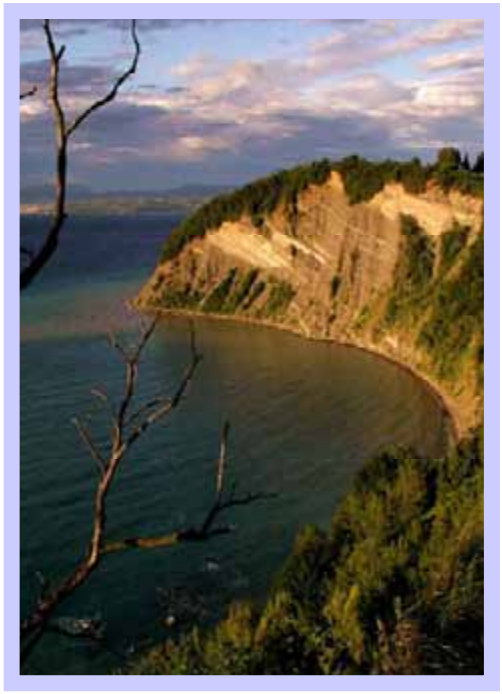

LANDSCAPE MANAGEMENT METHODOLOGIES

Synthesis report of thematic studies

April 2011

UNEP

PRIORITY ACTIONS PROGRAMME

MAP

LANDSCAPE MANAGEMENT METHODOLOGIES

Synthesis report of thematic studies

Regional Activity Centre for the Priority Actions Programme
(PAP/RAC), Kraj Sv. Ivana 11, HR-21000 SPLIT, CROATIA

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PRIORITY ACTIONS PROGRAMME

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MAP

Author: **Nataša Bratina Jurkovič,** M.Sc., Landscape architect

allinea PLUS

service, consulting, landscape planning, landscape architecture

Allinea plus d.o.o.
Einspielerjeva ulica 6
1000 Ljubljana
Slovenia

M +386 051 44 55 44
T +386 01 432 93 30
F +386 01 437 93 31
E info@allinea.si
I www.allinea.si

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Acknowledgment

At the conclusion of the study entitled “Landscape Management Methodologies: A synthesis report of thematic studies“, I would like to express my thanks to PAP/RAC, especially to Mr. Marko Prem, Director a.i., for his support in co-ordinating the preparation of the study, providing advices on the structure of the report and valuable photographs, as well as for his contributions regarding the theoretical definitions of the terms *coastal landscape* and *seascape* that helped me to successfully finalise the study.

Nataša Bratina Jurkovič, M.Sc.

Author

Preface

Being very colourful and outstanding, the Mediterranean region constitutes a satisfying whole with its specific characteristics. From the environmental and nature protection aspect, it has often been considered a vulnerable ecosystem, whereas from the development point of view, and above all when tourism is concerned, it has always been a desired tourist destination.

The notion "Mediterranean" is usually associated with the sea, beaches, olive trees, citrus fruits, vineyards, fish, a lot of sun and good wine – simply, with comfort and some kind of a "paradise on Earth". The Mediterranean certainly does not comprise only beautiful things in its heart, but, unfortunately, a large number of immediate coastal zones degraded by intensive settlement, mass tourism and industry. Since we would like to preserve these images we have in our mind when we think of the Mediterranean, we would also like to preserve the very typical Mediterranean landscapes standing out with their image and presenting the identity of the Mediterranean. If such areas disappear, then the admired and praised Mediterranean we know will no longer exist.

The Synthesis report is prepared on the basis of four independent thematic studies, commissioned by PAP/RAC from 2006 to 2010. The studies include:

- **Coastal landscapes of Tunisia with Special Focus on Cap Bon – A proposed Landscape Character Assessment** (February 2007), authors: Vogiatzakis, I.N. & Cassar, L.F.;
- **Revitalisation of the Rural Landscape of Blato Area on the Island of Korčula** (May 2007), authors: prof.dr. Branka Aničić, Ph.D., prof. Dušan Ogrin and Goran Andlar, M.Sc. (University of Zagreb, Faculty of Agriculture, Department of Landscape Architecture);
- **Landscape planning and vulnerability assessment in the Mediterranean** (February 2010), authors: Mojca Golubič, Ph.D. and Lidija Breskvar Žaucer; and
- **Outstanding Landscapes in the Mediterranean** (April 2010), author: Nataša Bratina Jurkovič, M.Sc. (Allinea plus d.o.o.).

Although each of the four thematic studies has been prepared separately, they are interrelated in terms of their contents. Namely, the studies are dealing with the same area - the Mediterranean region, and the same subject - the coastal landscapes.

Therefore, in this study, i.e. the Synthesis report of thematic studies on Landscape Management Methodologies, we tried to combine the knowledge and findings of the four thematic studies into a single comprehensive report, which can be used as a professional manual for understanding the topic and preparing individual contents in the field of spatial planning and landscape planning, evaluation, protection and revitalisation. The Synthesis report is intended for everyone interested in this topic, including the experts in the Mediterranean region, administration, politicians, and the general public who would like to have a better knowledge of different methods of landscape planning as tools for implementing the provisions of the ICZM Protocol. The Report mainly elaborates the implementation of the Article 11 of the ICZM Protocol dealing with the protection of coastal landscapes by means of regulations, planning and management. It can also be used as a teaching aid at schools and for raising awareness of the public.

The Synthesis report is aimed at acquiring the knowledge of the basic terms referring to landscapes, characteristics of Mediterranean landscapes and particular coastal landscape issues. It further provides an explanation of professional procedures and the use of planning tools in the field of landscape vulnerability and presents the typological definition of landscapes defining the outstanding landscapes as landscapes of special value. The summary of the Synthesis report thus deals with the spatial planning, evaluation and protection of

landscapes and protection of the heritage and revitalisation of the typical Mediterranean landscapes.

The Synthesis report has been prepared based on five large parts of the contents referred to as basic chapters, namely, a general theoretical part and four thematic parts dealing with individual methodologies in the field of landscape management.

At the beginning of the first part of the Synthesis report, a general insight into the landscape topic is given providing a theoretical explanation of landscapes, their types and definition, the definition of technical terms, the typological definition and evaluation of landscapes, the landscape vulnerability, and the explanation of concepts. Then, a legal framework is provided including the international legislation in the field of landscape protection and development. The state of Mediterranean landscapes as a Mediterranean identity, as well as the causes for and the consequences of changing the coastal landscapes in the Mediterranean region are described.

The second part deals with the Landscape planning and vulnerability assessment. This chapter comprises a full presentation and the contents of the study entitled “Landscape planning and vulnerability assessment in the Mediterranean” (2010), including two examples of vulnerability assessment. The study stresses the importance of vulnerability assessment as a key tool for a preventive environmental protection.

The third part presents the Landscape Character Assessment, including the contents of the study entitled “Coastal landscapes of Tunisia with Special Focus on Cap Bon – A proposed Landscape Character Assessment” (2007) and a case study of a typological definition of the Slovene landscapes – “Regional distribution of landscape types in Slovenia” (1998).

The aims of the study “Coastal landscapes of Tunisia with Special Focus on Cap Bon – A proposed Landscape Character Assessment” are: to define the Landscape Character Assessment methodology; to identify the landscape management practices in the coastal zone of Tunisia; to present the Landscape Typology for the Tunisian coastal landscapes; to provide recommendations for the landscape-based management; and to engage the local authorities active in the landscape management and assessment practices.

A chapter on the thematic study “Regional distribution of landscape types in Slovenia” includes a summary of the methodology of the Typological Classification of the Slovenian Landscapes, the working procedure, the landscape evaluation process and the project results.

The fourth part is the basic chapter dealing with the outstanding landscapes and defining recognisable areas and areas of special value. It includes the thematic study entitled “Outstanding Landscapes in the Mediterranean” (2010).

This part explains a draft of the outstanding landscape category, the terms, the criteria for defining the outstanding landscapes and the meaning of landscapes at the national and broader level. The possibilities of the inclusion of the contents in the spatial and other sectoral policies are also listed. Finally, two cases of outstanding landscapes are presented, including the descriptions and pictorial material.

The fifth part deals with the Revitalisation of Landscapes. It includes a thematic study entitled “Revitalisation of the Rural Landscape of Blato Area on the Island of Korčula” (2007). The objective of this study is to prepare the planning models for agricultural lands in order to anticipate possible landscape changes to be adequately integrated into development alternatives in the planning instruments. The landscape planning methodology, including the landscape analysis and valuation, modelling, as well as the public participation, is applied.

The main aim of the study “Landscape Management Methodologies: A synthesis report of thematic studies” is to provide advice on and the knowledge of implementation of the ICZM Protocol with regard to the protection of coastal landscapes to all those who want to realise the concept of the landscape character assessment, revitalisation and vulnerability of landscapes, as well as outstanding landscapes as specially protected landscapes in the process of planning

and management. This refers in particular to responsible experts and administration at the national, regional and local level within the framework of non-governmental organisations and other relevant institutions. The Synthesis report is particularly important for the decision- and policy-makers at all levels.

Photo 1: Slovenian coast

Photo 2: Traditional stone settlement from the Adriatic area

Photo 3: Kornati, Croatia

Photo 4: Monte Carlo, Monaco

Photo 5: St. Tropez, France

Photo 6: Provence area, France

Photo 7: Landscape pattern, the Adriatic

Photo 8: Natural coast landscape, The Adriatic, Croatia

Photo 9: Kornati National park, Croatia [1]

[1] Kornati National park: Because of its exceptional landscape beauty, interesting geomorphology, the diversity of the coastline and especially because of the rich biocoenoses of the marine ecosystem, a greater part of the Kornati maritime zone has been declared a national park in 1980. (Kornati National park - online).

Background of the Thematic Studies

The Barcelona Convention states that "*Contracting Parties shall commit themselves to promote the integrated management of coastal zones, taking into account the protection of areas of ecological and landscape interest and the rational use of natural resources*." Therefore, the Contracting Parties to the Barcelona Convention, at their Ordinary Meeting in Catania in 2003, adopted the recommendation to undertake thematic studies with a view to developing relevant landscape management methodologies and tools in Mediterranean coastal areas. In addition to this, the ICZM Protocol, signed in January 2008, in the Article 11, also requires the protection of landscapes through various means. In this regard, it is closely linked with the European Landscape Convention of the Council of Europe.

It should be noted that the Mediterranean coastal landscapes have never been studied or elaborated in the MAP projects *per se*. Landscape was taken into account only indirectly, through proposals of various documents (plans, strategies, programmes), in the projects oriented to the local level, such as the Coastal Area Management Programme (CAMP), by using the Integrated Coastal Zone Management (ICZM) methodologies or by dealing with individual natural resources. However, the existing landscape-specific methodologies and concepts (such as the landscape planning, vulnerability studies and outstanding landscapes) have not been introduced or taken into account. The activity related to landscape management was entrusted to PAP/RAC, and is implemented within the framework of Integrated Coastal Zone Management (ICZM).

As a first step towards the elaboration of the Landscape Management Methodologies, PAP/RAC organised an expert meeting, which was held in Dubrovnik, Croatia, in January 2006. The meeting recommended that the preparation of thematic projects be started which should be representative and complex enough to allow for solving problems in the coastal landscapes by using the methodologies and approaches presented and discussed during the meeting. The complexity of the area would mean a representation of the main development problems and pressures around the Mediterranean, such as tourism development, urban sprawl, infrastructure, forestry, agriculture and alike. Therefore, they should cover different situations and should be pro-active, i.e. focused on problem-solving rather than being descriptive and focused on data collection only. At a later stage of this activity, they could be used for the preparation of the guidelines for landscape management, which became one of the requirements of the ICZM Protocol.

From 2006 to 2010, four thematic studies were prepared dealing with, respectively: revitalisation of the rural landscape on an island in Croatia; characterisation of coastal landscapes of Tunisia; studies on outstanding landscapes in the coastal areas of the Mediterranean; and landscape planning including the vulnerability assessment methodologies. All four thematic studies form a basis for the Synthesis report.

The landscape character is defined as a distinct, recognisable and consistent pattern of elements in the landscape. The **Landscape Character Assessment** (LCA) is a set of techniques and procedures to map differences between landscapes, based on their historical evolution and physical characteristics (Griffiths *et al.*, 2004). LCA provides a common spatial framework as the foundation for integrating a variety of data from multiple sources that fulfils the needs for conservation, recreation and agriculture in the rural environment. Some of the most common applications that LCA can be employed for include:

- the development of indicators of ecological quality for monitoring the conservation status of the wider countryside;
- the identification of priority areas that are especially rich in wildlife interest;
- the identification of areas that provide the best opportunities to link, expand or buffer existing nature reserves and other protected sites;

- increasing understanding of the relationship between economic, social, and cultural factors and biodiversity;
- assisting with planning and landscape management applications and raising public awareness of landscape integrity;
- ways to achieve a long-term sustainable change in the landscape whilst protecting wildlife.

Despite the wide use of the Landscape Character Assessment (LCA) as a tool for landscape planning and management in NW Europe, there are few examples of its application in the Mediterranean as part of either a national mapping strategy or ICAM plans. (Vogiatzakis, I.N. & Cassar, L.F., 2007)

The thematic study on **revitalisation of the rural landscape** on the island of Korčula deals with a typical coastal area with problems common to other Mediterranean countries and in particular to the islands, i.e. the abandoned agricultural land and other developmental pressures that can significantly change the landscape, if the transformation process is not supported by expert proposals. The objective of the thematic study for the island of Korčula is to prepare planning models for agricultural lands in order to anticipate possible landscape changes to be adequately integrated into development alternatives in the planning instruments. Therefore, the purpose of the study is to identify the main problems of the island and to propose a planning model to be later used as an example for the whole island and other coastal areas. The landscape planning methodology, including the landscape analysis and valuation, modelling, as well as public participation, is applied. (Aničić, Ogrin, Andlar, 2007)

A **Landscape planning and vulnerability assessment** in the Mediterranean brings attention to the methodologies used in spatial planning, in particular the landscape planning approaches that allow for the integration of various land uses and protection of landscape values through planning instruments. The landscape planning approaches, such as the vulnerability assessment, are especially relevant for fragile areas such as the Mediterranean region, characterised by the increased competition of uses for the scarce and highly valuable natural resources. The vulnerability assessment provides tools for decision making on different levels and within different scopes of spatial planning and management. It can be applied as an input at the beginning of a planning process; as a mid-term evaluation tool or for comparing and making a choice among alternative options. Along with (strategic) environmental assessments, the vulnerability assessment is a key tool for a preventive environmental protection. (Golobič, Breskvar-Žaucer, 2010)

The **Outstanding landscapes** are the most valuable cultural and natural landscapes representing the identity at the regional or national level. The majority of cultural landscapes owe their value to agricultural practices and enormous efforts made by generations under the most difficult circumstances imaginable for cultivation. Combined with natural landscapes and natural elements such as hedges, individual trees, patches of natural features that pose extraordinary structural qualities, manifested in unique landscape patterns. In the present conservation practices, they do not represent a special category. Some of them are included within the national parks or landscape parks as a category of protected areas. However, most of them are not evaluated and managed under special guidance. Due to the development pressures and difficult production conditions, these landscapes are among the first to be abandoned or changed. Therefore, it is an urgent task to do something about them, in the first place to make an inventory of such landscapes and thereafter take adequate measures. (Bratina-Jurkovič, 2010).

GENERAL PART

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1. Introduction

The knowledge, recognition and awareness of a landscape as a value have become very distinctive and topical in the last two decades. The definition of landscape as a heritage - the cultural and natural one, is the earliest form of landscape protection.

But what is a landscape? The landscape is a space where we live and which we can change, take care of or maintain by our activity. The landscape reflects a common activity of natural processes and human activities. The main distinction is made between the natural and cultural landscapes.

Changes as a consequence of realisation of social needs in the form of new constructions due to the expansion of settlement, shrinking of forests, relief reshaping caused by agricultural activities, building of infrastructure, industry, sport facilities, expansion of tourism, etc. constantly take place in the landscape. All these changes, which have recently been growing extremely rapidly, had a strong influence on the landscapes and thus on their image. The pressure of intensive development and, consequently, changes of landscapes are also visible in the Mediterranean region and in particular in Mediterranean coastal areas.

In the developed countries, especially those with a very rapid and intensive development of various economic activities, people have become increasingly aware of the fact that the landscape is a limited natural resource which can be essential for the economic growth – above all for tourism.

The aim of this Synthesis report is to present and combine different knowledges of and views on the landscapes and their protection and development, with a particular stress on the Mediterranean coastal areas. It presents different methods, analyses, evaluations, and spatial planning tools for a quality spatial planning and ensuring the protection of landscapes, with special reference to the development and protection of cultural landscapes, and above all those influenced by human activities. The study is prepared as a compendium of several parts, consisting of four thematic studies commissioned by PAP/RAC and prepared in the period 2007-2010, with the general part presenting the theoretical aspect, the state of Mediterranean landscapes, development pressures on the coastal landscapes, and explaining the legal basis. It also includes the study on the Regional distribution of Landscape types in Slovenia (1998), i.e. its summary as an example of a good practice in the field of the Landscape Character Assessment. In 2009, the Committee of Ministers of the Council of Europe recognised the exemplary value of the study in the frame of the Council of Europe Landscape Award.

Individual studies can be found in the following five basic chapters:

- General part (introductory, explanatory and theoretical chapters as a basis for the Synthesis report);
- Landscape planning and vulnerability assessment;
- Landscape character assessment;
- Outstanding landscapes; and
- Revitalisation of landscapes.

