This is the reason why the existing methods within EIA still require improvement, in order to fulfill the needs for better environmental and landscape management. One of them is presented below.

### **LVIA enhancement – the proposal**

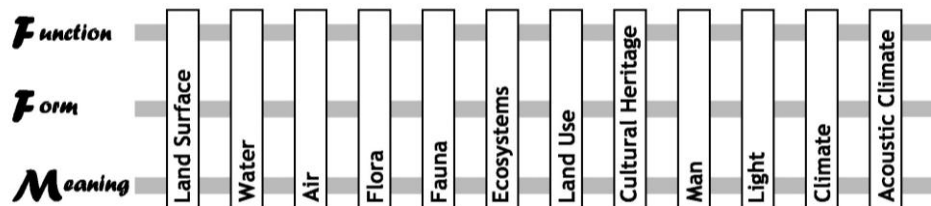
An original method for improving the accuracy of landscape and visual impact prediction is presented. This new method relies on the simultaneous, integrated assessment of the functions, forms and meanings of planned developments in relation to existing elements. The character of the neighborhood determines the scale of potential conflicts. Poor choice of **neighborhood functions** leads to conflicts and disturbances in the way that neighboring areas are influenced by physical interactions, such as air pollution or noise. The investigation of the **neighborhood of forms** is related to the visual aspects, in a physical sense. The evaluation of the **neighborhood of meanings** may be related to the functional level of interacting areas and actions, or to symbolic, invisible aspects that often define the real value of the land. The simultaneous consideration of many aspects affecting the quality of land, and a holistic approach to the evaluation of the environment, the landscape, and the impact caused by development activities, may help to balance the technical, natural, social, cultural, and compositional problems. Such an approach, presenting something more than just an objective character of land, helps to establish a hierarchy of goals, and thereby determine the most effective mitigating measures.

A medium integrating function, form, and meaning is the landscape, recognized in the presented method as the most significant factor in EIA. The landscape is seen as an element integrating all the investigations, because it is the ultimate manifestation of the changes occurring in various elements of the environment (Fig. 3). Along with a multidisciplinary consideration of the landscape, cause-effect relations that may lead to indirect, cumulative,

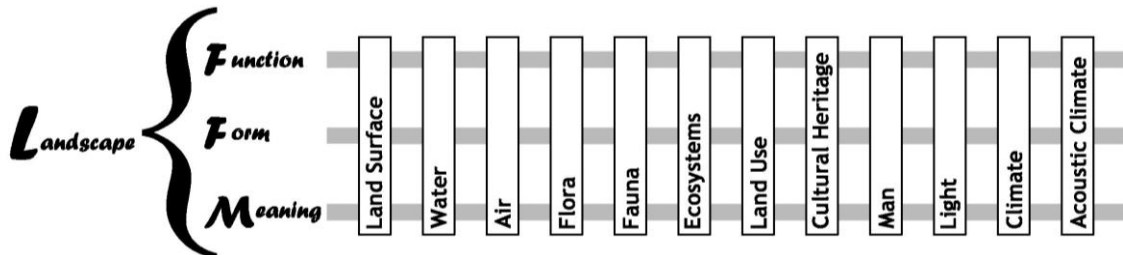
or synergistic effects must be taken into account during the prognosis and evaluation of all environmental changes. Such an approach improves the effectiveness of predicting changes in the environment (considered to be a complex system, not a set of individual elements), consequently enhancing the effectiveness of the prediction of landscape changes, for landscape is the fusion of the changes occurring in the environment.