Technical organisation and equipment of the study

The introductory General part is prepared as a combination of general subjects of the studies referred to. Some subjects are added and connected with the new ones as an independent contribution of the author of the synthesis study. Thus, the introductory texts are mostly taken from individual studies and combined into a coherent text so that it is clearly seen which contents is taken from an individual study. The

extracts from individual studies are marked as a reference with an official designation of the source. A large part of the contents and all photographic materials in the General part are taken from the thematic study entitled "Outstanding landscapes in the Mediterranean". (Bratina-Jurkovič, 2010)

The major part of the contents of the original studies providing the contents of individual studies is divided into individual chapters in four parts, whereas a part of theoretical contents from individual studies is included in the first part, the General part. The General part is prepared independently as a connecting theoretical part of the entire Synthesis report. Individual Thematic studies divided into four parts are marked with letters from A to E. These letters were used to better understand which part of the entire Synthesis report is included in an individual study. The same letter is used to mark all the graphics, photos and other enclosures included in an individual study. A graphical dividing line including an independent introductory page with a photo from the original front page of the study, the title of the chapter, and the letter can be found between individual studies.

The study is prepared comprehensively so that the front page of the "Landscape Management Methodologies: A synthesis report of thematic studies" includes the photos taken from all front pages of individual Thematic studies commissioned by PAP/RAC, and combined and presented in this Synthesis report. The text of the study is divided into columns in a uniform way; graphic enclosures are unchanged and only a letter was added to their designations for an individual chapter (that is, from A-E) for a better understanding which graphic enclosure is included in a particular chapter and study. The General part chapter is not marked with any letters and only photos and other graphic enclosures taken from individual studies carry an appropriate designation of the study – the letter of the study. Individual studies also include all the lists of graphic enclosures, sources, and references.

Individual studies are divided into basic chapters and are marked as follows:

- **General part:** Introductions and conclusions on the landscape management subject and theoretical contents from introductory parts of individual thematic studies including a new additional theoretical connecting text of the author of the Synthesis report;
- **Landscape planning and vulnerability assessment**:

  Landscape planning and vulnerability assessment in the Mediterranean (2010) - **sign A**;
- **Landscape Character Assessment**:

  Coastal landscapes of Tunisia with Special Focus on Cap Bon – A proposed Landscape Character Assessment (2007) - **sign B**;

  Regional Distribution of Landscape types in Slovenia (1998) - **sign C;**
- **Outstanding landscapes:**

  Outstanding Landscapes in the Mediterranean (2010) - **sign D**;
- **Revitalisation of Landscapes:**

  Revitalisation of the Rural Landscape of Blato Area on the Island of Korčula (2007) - **sign E**.

1.1 Landscape planning and vulnerability assessment – A

The thematic study entitled **"Landscape planning and vulnerability assessment in the Mediterranean"** brings attention to the methodologies used in spatial planning, in particular the landscape planning approaches that allow for the integration of various land uses and protection of landscape values through the planning instruments.

Although the landscape planning and vulnerability assessment in particular were not developed for any specific region, it should be noted that its concept and approach were developed to protect natural resources while trying to accommodate the needs of human uses. As such, these are especially relevant for the areas with the increased competition of uses for scarce and highly valuable natural resources and in particularly fragile areas such as the Mediterranean region. The vulnerability assessment provides tools for the decision making at different levels and within different scopes of spatial planning and management.

As such, it can contribute in several ways to integrated coastal management, as mentioned in the ICZM Protocol:

- It enables a preliminary assessment of the risk associated with the various human activities and infrastructure so as to prevent and reduce their negative impacts on coastal zones, to minimise the use of natural resources and take into account future generations.
- It enables integrated consideration of different aspects of hydrological, geomorphologic, climatic, ecological, socio-economic and cultural systems so as not to exceed the carrying capacity of the coastal zone.
- It supports formulation of land-use strategies, plans and programmes covering urban development, socio-economic activities and use of natural resources.
- It supports preparation of (strategic) environmental assessments of plans and programmes affecting the coastal zone. (Golobič, Breskvar-Žaucer, 2010).

The thematic study "Landscape planning and vulnerability assessment in the Mediterranean" includes the following presentations of the contents of the topic dealt with: the Landscape planning approach in relation to other planning concepts; Methods in the landscape planning; Vulnerability assessment; Integration of landscape planning concepts; Formal planning procedures; and Examples of vulnerability assessment application.

1.2 Landscape Character Assessment – B, C

The third part of the Synthesis report entitled "Landscape Character Assessment", presents two studies or two cases of a typological definition and evaluation of landscapes. First, it presents a thematic study "Coastal landscapes of Tunisia with Special Focus on Cap Bon – A proposed Landscape Character Assessment", as an example of a landscape evaluation in the coastal areas of Tunisia.

Then, it presents an example of a method of a typological definition of the Slovene landscapes as an example of a good practice. The study, entitled "Regional distribution of landscape types in Slovenia" was prepared in Slovenia, at the national level, and commissioned by the Slovenian Ministry of Environment and Spatial Planning.

1.2.1 Coastal landscapes of Tunisia with Special Focus on Cap Bon – a proposed Landscape Character Assessment – B

The Thematic study **"Coastal landscapes of Tunisia with Special Focus on Cap Bon – A proposed Landscape Character Assessment"** presents the method and an example of the use of this method in the Tunisian coastal areas. It comprises the following chapters: Landscape Character Assessment; Landscape Character Assessment of Tunisia; The need for a coastal landscape conservation strategy; and Conclusions.

The landscape character is defined as a distinct, recognisable and consistent pattern of elements in the landscape. The Landscape Character Assessment (LCA) is a methodology, which uses a set of techniques and procedures to map differences between landscapes, based on their historical evolution and physical characteristics. This methodology provides a common spatial framework as the foundation for integrating a variety of data from multiple sources that fulfils the needs for conservation, recreation and agriculture in the rural areas. It is a useful tool for the landscape planning and landscape management.

A practical part of the thematic study, namely, a proposed Landscape Character Assessment, was prepared in the coastal landscapes of Tunisia, in the area of Cap Bon. Tunisia has a great variety of coastal landscapes that reflect differences in biophysical conditions, and cultural heritage. The major threats to the coastal landscapes of Tunisia are common along the Mediterranean coastal zone, and related to uncontrolled development, urbanisation, increasing national and international tourism, land-based pollution, and unplanned or over-exploitation of natural resources, in particular freshwater. The strongest among these pressures, following the general trends on the South Mediterranean coast, are population increase and animal husbandry. As in the majority of Mediterranean countries, an assessment of landscape character and associated pressures on specific landscape types has never been realised in Tunisia.

The Cap Bon peninsula, located at the north-eastern tip of Tunisia, was selected for a more detailed landscape study. The selection of the area was due to its significance in terms of biodiversity and the range of pressures affecting its landscapes.

The aim of this project is to prepare a landscape character assessment for the coastal landscape of Tunisia. The specific objectives are the following:

- identify the current landscape management practices in the coastal zone of Tunisia and associated pressures and changes;
- illustrate the Landscape Character Assessment methodology;
- present a Landscape Typology for the Tunisian coastal landscapes with emphasis on the Cap Bon Peninsula;
- provide recommendations for the landscape-based management and on interventions that are deemed to have an impact on coastal landscapes;
- encourage the local authorities to implement the ICZM Protocol, in particular the provisions referring to landscape management and assessment.

The thematic study describes the steps undertaken to address these objectives. In particular, it sets out the development of an LCA methodology that could be employed, and provides with an example of its application based on real spatial data for Tunisia and the Cap Bon Peninsula.

1.2.2 Regional Distribution of Landscape types in Slovenia – C

The study entitled **"Regional Distribution of Landscape Types in Slovenia"** is presented as a summary of the most crucial subjects for understanding the method and the typological definition of landscapes in Slovenia. Graphic enclosures published in this Synthesis Study are

selected and summarised from the original study, particularly from the Volume on Methodological Bases and from the material prepared for the Candidature – for the 2008 honorary public award for the excellent work done in the field of landscape management in Slovenia and for the 2009 **Landscape** Award of the Council of Europe.

A project "Regional Distribution of Landscape Types in Slovenia" (1998) provides an inventory and typological definition of all landscapes in Slovenia. The achievement of the project is an atlas of landscapes, which defines five landscape regions divided into typological units, with a description of the landscape characteristics and patterns. The project also provides guidelines for landscape planning according to landscape typological units.

The project was commissioned by the Slovenian Ministry of the Environment and Spatial Planning, the National Office for Spatial Planning from Slovenia, and elaborated by the University of Ljubljana, Biotechnical Faculty, Department of Landscape Architecture, from Slovenia. It started in 1991 and was completed in 1997. The achievements of the project were presented in a publication in 1998. The project includes six individual volumes combined into a whole. The volume on Methodological Bases includes the aim of the study, the method of work, and the implementation procedure for the study. The following five volumes present and describe typologically defined landscapes according to individual five basic landscape regions in Slovenia and provide guidelines for landscape management.

The study describes landscape areas including landscape types and patterns and provides guidelines for planners developed according to individual landscape regions or typological units. The guidelines are based on specific features of the landscape structure, taking into account the expected landscape processes and the desired state of these landscapes.

The project aimed at:

- preparing the material for a national spatial plan to be used as one of professional bases for landscape planning;
- enforcing the landscape conservation by defining the outstanding landscape regions;
- implementing the indirect landscape conservation by integrating knowledge of landscape qualities into assessments in various land developing activities;
- giving practical directions to all those dealing with land development activities;
- elaborating general guidelines on how to behave in the landscape environment.

The Synthesis report provides a summary or an extract from the contents of the entire study "Regional Distribution of Landscape Types in Slovenia", placing stress on the explanation of the methodology, method of work, and results of the study. The study is presented in the following chapters: Project description; Working procedure; Landscape regionalisation of Slovenia; Typological classification of Slovenian landscapes; Landscape evaluation; Publication about the project; Contribution of the Project to establishing landscape quality objectives; and Popularisation of the project results.

1.3 Outstanding landscapes – D

The thematic study entitled **"Outstanding Landscapes in the Mediterranean"** was prepared in order to preserve the outstanding diversity of coastal landscapes. Due to intensive socio-economic impacts and changes in the Mediterranean landscapes, the Mediterranean coastal landscapes are often degraded or even destroyed. The study provides a methodology for defining the outstanding landscapes in the Mediterranean as the most valuable and typical landscapes in the Mediterranean region. Finally, two examples of the definition and evaluation of outstanding landscapes are presented according to the method provided in the thematic study.

The study comprises the presentation of the contents of the subject of outstanding landscapes dealt with, namely: The concept of outstanding landscapes; Criteria for the definition of outstanding landscapes; Methodology for the selection of outstanding landscapes; Proposal on how to introduce the outstanding landscapes into national policies; and Case studies – presentation of two examples of outstanding landscapes.

The landscape of harmonious and consistent relations is an essential competitive advantage between the human activity and preserved nature. A recognisable outstanding landscape presents above all the identity of a certain area at different levels (regional, national, European, international or global). The treatment of landscapes is also subject to the ideas of the society about it thus influencing the state and image of landscapes and quality of our life.

The special value landscapes are mainly defined as areas with great experience values connected with the outstanding natural or created landscape structure, a high level of nature conservation, outstanding forms of cultural landscapes or with other, mainly symbolic and associative meanings. The purpose of defining the outstanding landscapes is the protection and maintenance of their values, since, being the greatest achievement of landscape architecture, they are crucial for the formation of national identity.

Specifically for this purpose, we wanted to provide an insight into spatial issues and the definition of recognisable areas with special value referred to as outstanding landscapes. The study is prepared in such a way as to provide the definition of the Mediterranean coastal region and the explanation of the new concepts in the first part. Then, an overview of the Mediterranean environment and space, the state of landscapes and influences of spatial changes is provided. In the continuation, the design of the outstanding landscape category is explained as well as the concept and criteria for defining the outstanding landscapes and explaining their meaning and importance at the national and broader level. The possibilities for the inclusion of the contents in the spatial and other sectoral policies are also listed. Finally, two examples (as proposals) of outstanding landscapes are presented with descriptions, evaluation procedure and explanation of criteria, definition of the border area, photo and graphical presentations, while one of these examples is presented as a possible candidate for outstanding landscape.

A specific aim of this study is to provide advice on and knowledge of the concept of outstanding landscapes as specially protected landscapes in the planning and management field to responsible experts and administration at the national, regional and local level, non-governmental organisations and, above all, to those adopting decisions, politicians and stakeholders from the local to international level.

1.4 Revitalisation of Landscapes – E

The purpose of the thematic study entitled **"Revitalisation of the Rural Landscape of Blato Area on the Island of Korčula"** is to identify the main problems of the island and to propose a planning model to be used later on as an example for the whole island and other coastal areas. The landscape planning methodology, including the landscape analysis and evaluation, modelling, as well as the public participation, is applied.

This thematic study includes the following presentations of the contents of the subject revitalisation of landscapes dealt with: Introduction – Structural and formal features of the landscape in the Karst; Selection of a site location – Blato on the island of Korčula; Defining problems; Inventarisation; Analysis and valorisation of the area; Conflicts - Revitalisation model and Discussion with public participation.

Changes and processes related to agricultural landscapes, namely, modernisation of agriculture, on the one hand, and its abandonment, on the other, is a common problem in the Mediterranean countries. Both processes are reflected in the landscape and can have positive or negative implications on it.

Therefore, it is necessary to develop and put in practice instruments to keep farmers on their land, which is related to the introduction of new technologies, and to support farmers in the form of subsidies. In parallel, the planning instruments and procedures, such as the landscape planning, should be introduced to adequately respond to these needs.

The island of Korčula is a typical coastal area with problems common to other

Mediterranean countries and in particular to the islands, i.e. the abandoned agricultural land and other developmental pressures that can significantly change the landscape, if the transformation process is not supported by expert proposals. It is more than obvious that landscape transformations are not only a spatial issue but more a socio-economic one.

The implementation of the methods referred to and their inclusion in the spatial planning procedures ensures the protection of a typical Mediterranean landscape and Mediterranean islands and thus the implementation of the ICZM Protocol, particularly the provisions from the Article 11 dealing with the protection of islands.

Photo D1: Račišče settlement– island of Korčula, Croatia

Photo D2: Coast from Kornati islands - Levarnaka, Croatia

2. General introduction to Mediterranean landscapes

The Mediterranean coastal region is a junction of three continents – Europe, Africa and Asia. It comprises three peninsulas – the Iberian, the Apennine and the Balkan Peninsula which are together geographically designated as the region of Southern Europe. The Mediterranean coastal region is above all defined by the Mediterranean Sea and a specific climate. The Mediterranean coastal region varies greatly from other land regions; therefore, it is logically dealt with separately. Here, the Mediterranean several millennia old outstanding natural and cultural heritages are blended.

The imaginary and idealised Mediterranean landscape

Precisely, the fertile imagination of the Mediterranean civilisation, as expressed in the ancient mythology and absorbed by the Judaeo-Christian religions, has made it possible for the peoples of the Mediterranean to invent a better, idealised "other places", a landscape full of delights and harmony. It has also inspired these peoples to create on this earth a landscape that approaches as close as possible the place of which they have dreamed for thousands of years. The Garden of the Mediterranean, the "paradeisos" of ancient Greece, attempts to formalize the mythical dream of a fertile nature where man lives in harmony with the other living creatures of the world, where everything is scented, soft, and sensual. (Luginbuhl, 1992)

The building of the Mediterranean landscape

The Mediterranean landscape is a result of combined efforts of various civilisations that have sprung up around that almost closed sea, that vast thoroughfare which has facilitated the exchange of ideas, goods, techniques and new inventions and products of all types. These efforts are and have been, down through the centuries, of essentially peasant populations¸ although merchants, shipbuilders, soldiers, fishermen and engineers have also made their contributions by building towns and cities, harbours, fortresses, bridges, channels, dikes, and reservoirs.

2.1 Characteristics of the Mediterranean

Among the common natural and man-made characteristics of the Mediterranean, the Mediterranean Sea and its climate occupy the first place followed by characteristic vegetation, adapted agriculture, the type of building and the way of life – maritime navigation, fishing, desalination at the saltpans and tourism.

Mediterranean Sea

The Mediterranean coastal region is mainly characterised by the sea or the contact between the land and the Mediterranean Sea. The coastal region is explicitly articulated with peninsulas and numerous islands, with different gulfs and beaches from the rocky to shingle or sandy ones. Islands differ among themselves in size, form, distance from the land and unique characteristics. The Mediterranean can according to the relief be designated as a close permeation of the sea, plain, hills and mountains.

Mediterranean climate

The typical Mediterranean climate is the basic characteristic of the Mediterranean area. This is a type of climate of coastal regions of countries surrounding the Mediterranean Sea. Summers are sunny and hot and very dry, whereas winters are mild and rather rainy.

The Mediterranean climate was defined for the special Mediterranean climate by geographers with a scientific term which is now used also for other areas with a similar climate – e.g. in Chile and in Australia.

Flora

Flora is adapted to drought, whereas the forest where preserved is thin and bright. Characteristic flora is mainly stone pine, cypress, holm oak (*Qurecux Ilex*), palm trees, rosemary, lavender, laurel, agaves, oleander, bougainvillea, etc. Agriculture which depends on irrigation is also adapted to the hot and dry climate. Traditional crops are wheat, maize, fruit, grapevine, tobacco, citrus fruit, fig trees, olive trees, pistachios, crab trees. Sheep and goats are above all characteristic of livestock farming. Saltpans which are in some places still preserved are characteristic of coastal plains.