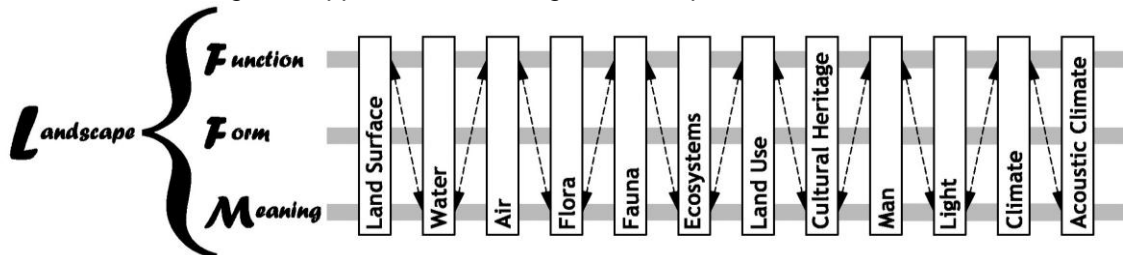
The current practice of predicting impacts in EIA has been based mostly on the independent investigation and assessment of the individual elements of the environment.



This approach should be implemented by additional investigation of impacts, concerning also aspects of function, form and meaning.



The new method is based on the fact, that the landscape – as the synthesis of function, form and meaning – can be treated as an element integrating all investigations and assessments – those concerning specific elements of the environment, as well as those related to function, form and meaning. The previous practice, based on independent analysis of specific problems will thus be transferred into an integrated approach - according to landscape.



The obligation of taking into account the landscape, during all investigations, helps to understand all the interrelations between the elements of the environment and potential impacts and consequently to predict more precisely the real significance of impacts and to define adequate mitigation measures.

Fig. 3. Function, form and meanings – an integrated approach (Author: A. Sas-Bojarska)

The method presented is a kind of framework, which, in each case, may be filled in with various data specific to the planned activity, as well as to characteristics and values of the threatened environment. These data may be investigated and evaluated by various techniques and methods specific to each case. The general character of the method enables

its implementation in a variety of situations, as it may be developed or made more complete in response to specific needs.

Due to the widespread application of EIA, the method of synthesis of function, form and meaning, guarantees better use of the potential of landscape architecture in physical planning, thus improving landscape protection in land use development. This method may be particularly useful in assessing complex cases, in which the interrelationships between various effects create difficulties in predicting irreversible changes in nature, cultural heritage and landscape. One should remember, that this heritage creates the identity of the land, while also defining the quality of life. That's why there is a need to protect the most important values, which is made possible by the new method. The new method has a universal character, meaning that it can be applied in every situation that may cause serious negative changes to the landscape and its visual character.

This method is illustrated below by a real case study, presenting its potential and the benefits it can bring for the preservation of the quality of landscape.

### A good example

The Rospuda case – the most controversial road project in Poland in recent years - served as an example to present the Landscape and Visual Impact Assessment, successfully conducted, and the potential of a new method.

A great transportation activity – the Express Road, named Via Baltica, has been planned in the North-East of Poland. The aim is to connect Poland with neighboring countries. One of the road fragments, the Augustów Bypass, was planned to cut through the very valuable Rospuda Valley and its wild moorland. Due to legal requirements, EIA procedure has been conducted. EIA Reports were modified a few times because of many mistakes. There was no real alternative comparison made, the prognoses of environmental impacts were inadequate and “non-material” aspects were not taken into account. The uncertainty of prediction has not been described and assessed. Social conflicts and controversy have not been analyzed. Some reports had not reflected issues of landscape and in others the landscape was treated only in the context of geography. Each report treated landscape as the less important part of the environment, landscape impacts – as not serious. No landscape architects took part in conducting EIA. In the meantime, the moorland in Rospuda Valley had been recognized as a protected area Natura 2000 – the European System of Protected Areas, because of many valuable and endangered species of fauna, flora and ecosystems. Independently public protest against the Augustów Bypass, harmful for the environment, arose all over Poland.



*Fig. 4. Protests in Gdansk  
(photo A. Sas-Bojarska)*



*Fig. 5. Protests at Rospuda Valley  
(photo A. Sas-Bojarska)*

In 2008, when the public conflict was most serious, the Polish Government took the decision to conduct once more EIA procedure – independently, and connected with SEA of Via Baltica project. A new team of experts conducted a new complex EIA. New environmental investigations and assessments were done, and a new report was prepared.