Biodiversity hotspot

The Mediterranean basin is recognised as biodiversity hotspot, rich in endemic flora and fauna, with 60% of unique flora species, 30% of endemic fauna and approximately 7% of all the marine species known worldwide, nearly 19% of assessed species to date are considered threatened with extinction. (SOED, 2009)

Saving of coastal nature diversity is one of the most important resources of number of coastal activities. However, regional assessment done so far for nine species groups shows that almost a fifth of these species are threatened with extinction mainly as a result of human activities. Conservation actions implemented to date have had positive results and some species have already been saved from extinction. Namely, from 2004 to date 175 large biodiversity projects have been identified within the Mediterranean region. However, in a region like the Mediterranean, where biodiversity is so strongly influenced by human activities, biodiversity loss is a constant reality that will only be stopped when humans realise that safeguarding biodiversity will ensure favourable environmental conditions that lead to increased economic and social benefits for all. (SOED, 2009)

Activities

The Mediterranean has been connected with the maritime navigation making large ports very significant some of which have also become important oil harbours. Industry was developed in their vicinity.

Tourism is apart from agriculture the most important branch of economy and the Mediterranean is the strongest European tourist area. A strong concentration of population and economic activities can be seen along the coast in the coastal areas of the Mediterranean.

Common is also the way of life in the Mediterranean which is most explicitly shown in the densely built settlements and the elements of building and architecture. (Bratina-Jurkovič, 2010)

Mediterranean region in numbers

The Mediterranean region is a very extensive, densely populated and extremely desired tourist destination also according to the definitions expressed with information.

The Mediterranean countries comprise the area of 5.7 % of all land in the world.

The Mediterranean coastline is approximately 46,000 kilometres long, with nearly 19,000 kilometres of island coastline. 54% of that coastline is rocky and 46% is sedimentary coast that includes important and fragile ecosystems such as beaches, dunes, reefs, lagoons, swamps, estuaries and deltas. (SOED, 2009)

A number of 460 million residents live in Mediterranean countries, which amounts to 7% of the world population. The projection of population growth in this area until 2025 is the increase to 520 million residents. This means 60 million more residents in the next 15 years. 60% of residents of countries with scarce water resources live in the Mediterranean.

The biggest problem in continued growth in population and infrastructure is linear nature of coastal urbanisation resulting in nearly 40% of the total length of the coastal area already being occupied.

Every year 275 million people visit the Mediterranean region which amounts to 31% of all global tourism. The Mediterranean countries generate 12% of global national product, but this share has lately been slightly decreasing. (SOED, 2009).

Photo D3: Olive tree plantation

Photo D4: Lavender plantation on Hvar island, Croatia

Photo D5: Vineyards in Bekka valley, Lebanon

Photo D6: Plantation of cactus in Sicily, Italy

Photo D7: Traditional agriculture – mixed culture

Photo D8: "Cultura mista" – island of Hvar, Croatia

Photo D9: Primošten, Croatia

Photo D10: Vineyards, island of Hvar, Croatia

Photo D11: Acropolis, Athens, Greece

Photo D12: Church, Island of Pag, Croatia

Photo D13:Traditional stone architecture, Hvar, Croatia

PhotoD14: Greek influence in Sicily, Italy

Photo D15: Abandoned villa in Hvar, Croatia

Photo D16: Traditional entrance, Greece

Photo D17: Traditional entrance, Spain

Photo D18: Public atrium with orange plantation, Spain

Mediterranean cultural elements

There are several cultures in the Mediterranean which vary among themselves but are connected with each other. Although related, the Mediterranean cultures are by no means completely equal. Some of their characteristics are similar, whereas others are very different. The differences are subject to the origin, history, religion and cultural practices. Here, three religions meet – Judaism, Christianity and Islam thus also leaving an obvious impact in the outer image of the Mediterranean countries.

In the historical description of the past of the Mediterranean, it is unique that large and strong nations such as the Romans, Greeks and Arabians sailed across the Mediterranean Sea and carried out mutual trading, settlements and combat land conquests in the Mediterranean countries and on the islands. The Greek and Roman Empires were the strongest. In different periods, one nation could prevail on the same lands and then the other leaving obvious impacts in the landscape everywhere and above all in the Mediterranean coastal regions. For example: The Arabians invaded from Africa to the Iberian Peninsula in the 8th century. A combat against the Arabic conquerors lasted until the end of the 15th century when the countries, today Spain and Portugal, were formed. The Arabic several century long occupation of the land left deep marks in the culture of both nations. This can still be seen today and above all in the architecture and landscape. Greece had a very strongly developed maritime transport and the merchant and conquest marine. Thus, on their navigations they conquered some southern Adriatic islands and the Italian islands, such as Sicily and Malta, leaving visible impacts of the Greek culture there. Three quarters of Italian borders are located along the Mediterranean coast and together with the islands of Sardinia and Sicily Italy was a strong maritime power as early as in the period of the Roman Empire. Thus, the main maritime and merchant republics – Venice and Genoa, developed there. Otherwise, the Roman Empire exerted a great influence on the large part of the Mediterranean and Central Europe as early as from the 3rd century BC. (Brinovec et all, 1998)

The characteristic architecture and the typical cultural landscapes, practices and customs can also be classified as cultural elements. The architecture is above all expressed as stone building with architectural styles which are typically Mediterranean, such as: the Ionic, the Doric and the Corinthian architecture, the Roman architecture and architecture influenced by the Arabic countries and other built characteristics – e.g. white-painted houses. The settlements were also characterised by small gardens in the atrium of houses (patio) or yards (yard gardens) and paved public squares with fruit plantations, usually planted with uniquely arranged citrus fruit trees. (Bratina-Jurkovič, 2010)

2.2 Mediterranean landscapes as a Mediterranean identity

Humans have adjusted to the natural diversity of the Mediterranean territory and over the centuries created various forms of landscapes.

Uniqueness and recognisability of Mediterranean landscapes are reflected in characteristic climatic conditions, characteristic ecosystems and the typical vegetation (the natural and cultural vegetation). The Mediterranean landscapes are also very diverse along the coast of the Mediterranean Sea. The climate and relief above all influence the diversity of the Mediterranean coastal landscapes. Geological characteristics and hydrological, vegetative and cultural characteristics related to them also define the diversity of landscapes. The geological (different bedrock) and relief diversity create a great variety in land use, orientation of the space, hydrology, etc.

The Mediterranean landscapes reflect the current as well as the past relations between humans and their natural and built environment contributing with its diversity to the local and regional identity. Through the history, people settling the Mediterranean developed very diverse and rich cultural landscapes with their diverse culture and religion. The typical

Mediterranean cultural landscapes are the result of a transformation of land – relief with the purpose of food production, building of residences, strongholds, churches, cemeteries, manors and artistic garden and park creation.

Photo D19: Sea landscape – the Adriatic

Photo D20: Coast landscape, Spain

Photo D21: Island of Kefalonia, Mirtos, Greece

Photo D22: Coast landscape, Greece

Photo D23: Kornati islands, Levarnaka, Croatia

Photo D24: Town of Hvar, Hvar island, Croatia

Photo D25: Boungevilia

Photo D26: Oleander

Photo D27: Orange tree

Photo D28: Lemon tree

Photo D29: Olive tree

Photo D30: Grapes

The cultural landscape in the countryside is above all characterised by agriculture which plays the vital role in its development. Terraces are characteristic areas cultivated on the steep slopes and stone border walls where mixed cultivation crops are being increasingly replaced with intensive plantations. Forests or small patches of forest also play an important visual, biological and climatic role in the Mediterranean landscapes, although forest is relatively scarce. Many former agricultural lands are grown by autochthonous forest vegetation, in some places also as a result of reforestation.

The traditional landscape cultivation pattern of the Mediterranean coastal zone is above all formed by vegetation with blended natural plant elements, decorative vegetation and agricultural crops as well as small contiguous settlements. The forms of farmlands are characterised by numerous small areas designed in the form of a square which are ranked on the slopes as terrace areas. The width of terraces is defined by the steepness of the slope. The “mixed culture” as a general Mediterranean cultivation pattern combining the cultivation of vegetable plant species, herbs, crops, grapevine, olive and fruit trees is characteristic of agricultural lands. The Mediterranean climate characterised by a high illumination throughout the year and high temperatures enables a “mixed cultivation”.

The traditional landscape pattern of the “mixed culture” is being displaced by the modern arrangement of farmlands abandoning the former terraces on the steep slopes and arranging larger dense farmlands in the flat areas. The basic pattern is preserved by the Mediterranean decorative plants and the Mediterranean natural vegetation which is also gradually overgrowing the terraces on the steep locations.

The large coastal plains were formed near river mouths. The extensive areas of saltpans were located there in the past. Nowadays, these are in some places changed to agricultural lands, whereas salt is partly produced on them. In some places, however, they are abandoned and decaying.

The Mediterranean cultural landscapes are also characterised by man-made built elements, above all by architecture and characteristic

urbanisation. The traditional settlements are located in the landscape mainly considering climatic conditions and are mostly contiguous. The current settlement is losing the traditional pattern of contiguous settlements. Settlements are mainly located near towns and their construction is rather rapid. The construction is dispersed and above all not enough controlled resulting in landscape degradation. (Bratina-Jurkovič, 2010)

2.3 Coastal landscapes in the Mediterranean

The transformation of the Mediterranean landscapes has been a long process involving both natural and human induced processes (Ogrin 2005; Vogiatzakis *et al*. 2005) resulting in a complex landscape mosaic. After the Second World War, this transformation was not only driven by agriculture, fire and grazing but also by imperatives (national or global) that bear little relation to the local and regional contexts in which settlements and agriculture have developed over millennia. Further anthropogenic pressures have been described by Naveh and Lieberman (1994) as the cause of a “neo-technological landscape degradation”. The forces of population growth and industrialisation have stimulated considerable land-use change, especially agricultural intensification, with associated impacts including soil erosion, eutrophication and industrial and power-plant construction. These processes now threaten landscape integrity and diversity in the region altering a fine grained and multifunctional landscape.

The idea of landscape conservation was initiated by the IUCN (IUCN 1994). In Europe over the last 10 years “landscapes” have received increasing attention from policy makers (Council of Europe, 1992; PEBLDS, 1995; ELC 2000) and researchers both at the national and international level (Vogiatzakis *et al*., 2005; Mazzoleni *et al*., 2004; Makhzoumi and Pungettti 1999). This reflects a new paradigm shift in natural resources management that recognizes the importance of landscape functions and values. The landscape is the fabric that integrates settlement, agriculture and ecology and offers a spatial unit for sustainable land management through the integration of sectoral activities (Naveh, 1995) and with which stakeholders can resonate. During the 20th century the rapid change and the growing concern about the impacts of these changes on the landscape led to an increased interest in the inventory of land cover and lands use as well as the mapping and understanding of the landscapes. There is a growing realisation that new approaches are necessary for the protection and management of all landscapes in a holistic manner rather than focussing on the most ”valuable” and beautiful landscapes.

The physiognomy of the coastal landscape is created by geological, geomorphological and biological factors greatly modified by human activity. Many different kinds of classification have been applied to coasts in attempts to characterize dominant features in terms of physical or biological properties, modes of evolution, or geographic occurrence (Fairbridge, 2004; Finkl, 2004; EUCC, 1998; LOICZ, 1998). The increased availability of spatial data in digital format and the advances in Geographical Information Systems and other disciplines provided the opportunity for a more comprehensive study of the coastal environment in an integrated and systematic manner (Vogiatzakis, I.N. & Cassar, L.F., 2007).

Photo D31: Olive tree –a recognisable Mediterranean plant

Photo D32: Typical Mediterranean settlements – stone, agglomerates

Photo D33: Abandoned terraces being overgrown, Croatia

Photo D34: Terraces – vineyards, Croatia

Photo D35: Cultural landscape, Island of Madeira, Portugal

PhotoD36: Stone-made terraces, Croatia

Photo D37: Ibla, Sicily , Italy

Photo D38: South of Sicily , Italy

The typical traditional Mediterranean town in the coastal zone – Korčula, island of Korčula, Croatia

Photo D39: Town of Korčula, Croatia

Photo D40: Town of Korčula from air, Croatia

Photo D41: Mediterranean town of Korčula, Croatia – cultural heritage

Photo D42: Main entrance to the old part of Korčula town, Croatia

Photo D43: Wider area of Korčula town, Croatia

3. Landscape changes in the Mediterranean

Over time, people have always been changing the natural environment. The available technique and technology enable people to exploit natural resources, managing and adjusting the environment to their needs while trying to adjust to it. Due to the increasingly advanced technology, the changes in the environment, space and landscape are becoming more intensive and concrete resulting in a serious degradation and permanent damage or even the destruction of landscapes. Today's image of landscapes is the result of all human activities, which have transformed the relief as successive layers and have been imprinted as patterns in the surface over centuries and millennia of changing and adjusting or cessation of old forms of dealing with and preserving the heritage of older cultures.

In the entire Mediterranean area, the coastal regions are exposed to a very strong pressure of intensive development and to the problems endangering the coastal resources. The result is a degradation of coastal natural and cultural landscapes which decreases the possibilities of sustainable development of economic activities.

The distinctive influence of humans on the coastal and marine ecosystems, which is reflected in deterioration of ecological state of coastal waters and production of healthy seafood, is also increasing. This is above all due to influences from intensively urbanised areas and, consequently, the increase of transport on the land and sea, expansion of ports and extensive industrial fishing. The result is a substantial economic damage and permanent changes of the whole image of the Mediterranean area.

All these changes in the Mediterranean area cause the degradation of coastal landscapes which is above all the consequence of the following human activities:

- extremely increasing development of settlements and tourism in the narrowest coastal zone;
- uncontrolled urbanisation – a dispersed and oversized construction;
- unregulated residential construction of family houses mostly extending to the very coast and slopes of the coastal zone;
- development of mass tourism, increasing construction of tourist settlements (hotels, apartment settlements) with a uniformed image that is entirely untypical of the Mediterranean and oversized;
- growth of intensive industry and maritime transport;
- deteriorated situation in agricultural areas due to abandoning of the traditional cultivation and introduction of plantations;
- soil erosion and desertification;
- frequent forest fires in the coastal areas which are far too poorly controlled;
- excessive use of coastal and maritime resources;
- pollution and consequently a loss of species, habitats and landscape diversity (Bratina-Jurkovič, 2010).

Photo D44: Marina near Primošten in Croatia

Photo D45: Beach in Montenegro

Photo D46: Nice, France

Photo D47: Loret del Mar, Costa Brava, Spain

Photo D48: Monte Carlo, Monaco

Photo D49: Menton, France

Photo D50: Saint Tropez – old part, France

Photo D51: Cadaquies, Spain

Photo D52: Natural coast, Korčula, Croatia

Photo D53: Island of Korčula, Pupnat bay, Croatia

Photo D54: Island of Mykonos, Greece

Photo D55: Town of Symi, Greece

Photo D56: Santorini, Greece

Photo D57: Malaga, Spain

Photo D58: Mallorca, Spain

Photo D59: Beach, Turkey

3.1 Reasons for landscape changes

There are numerous undesirable spatial processes in the Mediterranean region resulting in a poor structure and image of landscapes. Furthermore, the responsiveness of the society to these occurrences is not satisfactory. The socio-economic processes cause the spatial physical changes and the transformation of landscapes.

The most important reasons for the changes causing the degradation or even the destruction and loss of the Mediterranean landscapes are highlighted in the following paragraphs.

Increase in population and uncontrolled urbanisation

A rapidly growing population concentration, particularly in the last 20 years, the uncontrolled expansion of tourism and thus the reduction of areas intended for spare time activities, recreation and sport in the coastal zone are the main causes of degradation of the coastal Mediterranean landscapes. This is mostly present in the countries of the Southern Mediterranean, although it can more or less be noticed everywhere. All this is connected with land speculations and illegal building and thus the residential and tourist construction reaches to the most quality coastal areas bringing about a permanent negative influence on the coastal zone and coastal landscapes.

Urbanisation of the coast is already so strong that it has reached the state of saturation or hyper development characterised by a high population concentration, degradation of environment and thus the decreased quality of life. The biggest problem of a continued population growth and infrastructure is a linear development of the coastal urbanisation resulting in nearly 40% of the total length of the coastal area already being occupied.

The process of settlement along the coast is due to the expansion of economic growth along the coast and favourable climatic conditions. The process is so intensive that it accelerates a characteristic phenomenon of littoralisation and its pressures on the environment. The differences in the development of narrow coastal areas and the abandoned poor areas in the hinterland of the Mediterranean region are increasing. Demographic trends show that the population in the southern and eastern Mediterranean countries will even more increase in the future.

Intensive development of tourism

Tourism is a vital economic activity for all Mediterranean riparian countries. Drawing upon their geographical location at the crossroads of three continents, these countries attract 30% of global international tourism arrivals. In 2007, they received around 275 million international tourists. Tourism activities generate two series of environmental impacts: those related to transit and those related to out-of-home stays. (SOED, 2009)

The emergence of mass tourism in the very coastal zone has significantly changed the image of the landscape and settlements which were filled with complexes of multi-storey hotels and apartment settlements. These are in a sharp contrast with the traditional architecture and other traditional landscape forms. Tourism has with its great needs in the narrow coastal zone led to conflicts with agriculture, industry and water supply. Terraces as typical farmlands which were cultivated for millennia are also being abandoned.

The expansion of tourism increases the already existing problems of urban areas, whereas the biological diversity and landscape values of coastal areas are decreasing. The most interesting locations in the area and special landscapes, those in which the natural image or a great part of cultural characteristics are still successfully preserved and thus have a high value, are under the greatest pressure of the future tourism development.