The complex Landscape Impact Assessment study was conducted by the author within the EIA Report for the Augustów Bypass crossing Rospuda Valley. The landscape values, and

the magnitude and significance of predicted landscape impacts caused by few alternatives, were assessed using the elements of a new method – the synthesis of function, form and meaning.

The resources and values of **existing landscape** (including the range of the values: of international importance, national, regional, local) were identified, assessed and described and presented on maps. A supplementary photographic study was also prepared. Then potential **landscape and visual impacts** were predicted and assessed, in terms of their magnitude, significance, non-material aspects and scale of conflict.

Owing to the scale of planned activity, the landscape value and the significance of potential impacts, as well as the high public controversy, a special technique to indicate the **zone of visual influence** of planned bridges – the most controversial part of the bypass – was adopted. Digital models of terrain, the river, and planned engineering objects and special site investigation enabled an objective definition of the “visual envelope” and to create the visualisations of bridges, „located” in the pictures of real landscape (Fig. 6-11).



Fig. 6. The approximate view of assumed suspension bridge I (120 m height) from about 1,5 km. (photo A. Sas-Bojarska)



Fig. 9. The approximate view of assumed suspension bridge II (80 m height) from about 700 m (photo A. Sas-Bojarska)



Fig. 7. The approximate view of assumed suspension bridge I (120 m height) from about 400 m (photo Zb. M. Michniowski)



Fig. 10. The approximate view of assumed suspension bridge II (80 m height) from about 400 m (photo Zb. M. Michniowski)



Fig. 8. The approximate view of assumed suspension bridge I (120 m height) from about 200 m (photo Zb. M. Michniowski)



Fig. 11. The approximate view of assumed suspension bridge II (80 m height) from about 200 m (photo Zb. M. Michniowski)

Fig. 4–9. Visualizations of bridges (A. Sas-Bojarska. Computer drawing A. Wierzchowska)

All these visualizations helped to assess not only the magnitude, but also the significance of landscape impacts. Predicted impacts would have different scale, character and significance for each alternative solution. The unique landscape of outstanding natural beauty, whose value is confirmed by the official opinion of the National Council of Nature Protection, would be destroyed by the new activity as was stated in the EIA Report. The Rospuda Valley is very sensitive to any intrusion. Endangered species of fauna and flora, as well as ecosystems, are expected to be in great danger due to the scale and character of the new construction. The prediction of impacts, due to very specific hydro-geological circumstances, is extremely uncertain, which means, that they can be much more serious than those predicted. Most of the impacts would be long-term, permanent, complex, irreversible, cumulative, and synergistic. Some would be indirect and difficult to predict precisely. Some will be of national and even international importance – like loss of the unique European natural moorland (the only one of that size, wildness and character), and possible destruction of a few rare species (registered in the Red Book). The other important aspect is the intrusion into wild landscapes of great visual attraction and increasing tourist interest. Some of the landscape impacts are objective (fragmentation of landscape units, appearance of “linear” dominants or huge bridges, change of landscape character, changes in views), others – subjective (the loss of wild beauty, the degradation of symbolic unique landscape, the disturbance by noise and lights). There is no possibility to mitigate these impacts. Moreover, the subjectivity of landscape issues and “non-material” aspects create many problems in the assessment of the significance of impacts. But, in the theory of EIA, doubts are treated as an argument to look for another alternative. The high level of public controversy in the Rospuda case supports this argument.

As a result of landscape assessment, adequate mitigation measures have been defined for each route alternative. They have been identified for the endangered landscape units as well as for fragments of each route alternative.

For all the study area maps illustrating endangered values, predicted impacts, and mitigation measures has been prepared.

The final result of the study was the comparison of alternatives (Fig. 12). The adopted criteria of landscape impact assessment aimed to indicate the less harmful route alternative.