As the Mediterranean tourism is predominantly of a seaside character, all installations constructed specifically on the coastline

contribute to the artificial coasts cover. The development of boating also contributes in exacerbating this phenomenon via the construction of ports and of marinas, both of which are large area consuming. For instance, Monaco and Gibraltar report the highest density of marinas per km of coast, with an average distance between the ports ranging from 2 to 4 km, while Egyptian coasts report not more than one boating port every 239 km. (SOED, 2009)

Modernisation of agricultural areas

In the recent decades, modernisation of agriculture by introducing new technologies and agricultural practices, such as plantations, is also considerably present in the Mediterranean area. Owing to the intensification of agricultural cultivation, the biotic (species, habitats) and landscape diversity is increasing and the typical image of the Mediterranean is changing due to the activities such as drainage of marshy lands, disappearance of dunes, changes and regulations of water beds, relief levelling of farmlands and similar. Apart from that, soil erosion, and in some places also desertification - the process of expansion or formation of desert areas as a result of climatic changes, inappropriate land use or certain complex interactions of these factors - are emerging consequently.

Elsewhere, on the steep slopes, the cultivation of agricultural lands is being massively omitted and these are exposed to overgrowing resulting in the basic transformation of cultural landscapes. The traditional landscape patterns are disappearing, as well as landscape structures and textures of articulation, field land articulation, use of natural elements (i.e. stone walls), etc.

Forest fires as natural disasters or influenced by humans

Forest fires in the Mediterranean coastal areas have recently become a serious threat and a great problem. They often break out as a natural disaster due to increasingly longer drought periods, and sometimes also due to negligence or intentional influence of the human. Owing to the impoverishment of surfaces due to fires, the surface cover is being destroyed and reduced and the basic characteristics of the landscape on the affected areas are changing. The surfaces are becoming bare and it takes a lot of time for them to become naturally rehabilitated with vegetation, which, however, is not equal to the original cover. Fires often break out near urban and tourist areas whose visual, microclimatic and social functions are thus completely changed and very impoverished. In remote areas, these surfaces are often left to natural succession, which is a long-term process. Reforestation is often carried out, particularly near settlements and tourist areas, which is, however, not always the most successful measure. With reforestation, new tree species (often non-autochthonous) and new, different landscape patterns – linear and symmetrical instead of the organic ones - are introduced.

Pollution due to intensive human activities

Pollution of the sea and seacoast is very intensive due to human pressures on the Mediterranean environment. The industrial production (food industry, energy, metallurgical industry, cement works, chemical installations and oil refineries), municipal sewage and eutrophication, as well as unbearable pressure on the sea with nutrients, are the main problems of the Mediterranean. Municipal sewage contributes 80% of all pollution of the Mediterranean Sea. Excessive industrial catch results in disappearance of marine species, also those which can already be found on the lists of endangered species.

A lack of drinking water and water for irrigation is a known fact in the Mediterranean, but the needs for water are constantly increasing in the entire Mediterranean region.

Climatic changes

Explicit climatic changes in the Mediterranean, influencing also the changed image of coastal regions, have been noticed recently.

At a global scale, the overall Mediterranean basin is considered a climate change hotspot.

The trend in the Mediterranean region is towards a rise in temperature. By the end of the century, the average annual temperature increase is likely to be between 2.2°C and 5.1°C for 2080-2099, compared with 1980-1999. The probability of temperatures rising by between 3 and 4°C is estimated at 50%. A high climate change hotspot

area is in Egypt, in the area of Alexandria. (SOED, 2009)

In the southwest, say in Spain, Northern Africa and in the Southwest Europe, an increase in average temperature by approx. 2°C and a decrease in precipitation (in the last century a decrease in precipitation by 20-25%) can be noticed. The sea temperature is also rising. In the western part of the Mediterranean pool, the deepwater and coastal temperature of the sea has in the last 30 years been averagely increased by 1°C (SOED, 2009).

3.2 Influence of changes on the landscape

Most of changes influencing landscapes can be contributed to the rapid development and uncontrolled urban development. Changes in the space are above all visible as:

- reduction of wide areas along the sea in the form of natural habitats or culturally created areas – agricultural areas which are now irretrievably reduced and degraded;
- reduction of a free access to the coast – a direct contact between the land and the sea;
- permanent reshaping of natural coast and relief in the coastal zone;
- reduction of fertility of the land and sea;
- increase in pollution in the coastal zone due to emissions of faeces in intensively populated areas and due to "huge" ports and excessive maritime transport;
- biological impoverishment of the sea;
- reduction of possibilities of using mineral resources;
- reduction of possibilities of using the coast and sea for bathing;
- excessive consumption of drinking water in the already endangered area with scarce water resources;
- a great fragmentation and dispersal of activities can already be seen in the landscape;
- intensive degradation of the coastal zone can also be seen;
- permanent disappearance of certain characteristic landscapes;
- the integrity and identity of the Mediterranean area are disappearing.

The coastal and maritime ecosystem services, which used to form a basis for the development of local population, are very impaired in the Mediterranean coastal areas and degraded and endangered as to their quantity and quality. Endangered are the production of healthy food and the development of future tourism, whereas the quality of life, which used to be an advantage and attracted new residents to these areas, is decreasing.

Consequently, the characteristic, natural and cultural quality and outstanding landscapes are being destroyed. The degradation of coastal landscapes causes the disappearance of the most quality Mediterranean coastal landscapes as the Mediterranean most characteristic image and identity. All this has irreversible social influences on environmental, spatial, social, cultural, and last but not least, economic aspect of the Mediterranean region. Quality landscapes are an important factor for the development and success of economic and social initiatives and form the basis for a healthy and quality way of life.

The Mediterranean characteristic and recognisable natural and cultural landscapes give a distinctive identity to the Mediterranean. Since these are recognised as a particular cultural landscape heritage at the international level, they have to be preserved and protected. The Mediterranean landscapes have to be dealt with fully and the policies and measures for their protection, management and spatial planning must be adopted as required by the ICZM Protocol.

Photo D60: Urban coastal landscape, Benidorm – Spain

Photo D61: Beirut – beach (tourist area)

Photo D62: Port of Barcelona, Spain

Photo D63: New settlement, Cala Montgo, Spain

Photo D64: Cultural landscape – Spain

Photo D65: Targha Coast, Morocco

Photo D66: Naples, Italy

Photo D67: Area of Tuscany, Italy

4. About the landscape in general

Different literatures provide different definitions of landscapes and cultural landscapes, since these are the phenomenon of and a subject dealt with in different scientific disciplines. However, by looking at different definitions and comparing them with each other, we can see that they are mostly very similar in terms of the contents. They are dealing with the perception and studying of landscapes as the result of economic, social and protective factors.

The cultural landscape is a man-made as well as a cultural phenomenon (Panjek, 2006). The cultural landscape is a result of several century long human activities, particularly agriculture and the expansion of settlement. These activities have left a mark on landscapes over the centuries of their formation and the adjustment of the natural environment to human use. Agriculture, the construction of settlements, traffic routes, representative and religious facilities have left the most expressive patterns. Agriculture with its specific patterns of the field land articulation, revealing the basic characteristics of agricultural lands (form, size and land use type), land cultivation methods, and individual characteristic elements such as the stone border walls and terraces, has the greatest influence on the image of cultural landscapes, particularly in the countryside.

When studying landscapes, we observe, analyse, and evaluate individual landscape elements as well as broader characteristics of landscapes.

The contents and aim of this study of landscape is to deal with it in a comprehensive way, from all aspects, placing stress on spatial development and protection. Its purpose is to protect quality landscapes and typologically characteristic landscapes, presenting the identity of the Mediterranean region, as well as to plan the development so as to avoid vulnerability and degradation of landscapes – particularly in the Mediterranean coastal areas. The quality of life and experience of this space shall remain at its highest level as a special value and an identifying characteristic of the Mediterranean region.

The landscapes of the Mediterranean region, particularly the coastal landscapes, shall be dealt with as a unified space, which was exposed to more or less equal influences and processes, rather than strictly divided among the borders of countries. Dealing with them and their management requires comparable approaches, methods, and criteria in order to achieve the unified desired state of the Mediterranean landscapes, our everyday living environment and an enormous potential for the economic and above all tourist development.

4.1 Definition of the landscape

What is a landscape at all, how can we perceive and understand it? How to define landscapes and what are the landscape types? This chapter provides answers to these questions and explains and describes individual concepts/terms.

The landscape is what we today visually perceive on the surface of the Earth and what can be embraced by vision. The landscape was perceived and described in a similar way and artistically expressed by painters and writers. The origins of landscape representation can be found as early as in the ancient times and more expressively in the 14th and 15th century; a real expansion of landscape painting and perception and admiration of the landscape was developed at the end of the 18th and beginning of the 19th century. A romantic attitude towards the nature and landscape caused a real wave of enthusiasm. The landscape as an independent “subject” of observation has become a subject of admiration, desire and an area of relaxation and thus received a special attention and value (Bratina-Jurkovič, 2010).

Photo D68: Landscape fresco from Pompeii, Rome (Antiquity)

Photo D69: Poppy, Claude Monet (beginning of the 19th century)

Photo D70: Fall of Icarus, Peter Brueghet (16th century)

Landscape is a part of space consisting of several layers which is a blend of several factors.

Landscape is mainly characterised by relief with a distinctive action of waters, surface cover and climate particularly defining the basic characteristics of landscape. The relief together with waters forms the morphological basis for the landscape structure. The land cover or use of land is a result or a synthesis of the climate and relief in a certain area and obviously the human influence with spatial development and numerous activities (Bratina-Jurkovič, 2010).

Landscape is very multi-layered and different relations of factors also form very various and diverse landscapes. The prevalence of certain factors in the landscape forms different types of landscapes. Basically, landscapes are classified into natural and cultural landscapes. These can further be classified into numerous subtypes (Bratina-Jurkovič, 2010).

The landscape ecologists Forman and Godron define the landscape as a natural or cultural network or a blend of different elements. Within the meaning of space these appear as patches of organic forms – forests, clusters of vegetation, clearings, large plantations, lakes, sea gulfs, as natural longitudinal corridors – watercourses, riparian vegetation, hedgerows, in urban areas lines of trees, as geometrical shapes of built

structures - settlements, towns, agricultural surfaces, sports grounds, tourist settlements, ports, production activities, industry, or regular facilities – roads, railways, power lines, etc. (Bratina-Jurkovič, 2010).

The physiognomy of the coastal landscape is created by geological, geomorphological and biological factors greatly modified by human activity. Many different kinds of classification have been applied to coasts in attempts to characterise dominant features in terms of physical or biological properties, modes of evolution, or geographic occurrence (Fairbridge, 2004; Finkl, 2004; EUCC, 1998; LOICZ, 1998).

The increased availability of spatial data in digital format and the advances in Geographical Information Systems and other disciplines provided the opportunity for a more comprehensive study of the coastal environment in an integrated and systematic manner (Vogiatzakis, I.N. & Cassar, L.F., 2007).

Photo D71: Taormina – Sicily

Definition of the term landscape:

Landscape is a space defined by spatial and natural elements and socio-economic conditions. The development of the landscape is influenced by different natural processes causing its constant changing and the activity of humans using the space for settlement, agriculture, industry, energy, sports grounds and recreational areas and thus forming various cultural landscapes (Bratina-Jurkovič, 2010).

Photo D72: Cultural landscape – island of Hvar – the Adriatic region

Natural landscape

The natural landscape presents the state of being unspoilt, originality and free development according to natural laws. The ecosystem protection is a criterion describing the level of natural protection of the landscape. Plant communities are the most obvious and easily measurable ecological whole. According to the plant community, the state of the ecosystem can be reliably ascertained. Here, the tendency for as great diversity of species as possible and the increase in the number of organisms can be noticed. The climax referring to the highest level of community is considered as a basis. The deviation from the climax results in destroying of the naturaleness of the ecosystem. However, it must be stressed that completely natural landscapes are very scarce or can hardly be found in urbanised areas, since at least some influence of humans can be seen everywhere.

Cultural landscape

The cultural landscape is very different from the natural one and is changed due to human activities and influences on the natural landscape. Minimum deviations from the natural landscape are in the uses which are close to the nature or sustainable uses of the landscape such as the forests with economic management, pastures, traditional agriculture, and fruit and wine growing, whereas natural elements in the landscape can be destroyed with the building and construction in the landscape. The elements and uses referred to above are mostly interwoven in the cultural landscape. The structure of cultural landscapes usually consists of regular, geometrical shapes as well as natural forms and is very articulated showing its man-made character.

Only when appropriately maintained, the cultural landscapes can preserve the same structure; otherwise, they can be rapidly changed by abandoning of the activities or by introducing the new ones, particularly the building activities. Thus, the original cultural landscapes will be lost forever.

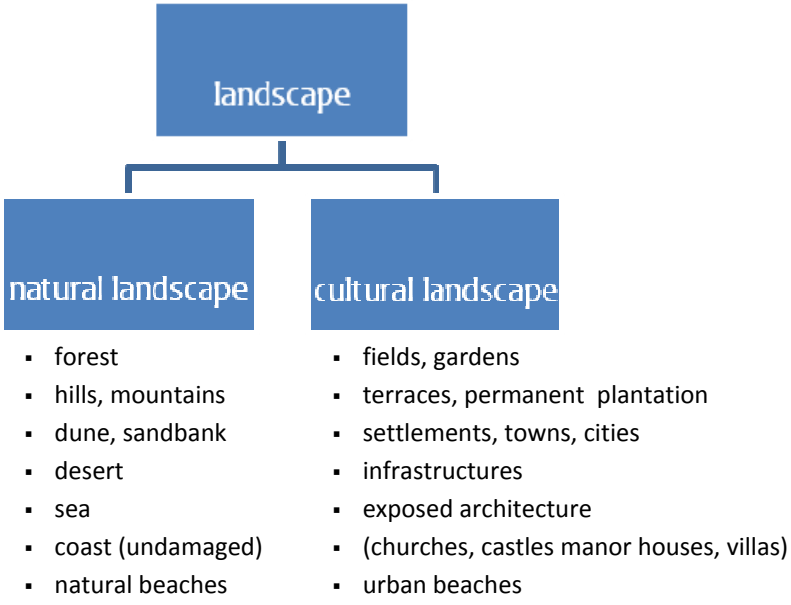

Figure D1: Types of landscapes

The natural and cultural landscapes can be defined and named according to the prevailing element in the landscape, i.e. according to their prevailing characteristics.

Thus, the natural landscapes can be: mountain landscapes, forest landscapes, sea landscapes, coastal landscapes, sandy landscapes, lake landscapes, etc.

The cultural landscapes can be: field landscapes, meadow landscapes, wine-growing landscapes, terrace landscapes, urban landscapes, etc. (Bratina-Jurkovič, 2010).

Coastal landscapes

The Synthesis report places above all special emphasis on the coastal landscapes which are considered the terrestrial landscapes. However, since the marine part and its seascape is also an important element of coastal zones, it deserves being at least mentioned in this Report. Neither the legislation nor the ICZM Protocol contains a specific definition of the term seascape. Therefore, for a better understanding and further use and communication, the Report tries to provide its simple definition.

Coastal landscapes are landscapes characterised by the contact of the sea and the land. They usually present a narrow or a wide coastal zone including naturally protected or man-made coastal areas. The latter are referred to as the man-made cultural coastal landscapes or those settled by people for living or used for other purposes – such as ports, marinas, agriculture, industry, tourism, etc. or the settled coastal areas and their landscapes.

Seascapes

Seascape as a term refers to sea landscapes. These are landscapes where the sea prevails, touching the land on one side and the sky on the other. This is usually a homogenous surface, which is visually changing according to weather conditions. Many human activities referred to as sea-uses also take place offshore, particularly in the inshore zone at the junction with land and near large urban agglomerations. Seascapes are also characterised by some activities such as shellfish farming, fish farms, and similar with their technologies, creating visible facilities and thus special patterns on the sea surface. Thus, special seascape patterns are created.

Possible definitions or explanations of landscape (Marušič J., 2001)

Landscape as nature - natural elements are present in each landscape.

Landscape as a habitat - it applies to settlement patterns.

Landscape as an artefact - cultural aspect as the result of use.

Landscape as a system - landscape is a large system composed of subsystems.

Landscape as a problem - its condition often requires improvements.

Landscape as a property - with respect to its possible market value.

Landscape as ideology - its characteristics reveal in a tangible way the philosophy of a certain society.

Landscape as history - accumulated labour of man and nature.

Landscape as a place - a specific locality in the endlessly picturesque mosaic of the Earth.

Landscape as aesthetics - visual attraction of landscape.

4.2 Different legal definitions of the term landscape

The term landscape is defined in the international legislation in the European Landscape Convention, which was developed in 2000. The term landscape is defined differently in different fields from the aspect of the sector dealing with it. In the field of protected nature, the term landscape is usually legally defined from the aspect of conservation of biodiversity and natural heritage. The term cultural landscape is usually legally defined and mainly applies to cultural heritage and its protection.

Below, different legal definitions of the terms landscape, protected landscape and cultural landscape are presented within the framework of international legislation, such as: the Council of Europe – the European Landscape Convention; IUCN – the World Conservation Union; UNESCO – World Heritage; and some definitions of the term landscape at the national level, i.e. in different countries.

Definition of "landscape" in the European Landscape Convention

Landscape means an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors (European Landscape Convention, 2000).

Definition of "protected landscape/seascape - category V" by IUCN:

Protected landscape (category V) is a protected area where the interaction of people and nature over time has produced an area of distinct character with significant ecological, biological, cultural and scenic value: and where safeguarding the integrity of this interaction is vital to protecting and sustaining the area and its associated nature conservation and other values (http://www.iucn.org).

Definition of "cultural landscape" by UNESCO

Cultural landscapes are cultural properties and represent the "combined works of nature and of man" designated in Article 1 of the *Convention*. They are illustrative of the evolution of human society and settlement over time, under the influence as distinctly natural areas where the evolution process obeys the laws of nature of the physical constraints and/or opportunities presented by their natural environment and of successive social, economic and cultural forces, both external and internal. (UNESCO, Operational Guidelines 2008, Annex 3**)**

Definition of "landscape" in Italy

Cultural Heritage and Landscape Code define the landscape as follows:

"1. Landscape is intended as the territory expressing an identity, whose character derives from the action of natural and human factors and from their interrelations.

2. The present Code safeguards landscape in relation to aspects and characters which constitute a material and evident representation of national identity, being an expression of cultural values." (Cultural Heritage and Landscape Code, Article 131, paragraphs 1 and 2) (ELC-CE – online).

Definition of "landscape" in Malta

Landscape is defined as the characteristics, patterns, forms and structures of the environment, including the traits, patterns, forms and structures of a specific geographic area, its biological composition, its physical environment, its geomorphology, its palaeontology, its lithostratigraphy and its anthropogenic and social patterns.). (Legal Notice 204 –2001, re. Environmental Impact Regulations (ELC-CE – online)).

Definition of "landscape" in Catalonia and in Galicia, Spain

Landscape means an area, as perceived by people, whose character is the result of the action and interaction of natural or human factors; (Law 8/2005, of 8 June, on Landscape Protection, Management and Planning in Catalonia), (Law 7/2008, of 7 July, on Landscape Protection in Galicia).

Definition of "landscape" in the United Kingdom

Landscape was described in the "Landscape Character Assessment: Guidance for England and Scotland" as being "about the relationship between people and place. It provides the setting for our day-to-day lives. The term does not mean just special or designated landscapes, and it does not only apply to the countryside. Landscape can mean a small patch of urban wasteland as much as a mountain range, and an urban park as much as an expanse of lowland plain. It results from the way that different components of our environment – both natural (the influences of geology, soils, climate, flora and fauna) and cultural (the historic and current impact of land use, settlement, enclosure and other human interventions) – interact together and are perceived by us." (ELC-CE – online).

Some definitions of "landscape" in Slovenia

In Slovenia, the term landscape is legally defined in the field of spatial planning and the National Spatial Planning Strategy provides a detailed definition of the terms cultural landscape and natural landscape.

The second sectoral legislation uses the definition of landscape which is usually presented more narrowly from the aspect of the sector dealing with it.

Definition of "landscape" in the Spatial Planning Act

A landscape is a part of space characterised by the prevailing presence of natural components and is the result of the interaction and influence of natural and human factors (Spatial planning act, 2007, Slovenia).

Definition of "natural landscape" in the Spatial development Strategy of Slovenia

Natural landscape comprises those parts of the Earth's surface, which appear in the landscape image without any human interference. The criterion for the degree of naturalness of a landscape is how well the ecosystem is preserved as compared to its climax ecosystem. (Spatial development Strategy of Slovenia, 2004)

Definition of the "cultural landscape" in the Spatial development Strategy of Slovenia

The cultural landscape is the result of the interaction of natural processes and man-made activities. Here, we distinguish among:

- the cultural landscapes, which have been designed and created by humans for the aesthetic reasons;
- the organically evolved cultural landscapes, which have originally evolved for the economic, administrative and/or religious reasons;
- the associative cultural landscapes, in which distinctive religious, artistic or cultural links with natural media exist (Spatial development Strategy of Slovenia, 2004).

4.3 Presentation of other terms in the field of spatial planning and landscape protection and development

Spatial Planning

Spatial planning is a planning aimed at future, with a specific purpose and objective to achieve a favourable state in the space. The planning is carried out at the planning and project level. Spatial planning is aimed at preparing a basis for social decisions on developmental use, as well as the protection of its valuable elements on land and at sea (marine spatial planning).

Spatial planning includes a certain level of placing different uses and activities in space and the harmonisation of their interests. This often leads to conflicts between different activities which have to be harmonised and dealt with in the spatial planning process by using different methods, instruments and techniques. The advanced spatial planning comprises the developmental and protective approach, which also presents a methodological basis for directing the planning of a balanced development.

Spatial planning is an interdisciplinary activity with which interventions into space and spatial arrangements are planned on the basis of development policies which take into account the public benefits of environmental protection, nature conservation, protection of animals and natural goods, protection of property and cultural heritage (Spatial Planning Act, Slovenia, 2007).

There are several types of planning: physical planning, spatial planning, urban planning, sectoral planning and landscape planning. Sectoral planning is a planning within a single activity – for example, planning of agriculture, traffic, tourism, etc.

Landscape planning

The landscape planning has a special place in the context of planning. The landscape planning is above all aimed at ensuring the protection of culturally ecological and cultural values of landscapes and protective planning. The field of work comprised in the landscape planning can be summarised in several steps. First, it refers to the assessment of landscape values, facing these values with planning activities and the preparation of planning variants – versions which would enable the planned development with as minimal changes in the landscape as possible. The subject of landscape planning is the processes of interaction between the planned actions and the value systems of landscapes.

Vulnerability

The vulnerability of a space or a landscape is the part of a space or a landscape which is more sensitive and vulnerable in the sense of implementing the actions and major changes. These are are usually particularly protected due to their characteristics or the presence of specific protective natural components or cultural elements or important natural resources (an example of a region/area with a spring of potable water and similar). Therefore, an analysis of the vulnerability of a space or the assessment of sensitivity of a space shall be prepared in the spatial planning procedure in the phase of preparing expert positions. The vulnerability analysis is a method which can be used at different levels of spatial planning and environmental protection. It is used to discern more sensitive parts of space, in which particular programmes or development should not occur. The analysis results and findings can be used in several spatial planning and environmental protection tasks as searching for adequate space or spaces for particular programmes or uses, defining protected areas, verifying borders of protected areas, performing strategic environmental assessment, structuring of the area and preparing guidelines for a detailed planning.

More on the contents and a detailed explanation of the terms and use of methods in the field of landscape planning and vulnerability in the spatial planning system are presented and described in the chapter on the Landscape planning and vulnerability assessment.

Landscape protection

The landscape protection is consequently a measure caused by the process of landscape vulnerability. The protective actions are always directed against changes. The landscape protection is thus aimed at limiting the major changes due to the social interest in maintaining the structural state of landscapes and the preservation of their qualities. The landscape protection can be efficient if the efficiency of the use it originally generates is ensured. The agricultural use is mainly the main factor for generating landscapes in cultural landscapes.

The landscape protection can in general be implemented in different forms, such as a protection in the form of a reserve, or by introducing specific protection regimes which shall be considered in developmental activities.

The protection based on the reserve principle means that a particular area with a great landscape value is declared as protected with a normative instrument so that a complete block for new developmental activities is introduced in it.

Another option is to provide a legal definition of landscape areas and introduce a less strict regime of protection in them allowing some less intensive spatial activities such as sustainable activities.

One of the protection forms is based on the fact that in order to preserve the existing structural state of landscapes, deriving from a specific use, a management regime is introduced enabling the maintaining of landscape structure or the desired state of landscapes. This method often requires economic incentives and other forms of incentives.

Landscape protection – legal definition

"Landscape protection" means actions to conserve and maintain the significant or characteristic features of a landscape, justified by its heritage value derived from its natural configuration and/or from human activity.

(European Landscape Convention, Florence, 2000)

Landscape management – legal definition

"Landscape management" means action, from a perspective of sustainable development, to ensure the regular upkeep of a landscape, so as to guide and harmonise changes which are brought about by social, economic and environmental processes.

(European Landscape Convention, Florence, 2000)

Engaging the coastal management through the landscape approach

Within the Mediterranean setting, as outlined in the sections above, ecosystems are, on the one hand, intrinsically linked to human affairs, and on the other, severely threatened by them. In the plurality inherent in the concept of landscape lie both the strength and the weakness as a setting for conservation. It is apparent that the term "landscape" means different things to different people, notwithstanding common elements. Hence, the term has a plurality of meaning and association. Despite the multitude of definitions put forth, there are three aspects that make landscapes much more than simply passive features in people's everyday lives. One is that the impact of landscape is felt through all the senses. Secondly, landscape has a two-way relationship with people, with the power to shape and reinforce values, to inspire, to calm and to reinforce a sense of identity. Thirdly, landscape embodies past record of human land-use and ancestry. Landscape hence constitutes a meeting ground between nature and people, past and present, tangible and intangible values. As a result, landscape is increasingly being recognised as particularly relevant to the quest for more sustainable ways of living. It has several characteristics which echo concepts of sustainable development, such as its universality, its dynamicity and the fact that it is holistic yet hierarchical. By this implication, landscape is not merely an environmental resource in its own right, but also a means through which to pursue sustainable development (Phillips, 2005).

Since landscapes are multifunctional, encompassing numerous facets, and because they can be identified with easily, providing as they do a backdrop to people's everyday life, they provide an ideal arena for conservation efforts. Landscapes also provide an ideal scale for conservation efforts from an ecological perspective, evidence of which is the growth of the field of landscape ecology. In contrast one may argue that landscapes are cultural constructs, often contested. Where one individual may see a vacant plot suitable for development, another may see a valuable natural space. Moreover, landscape also has a range of often-unquantifiable values, ranging from pragmatic economic values to ecological, recreational, health-related and spiritual values. In a place like the Mediterranean, where landscapes are at times required to accommodate multiple, often conflicting, uses, changes are very often inextricably linked to social and cultural forces. Real-life examples include the case of economic situations triggering urbanization in rural areas or agricultural intensification and resultant ecological and visual impacts on the landscape. Such situations are commonplace in the Mediterranean. Linked to a rich and interesting past, the region's landscape has been subjected to extraordinary changes – primarily through topographic modification to accommodate agricultural practice and the denudation of the sclerophyllous (woodland) cover for fuels and cultivation (Vogiatzakis, I.N. & Cassar, L.F., 2007).

Photo 73: Lumbarda settlement, Croatia

Photo 74: Town of Piran, Slovenia

Photo 75: Stone terraces, Croatia

Photo 76: Port of Piran, Slovenia

5. Legal base

5.1 European Landscape Convention

The European Landscape Convention was prepared owing to intensive social and economic processes and globalisation as well as concern for the disappearance of landscape values and qualities which are important for an individual and the entire society. It was formed on the initiative of the Committee of Ministers of the Council of Europe and signed and adopted in 2000 in Florence in Italy. The Convention entered into force in March 2004. As many as 39 countries have signed the Convention so far, 33 of which have already ratified (Council of Europe, March 2011) it and thus the implementation of provisions of the Convention already takes place in the broader part of Europe.

The purpose of the Convention is to form a basic framework for a complex dealing with landscapes and the protection of landscape heritage in the entire Europe. The Convention provides basic orientations for the field of the landscape which must be observed by the States signatory in planning sustainable development within the framework of developmental policies, strategies, programmes, in sectoral and spatial planning and in international co-operation.

Key emphases of the European Landscape Convention

The aim of the Council of Europe is to achieve as great unity among its member states as possible to protect landscapes which are our common heritage. With this Convention the Council wants to achieve to raise awareness of the quality and diversity of European landscapes as a common resource that needs to be adequately protected, planned and managed. For this purpose, Article 5. b of this Convention introduces a new instrument intended exclusively for the protection, management and planning of all landscapes in Europe, i.e. a landscape policy. The Council aims at encouraging the Member States to carry out the activities in the field of landscapes and establish the European co-operation in addressing the landscape-related issues.

With this Convention the Council wants to emphasise “that the landscape is an important part of the quality of life for people everywhere: in urban areas and in the countryside, in degraded areas as well as in areas of high quality, in areas recognised as being of outstanding beauty as well as everyday areas”.

Basic aims of the European Landscape Convention are as follows:

- to encourage and promote the protection, management and planning of landscapes;
- to recognise and evaluate landscapes and provide guidelines for their protection and development;
- to specify a common definition of terminology such as landscape, landscape policy, landscape planning;
- to inform the public and increase awareness on the meaning and values of landscapes;
- to provide education in the field of policy, protection, management and planning of landscapes;
- to establish the European co-operation in addressing the landscape-related to.

5.2 Barcelona Convention

In 1976, the Parties adopted the Convention for the Protection of the Mediterranean Sea against Pollution (the Barcelona Convention) addressing specific aspects of the Mediterranean environmental conservation to complete the Mediterranean Action Plan (MAP) legal framework. In 1995, the Convention was renamed to the Convention for the Protection of

the Marine Environment and the Coastal Region of the Mediterranean, and ICZM became one of the priorities of MAP. Today, the Convention, together with its seven Protocols, constitutes what is referred to as “the Barcelona system”.

The signatories to the Barcelona Convention are bound to encourage the integrated management of coastal regions by considering the protection of areas which are important as to the ecology and landscape and the use of natural resources.

The Convention's main objectives are:

- to assess and control marine pollution;
- to ensure sustainable management of natural marine and coastal resources;
- to integrate the environment in social and economic development;
- to protect the marine environment and coastal zones through prevention and reduction of pollution, and as far as possible, elimination of pollution, whether land or sea-based;
- to protect the natural and cultural heritage;
- to strengthen solidarity among the Mediterranean coastal States;
- to contribute to improvement of the quality of life.

The term protection of coastal regions or marine environment and thus indirectly protection of coastal landscapes is included in Article 4 of the Barcelona Convention. According to the Convention, it can be ascertained that the Contracting Parties to the Barcelona Convention agreed to:

- consider the economic, social, health and cultural value of the marine environment of the Mediterranean Sea area;
- fully aware of their responsibility, preserve this common heritage for the benefit and enjoyment of present and future generations;
- realise fully the need for a close co-operation among the States and international organisations concerned in a co-ordinated and comprehensive regional approach for the protection and enhancement of the marine environment in the Mediterranean Sea area.

The Barcelona Convention and its Protocols, together with the Mediterranean Action Plan (MAP), form part of the UNEP Regional Seas Programme. In the chapter that follows, the seventh Protocol in the framework of the Barcelona Convention – the Protocol on Integrated Coastal Zone Management in the Mediterranean, which was signed in January 2008 and entered into force on March 24, 2011, is presented. The ICZM Protocol is the most important protocol for the protection of the Mediterranean coastal landscapes.

5.3 Protocol on Integrated Coastal Zone Management in the Mediterranean – ICZM Protocol

The Protocol on Integrated Coastal Zone Management is the latest legal instrument in the framework of the Barcelona Convention. At the Conference of the Plenipotentiaries on the ICZM Protocol that took place on 21 January 2008 in Madrid, the ICZM Protocol was signed. The ICZM Protocol entered into force on 24 March 2011, when 6 Signatory Parties to the Barcelona Convention ratified it. All the Parties are convinced that this Protocol is a crucial milestone in the history of MAP. It will allow the countries to better manage their coastal zones, as well as to deal with the emerging coastal environmental challenges, such as the climate change.

The Contracting Parties to the ICZM Protocol are convinced that:

- the Mediterranean area is an irreplaceable ecological, economic and social resource;
- the planning and management of coastal zones with a view to their preservation and sustainable development requires a specific integrated approach at the level of the Mediterranean basin as a whole and of its coastal States;
- the Parties wished to establish a common framework for the integrated management of the Mediterranean coastal zone and shall take the necessary measures to strengthen regional co-operation for this purpose.

Objectives of integrated management (ICZM Protocol, 2008):

In implementing the ICZM Protocol, the Parties shall or would like to achieve:

- **a common framework for integrated management** of the Mediterranean coastal zone, **equal measures for regional co-operation**,
- **effective management plans** of the Mediterranean coastal zone,
- **the appropriate sustainable spatial planning and sustainable development**, by ensuring the protection of the quality of coastal zone;

to ensure**:**

- **preservation of the integrity of coastal ecosystems, landscapes and geomorphology**,
- **sustainable use of natural resources**, particularly with regard to water use; and

to preserve:

- **coastal zones** for the current and future generation.

The ICZM Protocol is supposed to be a means for facing new challenges in the protection of the Mediterranean coast. Its preparation was harmonised with the Contracting Parties to the Convention. The ICZM Protocol is an important achievement in the implementation of the European Marine Directive at the international level in the regions of the Mediterranean area. The Signatory States use it to define a joint framework for a comprehensive management of the Mediterranean coastal areas and use unified criteria for strengthening the regional co-operation.

The ICZM Protocol to the Convention for the Protection of the Mediterranean Sea against Pollution (Barcelona Convention, 1976/1995) is one of the basic projects and results of the Mediterranean Action Plan (MAP) and an important objective of the Mediterranean Strategy for Sustainable Development (2005). It is a crucial legal instrument at the international level and at the national level of the Mediterranean countries which are the Parties to the Convention. It has a great importance for ensuring sustainable development of the Mediterranean regions and sustainable spatial development of natural coastal regions and all Mediterranean coastal regions.

Contents of the ICZM Protocol

The title of the Protocol already says that the co-operation among the Contracting Parties refers to a comprehensive management of the Mediterranean coastal regions. The States Parties use it to define a joint framework for a comprehensive management of the Mediterranean coastal areas and use a unified criterion for strengthening the regional co-operation.

In the first part, the Protocol defines the coastal area and the term “Integrated Coastal Zone Management”. Integrated Coastal Zone Management refers to a dynamic process of management and planning of coastal zones by considering the vulnerability of coastal ecosystems, coastal landscapes and the enabling of different activities by taking into account their interaction and their cumulative impact on the coastal and land regions of the coastal zones. The basic aim is to deal with the regions in a comprehensive way and to preserve the quality of the Mediterranean coastal regions.