The scale from 0 - 10 has been used to compare alternatives, while “0” should be understood as the worst alternative, “10” – as the best one. The number 0 - 10 does not reflect any real magnitude, they serve only as an indicator to illustrate the differences between the significance of impacts caused by specific alternative solutions.

It was stated in LVIA, that the indicator “0”, meaning the exclusion of the specific solution may be related to these alternatives, which may cause the most danger, most significant impacts. These impacts should fulfill the following criteria, related to function, form and meaning:

- serious negative landscape changes are expected (according to type, size, spatial scope, intensity); impacts would be long-term, with no possibilities of mitigation
- they may occur in very valuable, unique landscapes, recognized as of international significance; they cause serious public controversy; they are irreversible.

The medium scale, from „5” to „6”, suggested the exclusion of the alternative, may be related to these alternatives, which may cause serious impacts, fulfilling the following criteria:

- negative landscape changes are expected (according to type, size, spatial scope, intensity), with few possibilities of mitigation
- they may occur in valuable landscapes, recognized as of international or national significance; they cause public controversy.

The highest scale, „9” and „10”, meaning the acceptance of the alternative (under the condition of implementing suggested mitigation measures), had been related to these alternatives, which may cause landscape impacts undergoing effective mitigation. The possibility of mitigation in each case was stated as the most important criteria.

Based on the criteria stated above, the final comparison of a few alternatives has been conducted. The scale and intensity of impacts, uncertainty of prediction, long term and irreversible impacts, significance of impacts, the potential disturbances of touristic use, scale



of conflict and possibility of effective mitigation – all these issues have been taken in account during the comparison of alternatives.

		Alternative I „Rospuda valley”				II „Ecological”		III „Ecological”		„0” Alternative
		Typical bridge	Suspension bridge I	Suspension bridge II	Tunnel	II	II A	III	III A	
Objective impacts	Linear Dominant	XXX	XXX	XXX		X	X	X	X	
	Landmark		XXX	XXX						
	Fragmentation	XXX	XXX	XXX	?	X	X	X	X	
	Change of character	XXX	XXX	XXX	?	X	X	X	X	X
	Destruction of touristic resources	XXX	XXX	XXX	?	X	X	X	X	X
Uncertainty of prediction		XX	X	X	XXX					
Long term impacts		XXX	XXX	XXX	?	XX	XX	XX	XX	
Non reversible		XXX	XXX	XXX	?	X	X	X	X	
Impact perception	The change of landscape perception	XXX	XXX	XXX	?	X	X	X	X	XX
	Disturbances of touristic use	XXX	XXX	XXX	?	X	X	X	X	XX
	Magnitude of impacts	XXX	XXX	XXX	?	XX	XX	X		XX
	Scale of conflict	XXX	XXX	XXX	XXX	XX	XX	X		XXX
Mitigation measures		Lack of possibilities				Low possibility		Medium possibility		High possibility
Final assessment: scale from 0 (the worst) to 10 (the best)		0	0	0	0	5	6	9	10 <sup>*)</sup>	10 <sup>**)</sup>
Final guidelines		Excluded				Not Recommended		Recommended		Recommended under some conditions <sup>****)</sup>

The intensity of issue: XXX – very high; XX – high; X – medium; ? – not certain.

<sup>\*)</sup> after implementation mitigation measures / <sup>\*\*)</sup> Simple mitigation measures / <sup>\*\*\*\*)</sup> recommended, after reducing transit transport.

Fig. 12. Comparison of alternatives. Author: A. Sas-Bojarska

The alternatives excluded, as well as those preferred have been indicated. It has been stated, that alternative I, cutting through Rospuda Valley, suggested by the Investor, should definitely be excluded.

The study shows the practical application of a method promoting the synthesis of function, form and meaning in Landscape and Visual Impact Assessment within EIA. The described EIA report, including Landscape Impact Assessment, served in 2009 to make a decision to

maintain the valuable, endangered Rospuda Valley in a natural condition. The less conflicting alternative, bypassing the unique area and landscape, has been chosen.