The second part of the Protocol defines the basic elements and methods of the Integrated Coastal Zone Management, namely: the protection and use of coastal zones, and economic activities (agriculture, industry, shellfish farming, tourism, sport and recreation, exploitation of natural resources, infrastructure, energy industry, ports, and navigation). Below, specific coastal ecosystems, the coastal landscapes, islands, and the cultural heritage are dealt with. A special stress is placed on raising awareness of public, education, and research.

The third part defines the instruments for Integrated Coastal Zone Management, namely: monitoring of the Protocol implementation; the Mediterranean Strategy for Integrated Coastal

Zone Management; the definition of national coastal strategies, plans and programmes; a comprehensive environmental impact assessment; land policies; and economic, financial, and fiscal instruments.

The fourth part of the Protocol defines natural risks which coastal areas are facing, such as natural disasters, coastal erosion, etc. The fifth part defines international co-operation – research, scientific and technical assistance, cross-border co-operation, and the definition of the cross-border environmental impact for the activities in the coastal areas.

OBJECTIVES OF INTEGRATED COASTAL ZONE MANAGEMENT

Article 5

The objectives of integrated coastal zone management are to:

a) facilitate, through the rational planning of activities, the sustainable development of coastal zones by ensuring that the environment and landscapes are taken into account in harmony with economic, social and cultural development;

d) ensure preservation of the integrity of coastal ecosystems, landscapes and geomorphology;

f) achieve coherence between public and private initiatives and between all decisions by the public authorities, at the national, regional and local levels, which affect the use of the coastal zone.

PROTECTION AND SUSTAINABLE USE OF THE COASTAL ZONE

Article 8

1. In conformity with the objectives and principles set out in Articles 5 and 6 of this Protocol, the Parties shall endeavour to ensure the sustainable use and management of coastal zones in order to preserve the coastal natural habitats, landscapes, natural resources and ecosystems, in compliance with international and regional legal instruments.

5.4 ICZM Protocol – some sections with direct connection to landscape

Individual parts of the Protocol include, concretely or indirectly, the contents, objectives, purposes and obligations for the protection of coastal regions, coastal landscapes, particularly very vulnerable or valuable ones, or landscapes which present the cultural heritage and the identity of the Mediterranean.

Preamble

The preamble section of the ICZM Protocol states that we should be aware of and take into account that the coastal zones of the Mediterranean Sea are the common natural and cultural heritage of the people of the Mediterranean and that they should be preserved and used judiciously for the benefit of present and future generations.

The preamble is clearly concerned about the increase in anthropic pressure on the coastal zones of the Mediterranean Sea which is threatening their fragile nature and desirous of halting and reversing the process of coastal zone degradation and of significantly reducing the loss of biodiversity of coastal ecosystems.

The States Parties to the Protocol are convinced that, as an irreplaceable ecological, economic and social resource, the planning and management of coastal zones with a view to their preservation and sustainable development requires a specific integrated approach at the level of the Mediterranean basin as a whole and of its coastal States, taking into account their diversity.

Articles 10-13

Articles 10, 11 and 12 of the Protocol deal with very vulnerable Mediterranean areas, such as: specific coastal ecosystems, coastal landscapes and islands.

The importance of the cultural heritage of coastal regions is particularly stressed in Article 13.

Specific coastal ecosystems

Quite concrete measures for protecting the characteristics of specific coastal ecosystems can be found in Article 10. Specific coastal ecosystems include wetlands and estuaries, marine habitats, coastal forests and woods, manner dunes and bars.

Coastal landscapes

Coastal landscapes are dealt with separately in Article 11. The main objective is to adopt concrete measures for the protection of coastal landscapes by means of regulations, planning and management. The States Parties to the Protocol undertake to promote regional and international co-operation in the field of landscape protection, and the implementation of joint actions for transboundary coastal landscapes.

ICZM Protocol, 2008

Article 11: Coastal landscapes

1. The States Parties, recognising the specific aesthetic, natural and cultural value of coastal landscapes, irrespective of their classification as protected areas, shall adopt measures to ensure the protection of coastal landscapes through legislation, planning and management.
2. The States Parties undertake to promote regional and international co-operation in the field of landscape protection, and in particular, the implementation, where appropriate, of joint actions for transboundary coastal landscapes.

Islands

The Article 12 deals with islands separately and the Parties should undertake to accord special protection for them, including small islands.

They shall promote environmentally friendly activities and take special measures to ensure the participation of the inhabitants, and ensure interaction among islands in planning strategies, programmes and activities and defining management methods.

Cultural heritage

The importance of preserving the cultural heritage of coastal areas is dealt with in the Article 13, which states a commitment that the preservation *in situ* of the cultural heritage of coastal zones is considered the first option before any intervention directed at this heritage.

Preservation of cultural heritage is also of great importance for the conservation of typical coastal landscapes. Through the preservation of cultural heritage created by human, we keep particularly valuable human activities in space which are the result of the emergence of coastal cultural landscapes such as the terraced landscape, different patterns of agricultural processing and typical settlements.

Landscape in the ICZM Protocol

In the ICZM Protocol, coastal landscapes are dealt with separately and the need for the protection of coastal regions and stopping the decaying of coastal regions, the strengthening of striving of coastal countries for ensuring the integrated management of coastal areas and the conservation of coastal regions of the Mediterranean Sea as a common natural and cultural heritage of Mediterranean nations is underlined. The statements from the Preamble, and particularly from Article 11 of the ICZM Protocol, require the protection of landscapes through various means as legislation, planning and management. In this regard, it is closely linked with the European Landscape Convention of the Council of Europe.

Photo 77: Lighthouse on a small island, the Adriatic Sea

Photo 78: Terraces on Korčula island, Croatia

Photo 79: Natural coastal landscape, Croatia

Summary

In order to achieve developmental objectives with minimum damage for the environment, every society shall ensure procedures for balancing human activities in space. First, awareness should be raised of development consequences, as well as of the fact that every decision on implementing a certain activity in space also understands the protection of that space. In the planning process, we shall take into account that placing stress on the development requires a certain type of protection and *vice versa*. If stress is placed on the protection, at least a certain degree of development, such as sustainable development, should be allowed.

Landscape as a spatial component is constantly facing conflicts of interests thus being potentially threatened. This is a consequence of constantly increasing social needs due to the increase in population or the requirements for the improvement of working and living conditions, provision of food, relaxation, recreation and other. For the appropriate planning of protection and development, every society has to establish certain principles and set objectives for the management of their space as a basis and understand it as a limited natural resource (Ogrin, 1989).

The basic conditions for spatial protection and development could include:

- Different use and activities must function in space satisfactorily without expressively disturbing conflicts among them.
- The spatial structure shall reflect a respectful attitude of the society towards the natural and cultural heritage.
- Space or a landscape shall have a coherent image which can be seen also in productive and gainful systems as a component of their design rather than a subsequent decorative addition.
- Space as a whole consisting of natural and man-made structural characteristics enables and constantly encourages the inhabitants to identify with it.
- The uniqueness of the structure of landscapes and cultural achievements imprinted on them ensure that people will efficiently identify with their environment, which can be seen from the condition of cultural landscapes.
- A comprehensive management of planned regions or other regions with common specific characteristics.

The entry into force of the European Landscape Convention proves the increasing presence of concern about landscapes in Europe. This concern results in a series of efforts and actions for the improvement of the state of landscapes as well as efforts for the minimum changes in the landscapes due to human activity. The European Landscape Convention requires from the States Parties to ensure the appropriate measures for the landscape assessment and protection in their entire territory.

The Barcelona Convention stresses that the Mediterranean coastal landscapes are the most vulnerable Mediterranean areas. The legal protection of the Mediterranean landscapes, more specifically the Mediterranean coastal landscapes, is defined with the entry into force of the Protocol on Integrated Coastal Zone Management in the Mediterranean (ICZM Protocol). It is legally defined that coastal landscapes shall be defined and protected in order to ensure their full protection, spatial planning and management.

Care for the protected typical Mediterranean coastal landscapes has been increasing in the recent years, since the Mediterranean countries became aware of their importance as the countries' wealth and identity. Most importantly, the protected coastal landscapes provide a quality life for the inhabitants and attract tourists, which is crucial for the economic development and maintenance of the economic position of the Mediterranean countries.

The entry into force of the ICZM Protocol as a legal instrument will in practice contribute to the efficient spatial management and appropriate sustainable spatial development. Such spatial

development will ensure the improvement and maintenance of the quality of coastal regions and a direct implementation of the Mediterranean Strategy for Sustainable Development aimed at achieving a comprehensive management of the Mediterranean coastal areas.

The essential objectives of integrated coastal zone management in implementing this Protocol, in particular in the framework of the landscape management implementation, are:

- to assure, through the rational planning of activities, sustainable development of coastal zones by ensuring that the environment and landscapes are taken into account in harmony with the economic, social and cultural development;
- to preserve coastal zones for the benefit of current and future generations;
- to ensure preservation of the integrity of coastal ecosystems, landscapes and geomorphology;
- to prevent and reduce the effects of natural hazards and in particular of climate change, which can be induced by natural or human activities;
- to achieve coherence between public and private initiatives and between all decisions by public authorities, at the national, regional and local level, which affect the use of the coastal zone.

A responsible spatial planning is mostly connected with the definition of detailed conditions for the development of activities in space. If the goal is to ensure a quality state of the space, then the social, economic, and environmental development shall be organised in a comprehensive and sustainable way. However, a good condition of the space cannot be ensured merely within the framework of legal instruments. In other words, the efficient spatial planning and, consequently, the spatial quality, cannot be ensured based only on the adoption of legal acts.

The sustainable spatial planning thus refers to spatial planning which is aimed at the development and protection. Good expert studies and guidelines prepared based on using the tested instruments and methods of work for implementing the sustainable spatial planning (including the land and marine spatial planning) contribute to a responsible adoption of decisions on spatial development.

In order to ensure the protection of the Mediterranean coastal landscapes and the implementation of the appropriate spatial planning and landscape management, different spatial planning instruments and methodologies for defining the protected areas are required. However, it is important that the instruments and methodologies used are as comparable for all Mediterranean areas as possible. Also, it is necessary for the coastal areas to be dealt with in a uniform and comprehensive way aiming at the cross-border co-operation and the achievement of unified and comparable results.

The definition of methodologies and spatial planning instruments presented in the "Landscape Management Methodologies: A synthesis report of thematic studies" ensures a quality and sustainable spatial planning and development of coastal areas emphasising the protection of coastal landscapes – the natural and cultural landscapes, and areas of specific value, such as the outstanding landscapes in the Mediterranean. A special emphasis is also placed on the revitalisation of the Mediterranean landscapes in the areas where the traditional activities are being abandoned and thus the typical cultural landscapes overgrown.

The **Landscape planning and vulnerability assessment** in the Mediterranean brings to attention the methodologies used in the spatial planning, in particular the landscape planning approaches that allow for the integration of various land uses and protection of landscape values through the planning instruments. Findings from the vulnerability assessment can be used in several spatial or environmental planning processes, such as: defining the land use; defining the alternatives for the activities/land uses; defining vulnerable areas for the protection; preparing the Strategic Environmental Assessment; and preparing the guidelines for a detailed spatial planning in sensible Mediterranean areas.

The **Landscape Character Assessment** is a methodology to map different types of landscapes, based on their historical evolution

and physical characteristics. The results of this methodology are the atlas of landscape types and guidelines for landscape planning and management. With the implementation of the definition and evaluation of different Mediterranean landscapes, and landscape types and patterns, we could acquire knowledge about the characteristics and conditions of the Mediterranean landscapes and development trends affecting various Mediterranean landscapes. We could further categorise the Mediterranean coastal landscapes according to their visual appearance, prepare the basis for establishing the protection of outstanding landscapes and prepare the guidelines for landscape development and protection in spatial planning and sectoral plans affecting the landscapes.

The **outstanding landscapes** are the most valuable cultural and natural landscapes representing the identity at the regional or national level. The definition of outstanding landscapes will contribute to the protection of the most valuable characteristics and features of the Mediterranean region. Due to development pressures and difficult production conditions, these landscapes are among the first to be abandoned or changed. The definition and legal protection of outstanding Mediterranean coastal landscapes, as well as the definition of the guidelines for their further development and protection, will contribute to the protection of the Mediterranean region identity and thus to the protection of its coastal areas, the quality of life for its residents, and the potential for tourism as one of the basic economic branches. In this way, the processes of spatial devaluation and degradation in the sense of space and environment will be slowed down or even stopped. The findings about the outstanding landscapes should in future be included in the sectoral policies and legislation. Consequently, the financial assets and instruments for ensuring the implementation of the protection of outstanding landscapes shall be provided.

Revitalisation of landscapes in Mediterranean countries is a methodology which can be used to restore an abandoned, neglected cultural or natural landscape. The abandoned agricultural land and other developmental pressures can often significantly change the landscape. A landscape which used to have a great value becomes overgrown and often also explicitly degraded. The presented method can be used to identify the main problems of a research area and prepare proposals for a planning model which could be used as an example for the similar Mediterranean or coastal areas. A revitalised landscape eventually recovers its characteristic image and thus contributes to the establishment and preservation of the Mediterranean integrity and identity.

The subject matters presented in the Synthesis report will certainly contribute to the efficient management and appropriate sustainable spatial development, which will ensure the improvement and maintenance of the quality of coastal areas and direct implementation of the Mediterranean Strategy for Sustainable Development, the ICZM Protocol and the provisions of the Barcelona Convention as well as the implementation of the European Landscape Convention.

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ICZM Protocol – the seventh Protocol in the framework of the Barcelona Convention
http://www.pap-thecoastcentre.org/razno/ICZM_flyer_final_print.pdf

European Landscape Convention – Council of Europe
http://www.coe.int/t/dg4/cultureheritage/heritage/landscape/default_EN.asp

IUCN, the International Union for Conservation of Nature: http://www.iucn.org/

UNESCO, The World Heritage, Cultural landscapes : http://whc.unesco.org/en/culturallandscape

LANDSCAPE PLANNING AND VULNERABILITY ASSESSMENT

Thematic Study **A**

LANDSCAPE PLANNING AND VULNERABILITY ASSESSMENT IN THE MEDITERRANEAN

February 2010

Authors:
Mojca Golobič, Ph.D., Landscape architect
Lidija Breskvar Žaucer, Landscape architect

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1. Summary

Integrated management of coastal zones should, according to the Barcelona Convention and its ICZM Protocol, apply relevant landscape management methodologies and tools to take into account the protection of landscapes and areas of ecological interest and the rational use of natural resources. The thematic study entitled “Landscape planning and vulnerability assessment in the Mediterranean” brings to attention the methodologies used in landscape planning that allow for the integration of various land uses and protection of landscape values through planning instruments. The landscape planning approaches, such as the vulnerability assessment, are especially relevant for fragile areas, such as the Mediterranean region, characterised by the increased competition of uses for scarce and highly valuable natural resources. The vulnerability assessment provides tools for decision making on different levels and scopes of spatial planning and management. It can be applied as an input at the beginning of a planning process, as a mid-term evaluation tool or for comparing and selection of alternative options. Along with (strategic) environmental assessments, the vulnerability assessment is a key tool for a preventive environmental protection.

The study first provides an overview of different planning methods and their potentials to respond to two main challenges of the contemporary planning and management: protection of environment and natural resources and conflict resolution by stakeholder participation. The chapters that follow deal with landscape planning methods in general focusing then on the vulnerability assessment. The landscape planning approach is based on a “suitability" concept, meaning the inherent fitness of the land to support a particular use. The limitation (vulnerability) criteria consider the characteristics, which may trigger environmental impacts in case of a proposed land use and identify the need for protection. The level of vulnerability depends on the characteristics of a stressor (human intervention) and environment. The description of both is, therefore, an essential first step of the assessment, leading to the identification of the key elements. These elements are then used as inputs in the interaction matrix and interrelated to obtain potential impacts. Based on this matrix, a set of relevant impacts is selected for modelling in the following step. The vulnerability modelling begins with the selection of a spatial unit and development of a model concept. The spatial unit must provide (relative) homogeneity of environmental characteristics within the unit as well as useful information for decision-making. For the planning purposes, a raster cell of a suitable size is most useful, while an appropriate level of a landscape or bio-geographic unit is applicable for the management purposes. The aim of a model concept development is to describe the nature of the human-environment interrelation, i.e. to identify which characteristics of the environment affect the size of a potential impact and in what way. Indicators and available data must also be selected. The evaluation phase involves the estimation and expression of the impact size, which is ascribed to each spatial unit as a vulnerability class. The analytical part of the vulnerability assessment results in a number of models, describing relatively homogeneous and commendable parts of the problem. The use of these results in the decision-making processes requires that information be provided in a synthetic, ready to interpret way. The partial vulnerability scores are, therefore, aggregated using the logical or arithmetic rules.

The vulnerability assessment is a key approach of optimisation-based environmental planning and management. It enables the consideration of environmental requirements in an integrated (transsectoral) and transparent way by considering the needs and proposals for the development. By simulating potentially negative impacts of a planned activity on the environment, it can inform the planning process where to avoid a certain land use. Its outputs support development and choice among alternative planning options and optimisation of a site for an individual land use / facility, including the identification of the least vulnerable corridors for infrastructure. The vulnerability

assessment can help identify areas of strategic importance for the protection of natural resources and nature conservation including ecologic networks. A recently expanding field of application is in the strategic environmental impact assessments (SEAs) as required by Dir. 42/01 EC. While these types of questions are most relevant for strategic planning, vulnerability assessments can be used also at detailed planning levels as a base for defining management measures and criteria, regulations and guidelines for land use.

The last part of this thematic study presents two examples of vulnerability assessments applied in the Mediterranean part of Slovenia. Both presentations include a description of a vulnerability assessment process and application of a methodology. The case of the Piran Municipality presents the use of the vulnerability assessment as a part of a municipal land-use plan designation process. The example shows how and in what aspects the vulnerability assessment contributes to planning decisions. The case of wind farms in the Primorska region is an example of identifying spatial potentials (and restrictions) for the exploration of a natural resource. The results of the vulnerability assessment were in this case used as an input in a multi-criteria evaluation and a choice among alternative proposed sites for a wind.

2. Landscape planning approach in relation to other planning concepts

Spatial planning has a long history. As Wegener (2007) says, planning is not a phenomenon of modern times but has always been a prerequisite for survival under harsh conditions of life. Planning has been indispensable for creation of civilizations, for warfare and for the establishment of permanent settlements, communication networks and social systems. However, it was not until the 19th century that spatial planning became a field of political attention and professional activity.

Spatial planning has always been regarded as an activity that, in seeking solutions for a certain social problem, brings a change into the territory. It primarily looks after social needs, the economical use of the resource and its fertility. Because spatial planning is essentially economic in orientation, it is generally characterised as developmental planning.

The end of the 20th century has brought big challenges for the traditional spatial planning. Changed social and economic conditions as well as a growing environmental awareness required redefinition of the role and responsibilities of spatial planning. Today, planning has to respond to (at least) two additional expectations of society:

- environmental and landscape protection,
- public participation.

Figure A1 (Ivan Stanič)

2.1 Environmental and landscape protection in planning

The concern for environmental protection goes far back in the history (see for example Ndubisi, 2002a). In the 1960s, it became the subject of wide public interest. The book "Silent Spring" by Rachel Carson (1962) is widely credited with raising the awareness of the environmental consequences of our decisions and actions.

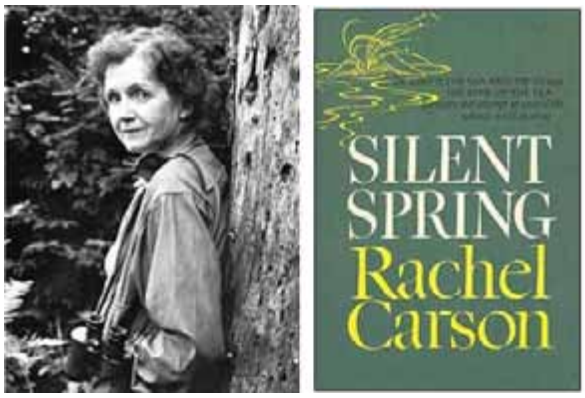


Figure A2: R. Carson and her book Silent spring

As long ago as 1976, the Vancouver Declaration on Human Settlements (UNCHS) stated that spatial planning must be tuned with environmental protection requirements. It states that human settlement policies must be harmonised also with policies on environmental and cultural preservation "*…so that each supports the other in a progressive improvement in well-being of all mankind*".

Political efforts for environmentally-tuned economic growth began more actively in the end of the 20th century, first with the Brundtland Report (WCDE, 1987) that introduced the concept of sustainable development, which seeks to meet "*… the needs of the present without compromising the ability of future generations to meet their own needs*". As was more explicitly defined later at the United Nations 2005 World Summit the concept of sustainable development focuses on three "*interdependent and mutually reinforcing pillars*": economic development, social development and environmental protection. The Brundtland Report was followed by Rio Declaration and Agenda 21, both agreed upon at the Rio Summit (UNCED, 1992). The Rio Declaration states that the only way to have a long-term economic progress is to link it with environmental protection. In Principle 4 it states: "*In order to achieve sustainable development, environmental protection shall constitute an integral part of the development process and cannot be considered in isolation from it*."

The Agenda 21 states that spatial planning should strive for "*promoting sustainable human settlement development*". It also stresses the need to change from old sector-centred ways of doing business to new approaches that involve a cross-sectoral co-ordination and the integration of environmental and social concerns into all development processes.

Today, environmental protection has become a very important part of development thinking and of everyday functioning, a kind of general obligation for everyone on the planet. This is also reflected in the field of spatial planning. There is a great demand for facing economic aspirations for spatial development with social interests, the need for nature and landscape protection as well as conservation of cultural heritage in order to contribute to a long-term and balanced - that is sustainable - spatial development. The demand is expressed in various world and European documents, including the Habitat Agenda (UNCHS, 1996), the European Spatial Development Perspective – ESDP (European Union, 1999) and the Guiding Principles for Sustainable Spatial Development of the European Continent (Council of Europe, 2000). All three documents are emphasising the significance of spatial planning and its instruments for the attainment of sustainable development.

Requirement for sustainable development and sustainable use of natural resources is particularly strongly emphasised in the areas that are, on the one hand, ecologically sensitive and landscape diverse and, on the other hand, under intensive pressure from developers. Such is the Mediterranean area, whose management is defined in the ICZM Protocol. One of its objectives is to "*facilitate, through the rational planning of activities, the sustainable development of coastal zones by ensuring that the environment and landscapes are taken into account in harmony with economic, social and cultural development*".

The important message that the Vancouver Declaration already partly implied and was explicitly expressed in the Rio Declaration was: in order to achieve sustainable development, a comprehensive and integrated approach in planning is needed. That is the approach, where all factors - economic, social, ecological and cultural "*… are jointly used and combined to guide land- and facility-use decisions towards sustainable territorial development*" (Council of Europe, 2007). In order to effectively and successfully guide decisions, they must be confronted and combined as soon as possible in the planning process.

The call for the comprehensive planning comes also from the European Landscape Convention – ELC (Council of Europe, 2000). The ELC defines landscape as »...*an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors*". Landscape is thus a notion that grew out of a comprehensive thinking about the visible environment. Since landscape is a synthetic concept, the care for it should be comprehensive. The same applies to the three implementation policies of the ELC: protecting, managing and planning the landscape.

The comprehensiveness and integration is also highlighted in the ICZM Protocol that governs management of the Mediterranean area. To ensure preservation of the integrity of coastal ecosystems, landscapes and geomorphology, which is one of the objectives of the ICZM Protocol, "*all elements relating to hydrological, geomorphologic, climatic, ecological, socio-economic and cultural systems shall be taken into account in an integrated manner*".

2.2 Public participation in planning

Figure A3 (Ivan Stanič)

The already mentioned book "Silent Spring" and major ecological disasters in the second half of the 20th century (e.g., Seveso in Italy, 1976; Chernobyl in Ukraine, 1986) not only brought environmental issues into conscious of planning professionals, but also had a great impact on the development of public participation. These disasters made the public increasingly aware of the potential dangers of environmental pollution, and therefore they insisted on better and safer regulations and more openness in matters of ecological importance. Authorities were forced to involve citizens in the decision-making process and to provide more access to information.

The promotion of public participation in spatial planning policies started with The European Regional/Spatial Planning Charter, also known as the "Torremolinos Charter" (CEMAT, 1983). Together with the need for environmental protection, public participation is also set within the context of sustainable development. It was given significant emphasis in the Brundtland Report (WCDE, 1987) and the Rio Declaration (UNCED, 1992). One of their messages was that active public participation is a prerequisite for achieving sustainable development and solving the environmental problems of the world. The value and importance of a bottom-up approach is also emphasised in the Agenda 21 (UNCED, 1992), particularly in the Chapter 28: "*Because so many of the problems and solutions being addressed by Agenda 21 have their roots in local activities, the participation and co-operation of local authorities will be a determining factor in fulfilling its objectives*". The chapter is an appeal to 'local authorities' to engage in a dialogue with all local stakeholders and to "*… seek for a new participation process where the communication … goes beyond existing and traditional consultation*". The documents were followed up by the Aarhus convention (UNECE, 1998) with full name "Convention on access to information, public participation in decision-making and access to justice in environmental matters". The full name highlights the so-called three pillars of the Aarhus convention that more precisely specify the requirements for public participation in environmental matters. The call for a close co-operation in spatial planning is stated also in the ESDP (European Union, 1999). It calls for a close co-operation amongst the authorities responsible for sectoral policies (horizontal integration) as well as for a close co-operation between actors at the community level and the transnational, regional and local levels (vertical integration). The need for participation and close co-ordination is as well expressed in the ICZM Protocol (Article 7) as an important requirement for the integrated coastal zone management in the Mediterranean. In addition, the European Landscape Convention in its Article 5 stresses the importance of integration of local people into decisions about the landscapes. As expressed by Marušič (2006), an open and dispersed decision-making process is even more important than the physical appearance of the landscapes themselves, when an adequate evolution of landscape is in question. In other words, the processes within which the landscapes are changed, intentionally or spontaneously, are even more important than inventory, recognition or evaluation of landscapes, their physical structure or their visual appearance alone.

Today, public participation from the very early stages of the planning process is generally accepted as a necessary part of spatial planning to reach development, which is both sustainable and accepted among the wider public. It should be noted that participation refers to involvement of all persons, groups or institutions with interests in a specific planning process. It is accepted that public participation can contribute to public awareness and increase support for the final decisions taken. The process of decision-making, up to and including the final decision, becomes more democratic and legitimate. Public debate on proposed planning solutions among all stakeholders at an early stage of decision-making may prevent or mitigate conflicts and adverse environmental impacts.

For a successful participation and engagement of the stakeholders, the decision-making process must not be just close to them and open for them from the beginning. It must also be transparent and systematic. Transparency is an important prerequisite for active and equal participation that would lead to a more democratic, legitimate and consensual planning solutions.

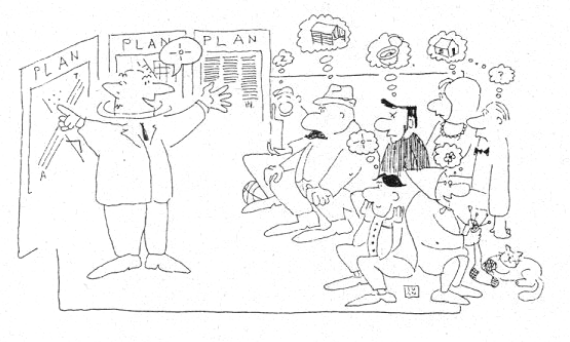


Figure A4 (Ivan Stanič)

2.3 Contemporary spatial planning: declarations and implementation

In response to the call for a more comprehensive and inclusive or participatory decision making, new theories of spatial planning have been developed. To be precise, on the theoretical field, the traditional model of planning as a form of a top-down and rational decision-making was challenged already in the 1960s and 1970s in the books of Jane Jacobs (1961), Robert Goodman (1971), John Friedman (1973) and others. The main reason came from the recognition that traditional top-down planning is ineffective and that spatial solutions are not harmonized with the real needs and interests of people. They all claimed for a new model of planning that would be based on a dialog between all actors and where the dialog would represent a basis for mutual learning. These ideas were picked up in the work of other contemporary theoretical planners, including John Forrester (1999) with the model of communicative planning and Patsy Haley (1997) with the model of collaborative planning.

However, changing theories of planning, to include a concept of sustainability and principles of integration and public participation at the most general levels are not enough. The authors of the publication "Landscape and sustainable development" (Council of Europe, 2006) have hit the heart of the problem when they wrote: "*Proclaiming the principle of integration (of environment in the development process) is all very well – it is integration methods and tools that pose most problems*".

There are many different spatial planning approaches across the countries, reflecting diverse territorial and political contexts. Accordingly, diverse methods and tools for integration of environmental concerns into spatial planning have been developed. Some are more effective and support a more comprehensive approach than others. In many European countries, the increased environmental concerns led to a stronger role of the sectors whose responsibility to protect nature, natural resources and cultural heritage has been supported by several legal instruments. These approaches prevailingly rely on standards and are well adjusted to management. As such, they are very important as a complement to planning, but can and should not substitute for it. For example, concentration on legally protected parts of environment leads to neglect of others, which may be in a certain specific or local context of great value, but have no legal protection. In

addition, some environmental components are easier to set standards for (for example air emissions) other (for example landscape amenities) much more difficult. Secondly, sectors tend to impose their protection regimes in a form of spatially defined areas (i.e. protected agricultural land, nature conservation areas, etc.), which inevitably confront with other uses of space. Since they are often not obliged to go through negotiation and conciliation procedures with them, this leads to one sided and potentially under optimal use of space. With increase of environmental demands, the sectors tend to expand the boundaries of the areas under their "jurisdiction", which results in bigger and more frequent conflicts with other users of land.

In addition to the successful integration of environmental considerations, methods and tools must also allow for active participation. Participation procedures in the spatial planning practices are still weak, *ad-hoc* and inadequate (e.g. Kalopedis, 2007; Marušič, 2006; Nilsson, 2007). Making decisions is often overpowered by main political and economical actors. Participation in the planning process is usually done only through selective consultation and not through inclusion. Inactive public participation in a form of giving comments on the planning proposals at the end of planning processes usually ends in denying proposals instead of developing joined consensual solutions. Similar to environmental issues, the biggest problem of public participation is the lack of methods and tools.

Unequipped with effective tools and methods planning is powerless in ensuring a balanced environmental, economic and social development. The consequence is colourfully illustrated by the words of Kristina Nilsson (2007): "*In practice, however, the concept of sustainable development seems to be used more like a mantra that is seldom realised in practical planning*".

If spatial planning is to effectively lead towards sustainable development, it must develop and apply methods and tools that would enable:

- comprehensive consideration of issues involving spatial, environmental, social and economic aspects;
- involvement of all relevant actors, including civil society and the public, based on a collaborative work, in the earliest stages of planning.

Transparency of the planning procedures and decision-making is one of the necessary conditions to achieve both of the above requirements. The creative component of the planning, which is inevitable due to many uncertainties involved in the task, still favours holistic, intuitive approaches, but should and need not prevent the planning to apply more transparent approaches.

2.4 The landscape planning approach

Landscape planning, often referred to as "environmental planning" or "ecological planning", is a way of directing or managing changes in the landscape so that human actions are in tune with nature and environment (Ndubisi, 2002a). It evolved from the belief that the fundamental instrument of environmental protection is unified approach to spatial planning that coordinates developmental interests and the demand for environmental protection. The premise of landscape planning is that natural environment is a resource and at the same times a constraint on human activities.

The definition of landscape planning, given by Dame S. Crow (R. Enis, Landscape Conference in Hannover, 1989) clearly indicated the essence of landscape planning. She defined it as "creative conservation". The aim of landscape planning is thus to prevent or at least limit the degradation of the environment to a minimum while increasing, as far as possible, "creativity" in order to meet the developmental needs.

By combining approaches from the natural sciences and the planning disciplines landscape planning has developed a range of different methods and tools for integration of environmental objectives into the process of

analysis and the development of planning proposals. The landscape planning approaches and methods are transparent and systematic, which makes them useful for a participatory and comprehensive spatial planning.

The basic distinction between the spatial planning and landscape planning is that the former is essentially economic and developmental in orientation, while the latter is more concerned with environmental and landscape qualities and thus protective in orientation. It must be noted that the landscape planning does not represent a substitute for spatial planning. With developed approaches and methods, it may complement a set of spatial planning approaches and methods and contribute to larger efficiency of a bottom-up comprehensive planning.

The landscape planning is also a way to effectively include the environmental requirements of different sectors into planning process. One of the most valuable approaches is the vulnerability analysis, where environmental qualities are assessed from the viewpoint of a potential threat resulting from the planned actions. It functions as an integrating and conflict-solving tool, since it:

- includes a whole territory (of a chosen administrative / planning unit),
- considers a whole range of diverse environmental components,
- supports active dialog between stakeholders,
- may embrace all interests (natural, social, economic, and political) and evaluate their consequences and thus supports cross-sectoral or comprehensive planning, and
- supports search for an optimal solution.

3. Methods in landscape planning

3.1 Suitability as a planning concept

According to Ndubisi (2002a), landscape is the geographical template for undertaking ecological planning. Landscape planning is therefore commonly used to denote the application of ecological principles in spatial planning. The approach is based on the "suitability" concept, meaning the inherent fitness of the land to support a particular use. The idea of suitability was introduced into planning by Patrick Geddes (1854-1932), biologist and urban planner who presented it as "valley section"; a sketch showing different parts of territory as being inherently suitable for specific human activity (figure A5). Failing to recognise these human – landscape interrelations either does not work or requires too much energy and too high a risk.

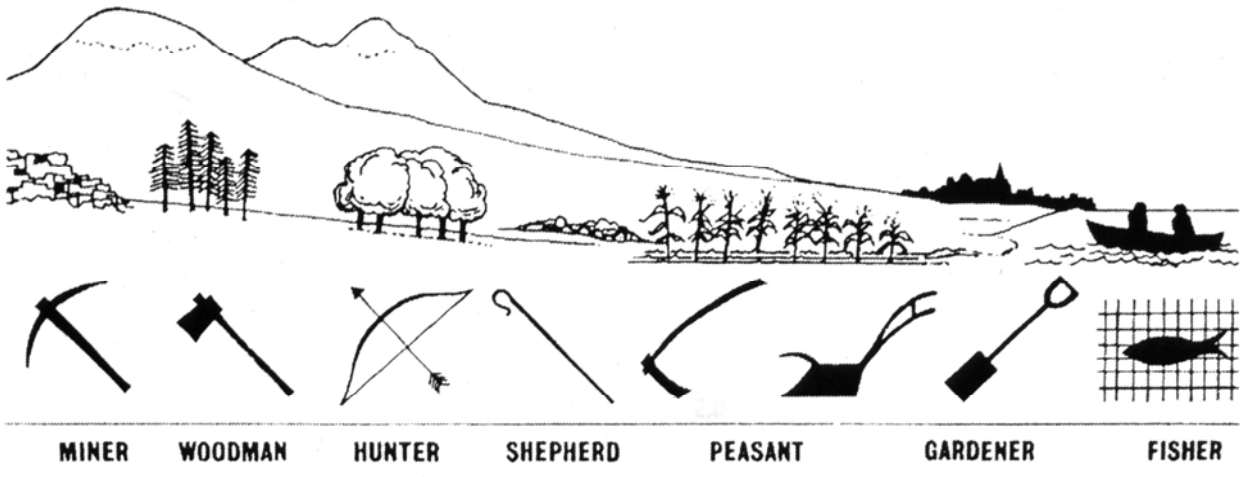


Figure A5: The valley section of P. Geddes illustrates the idea of suitability

The first applications of this idea in spatial planning were developed in New England in the USA by C. Elliot (in 1880) and W. Manning (between 1912 and 1923), who were using hand-drawn overlays to determine the ability of land to support planned uses.