### **A lesson for the future**

The example of Rospuda Valley – for which the final EIA/LVIA has been successfully conducted – presents the potential of the system of Environmental Assessments and the possibilities of its application in the practice of sustainable planning.

The Rospuda case was very special for its uniqueness in sensitivity of values, controversy, and because it is well known all over Europe. In other cases such complex, detailed EIAs usually are not being conducted, especially in relation to landscape. This one was rather an exception, not a rule. In most EIA cases in Poland landscape is treated as the least important element of the environment. Prediction of impacts on all elements of the environment is being conducted separately. The inter-relationship between different impacts is not being taken into account. Therefore it is not possible to adequately predict landscape impacts and to make conscious decisions. Meanwhile, due to the intense pressure put on by the development, the landscape is endangered more and more. That's why there is a need to enhance the role of LVIA within the EIA, and consequently in the general decision-making process.

The presented approach, promoting the synthesis of function, form and meaning, may be seen as one of such possibilities. It enables impact prediction on all elements of the environment more precisely, because every time the landscape, as a final receptor and the synthesis of impacts, should be taken into account. Therefore it gives the ability to define adequate mitigation measures, and to make choices best for the environment and landscape.

The most important is to understand, that “non-material” values, like wildness, uniqueness and beauty of the landscape, can be protected only with the great effort of experts, using legal instruments effectively. EIA and LVIA are such instruments. Although there are guidelines on how to conduct it, the universal recipe good for every case does not exist. Each case is different. That's why there is a need for an individual approach. Instrumental attitudes can endanger the sustainable decision-making process. New ideas for improving methodologies should be developed and implemented. This subject has been recognized as important and timely since knowledge of the character, magnitude and significance of landscape changes is the basis for the proper protection and shaping of a landscape that is subject to strong, unrelenting investor pressure. Developing new methodologies should be an on-going process. This is the best lesson for the future.

### **Summary**

Growing spatial chaos reminds us of the need for systematic, complex approaches related to environmental and landscape issues within different planning, organizational, operational, legal and political activities. It has been proved, that LVIA within EIA plays an important role in the enhancement of the spatial planning system, and that there is a need to use the potential of EIA/LVIA in spatial development and management. But the EIA system is only one of many instruments. The guidance from EIA/LVIA – as related issues, should be addressed to different levels and instruments of management and planning systems, because only an integrated system can enable proper protection of natural and cultural heritage and landscape – the real indicator of sustainable planning and development.

### **References**

*Guidelines for Landscape and Visual Impact Assessment.* Institute of Environmental Assessment, The Landscape Institute, London–Glasgow–Weinheim–New York–Tokyo–Melbourne: E&FN Spon 1995.  
*Guidelines for Landscape and Visual Impact Assessment.* The Landscape Institute / The Institute of Environmental Management and Assessment. London–New York: Spon Press 2002

Aleksandra Sas-Bojarska, Landscape protection – the challenge for sustainable planning,  
46<sup>th</sup> ISOCARP Congress 2010

Sas-Bojarska Aleksandra, *Prediction of Landscape Changes in Land Use Management Using Environmental Impact Assessment with the Example of Roads*, Wydawnictwo Politechniki Gdańskiej, Gdańsk 2006

Sas-Bojarska Aleksandra, Landscape Impact Assessment for Rospuda Valley, 2009, DHV POLSKA Sp. z o.o., [http://195.116.72.9/gddkia/2009/03/1/03\\_zalacznik08.zip](http://195.116.72.9/gddkia/2009/03/1/03_zalacznik08.zip)

European Landscape Convention, Florence,  
<http://20.X.2000http://conventions.coe.int/Treaty/en/Treaties/html/176.htm>

Aleksandra Sas-Bojarska, Gdansk University of Technology, Poland