The growing public awareness of the negative environmental impacts of human actions increased the need for the method that was both accurate and defensible. The ecologic planning method developed by Ian McHarg was the most coherent and complete one, and was supported by convincing philosophy, described in a classical book "Design with nature" (McHarg 1969). His approach is based on a layer cake representation of phenomena and their interdependence. The interactions among these phenomena through time can be interpreted through human aspirations as intrinsic value ("fitness") of environment for human use.

The majority of contemporary landscape planning approaches is still based on suitability concept, although the development in other disciplines and overlapping with them has brought variations, focusing on different aspects on nature-human relationships (Figure A6).

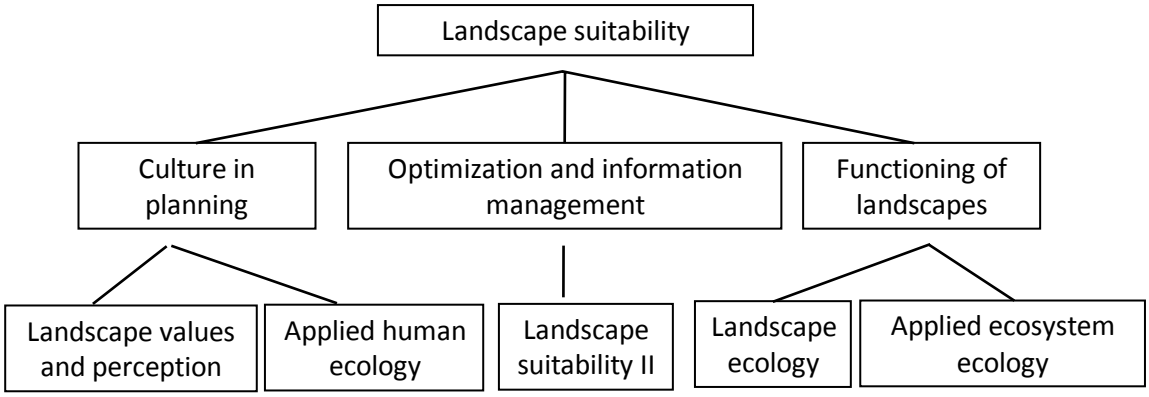


Figure A6: Major approaches to ecological planning (Ndubisi 2002b)

Landscape values and perception approach regards the landscape as a physical / aesthetic expression of human values (represented by, for example, E. Zube, S. and R. Kaplan). Applied human ecology is based on human interaction with environment. Its focus on cultural dimension aims at overcoming the human – nature divide (I. McHarg, D. Rose, F. Steiner, and M. Hough). Landscape ecology focuses on the relation between spatial (structural) and functional aspects of landscape (R. Forman, M. Godron, L. Zonneveld, M. VanBuuren, K. Kerkstra). The applied ecosystem ecology builds on a systems theory, functioning and response of ecosystems on human interventions and applies concepts such as the carrying capacity (E. Odum). The landscape suitability approaches of the second generation explore the advancements of information technology for processing spatial data (GIS) and update the ecological criteria for distribution of land uses with social, economic and political ones (C. Steinitz, F. Fabos, J. T. Lyle).

3.2 Methods and tools

Regardless of the specific focus of individual approach, they all share the common main steps (Ndubisi 2002b):

1. Understanding the nature of interactions between human action and natural processes
2. Understanding and describing the landscape to identify areas that are homogeneous
3. Analysing the identified homogeneous areas in light of the purposes of intervention
4. Developing alternative options for mediating the identified conflicts in human – environment interrelations
5. Detailed evaluation in terms of their technical feasibility, workability, probable effects on different groups, sustainable use of landscape, impacts on landscape
6. Developing measures for implementing the preferred option
7. Monitoring the effects

Suitability models

The most important step of the suitability analysis is describing the nature of interactions between human action and natural processes in a form, which is applicable for further processing and useful in the spatial planning process. This step is called “suitability modelling” and can be to a different extent formalised and quantified. Suitability modelling involves: identification (and mapping) of spatial characteristics (factors) which are relevant for concerned land uses, description of their interrelation (value) for individual land uses, mapping the values and overlay of value maps (definition of aggregation function). The suitability procedure is presented in Figure A7. The main step of this process is a description of the spatial characteristic interrelation (value) for individual land uses, or the definition of suitability criteria. An example is presented in Figure A8.

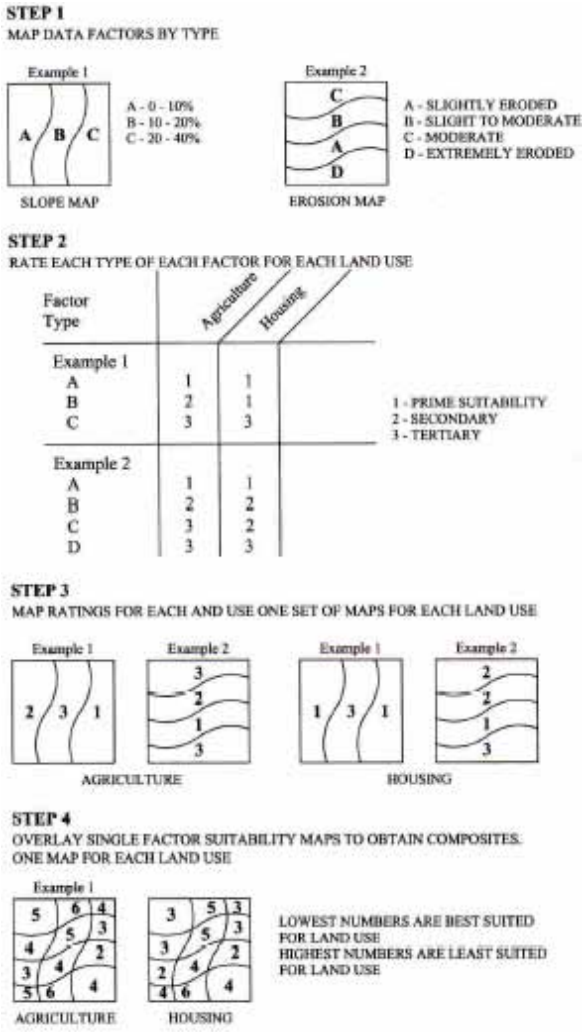


Figure A7: Illustration of the suitability procedure (Ndubisi 2002b, p. 143)

Criteria for evaluating suitability can be roughly divided according to two basic value systems – developmental and conservative. Developmental interest is described by opportunity (attractiveness) criteria. These reveal favourable conditions for land use, which can be expected to improve its output, such as vicinity of infrastructure in case of industry, fertile soils for agriculture, etc. Limitation (vulnerability) criteria on the other hand represent the need for protection and reveal the conditions, which may trigger increased environmental impacts in case of land use, i.e. vicinity of housing for industry or ground water reservoirs for agriculture. Such a division was originally implemented in environmental impact assessments (NEPA 1970) and was later also applied in spatial planning (Patri and Ingmire 1972, Steinitz 1967). There are two main reasons for separating the two aspects:

- They reveal two inherently antagonistic interests of society: development and protection, which are usually the cause of conflicts about land use. To resolve these conflicts, it is sensible to explicitly reveal both interests and their spatial implications and use these as a starting point for negotiation and consensus seeking.
- The increased environmental concerns have brought various types of (in)formal procedures, which aim to ensure adequate consideration of environmental protection in decision-making processes. The explicit treatment of environmental issues can, therefore, be used as an input in several of these procedures, such as (Strategic) Environmental Impact Assessments, eco-corridor and network mapping, comparative assessment of alternative options, sustainability assessment, etc.

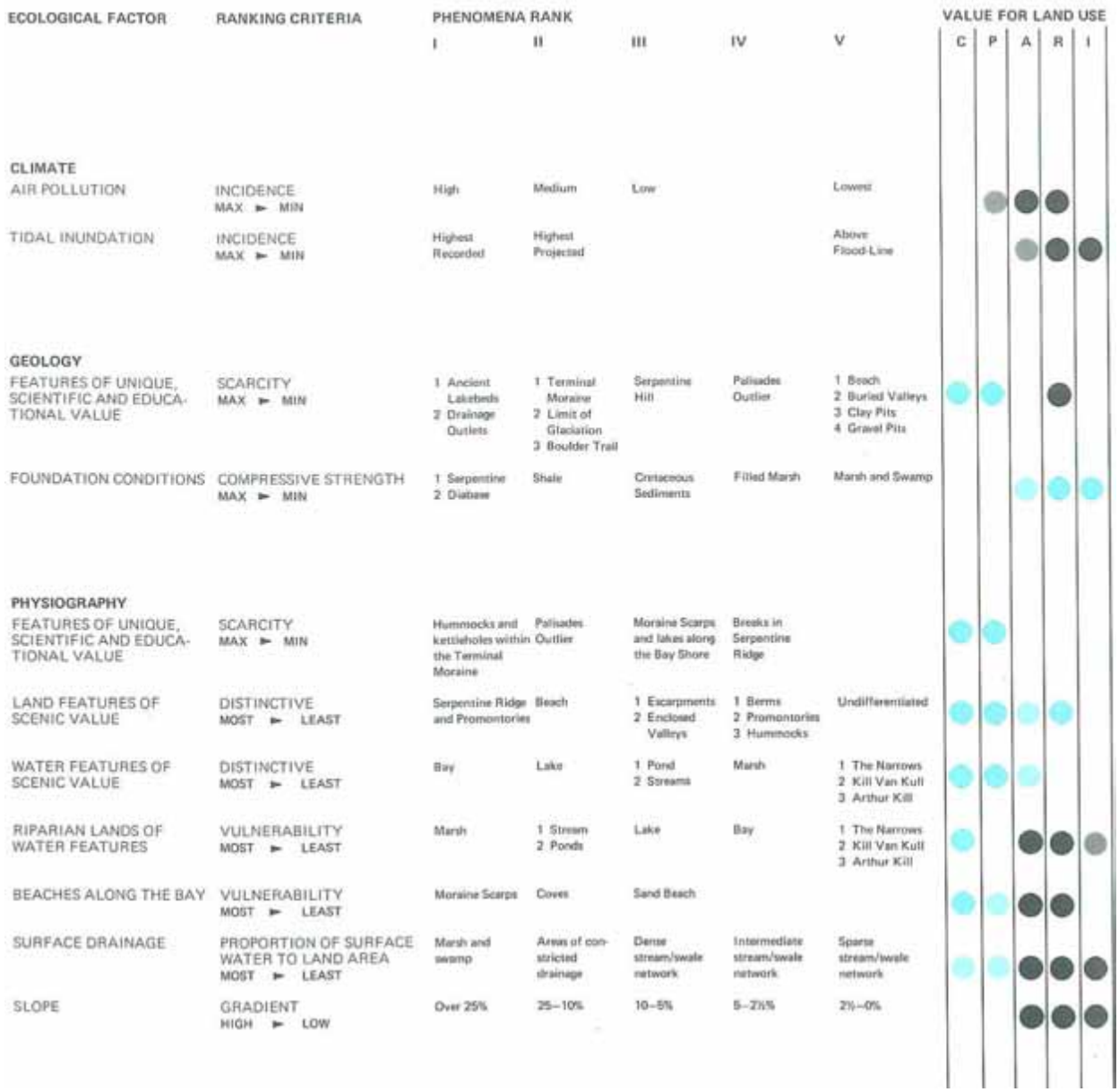


Figure A8: An example of a suitability model concept (McHarg 1969, p. 108). The concerned land uses are: C-conservation, P-passive recreation, A-active recreation, R-residential development, I-commercial and industrial development

The remaining part of this study will mainly focus on the vulnerability criteria of assessment or shortly assessment. Although it can be performed as an independent and complete task, its position and reference to other aspect of planning and management should always be kept in mind.

4. Vulnerability assessment

4.1 Vulnerability concept in landscape planning and management

Focus on environment in planning brought several approaches with different names, which are all conceptually close to vulnerability analysis, such as impact models (Lyle 1985, Steinitz 1990), sensitivity of resources (Lyle 1985, Kozlowski 1986), sensitivity to threat (Kozlowski 1986), development constraints (Patri 1972, Kozlowski 1986) and development thresholds (Kozlowski 1986). Vulnerability in landscape planning is defined as "vulnerability to impact" meaning the potential negative impact of planned activities on natural and man-made environmental values (Steinitz 1967). Vulnerability level, therefore, depends on the characteristics of a stressor (human intervention) and environment (Figure A9).

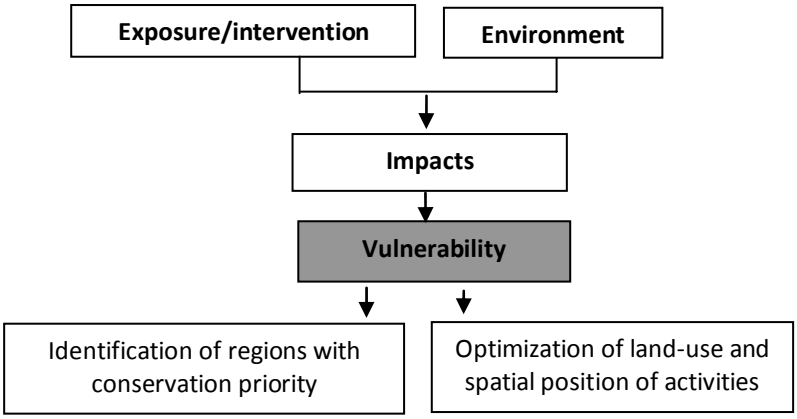


Figure A9: Vulnerability concept within the spatial planning context

Because of increased environmental concerns, contemporary planning procedures include various types of (in)formal procedures, such as sustainability assessment, (strategic) environmental impact assessment, and comparative evaluation of alternative options. These procedures require methods, which explicitly treat environmental protection aspects in an accurate and legally defensible manner (Ndubisi 2002b). The contemporary definitions and applications of vulnerability concept are answering this demand by focusing on obtaining objective criteria for deciding the site of a specific territorial intervention and for determining impacts associated to different alternative futures (Steinitz et al. 2003, Marull et al. 2007, Mehaffey et al. 2008, Shearer et al. 2006). The vulnerability approach is also applicable within the strategic environmental assessments (SEAs), following the European legislation (SEA Directive 2001). Marull et al. (2007), for example, use a "territorial vulnerability index" to quantify the vulnerability of the biosphere, lithosphere and hydrosphere in an SEA of impacts arising from implementing development proposals.

On the other hand, the vulnerability concept has been developed and used in several other fields of science and decision-making, traditionally in hazard management, social services distribution and most recently climate change. The common idea is to reveal the degree to which a system is likely to experience harm due to some threat and the common aim is to provide reliable expert information for policy and decision-making. In most contexts, these decisions refer to management of a natural or social system, aiming at optimisation of the technology of its functioning. The European (and consequently national) regional development and cohesion policies have spurred another, recently prevailing application of vulnerability assessments, which aim is to identify relatively deprivileged regions

that are entitled to certain funding and policy measures. Although these concepts are analogous and based on similar assumptions, their different contexts and way of application require differences in conceptualisation and implementation of analysis. The vulnerability in the context of land suitability analyses is meant as a site selection process for an intervention, and aimed at resolving environmental problems by the spatial planning procedure. On the other hand, most other vulnerability concepts refer to technological rather than spatial solutions to environmental requirements and are therefore management-oriented approaches.

4.2 Step-by-step process of vulnerability assessment

The main characteristics of spatial planning approaches, namely, their future orientation and territorial sensitivity, affect the choice of methods for vulnerability analysis: modelling and mapping of impacts. The models describe the nature of the interactions between human action and natural processes in a form, which is applicable for further processing and useful in the spatial planning process (Steinitz 1990, Steiner 1999).

Vulnerability analysis follows the structure of a deduction-based approach, where the concepts are built according to some theoretical base. The first step involves understanding the phenomenon that is being studied and the main processes that are involved. The second, reductionist, step involves identifying the main processes to be included in study and how they are related. The third step involves selecting the indicators for these processes and assigning values and weights (Niemeijer 2002).

The following chapter presents the main steps of this approach based on theory and experience in practical application of vulnerability assessments.

I. Scoping

I.1 Definition of analysed area

I.2 Definition of concerned land uses / activities

I.3 Definition of concerned environmental components

I.4 Identification of impacts / vulnerability models

II. Conceptualisation

II.1 Definition of environmental unit for assessment

II.2 Definition of vulnerability concept for each model and definition of criteria

II.3 Identification of indicators / data sets

III. Evaluation

III.1 Evaluation of vulnerability for each model

III.2 Synthesis: aggregation of individual models

I.1 Definition of analysed area

The borders of the area should be defined to include all potential alternative locations for prospective land uses /activities. In practice, this means that the analysed area is often wider than the site of initial proposal. If vulnerability assessment is a part of a land-use planning procedure for an administrative unit (i.e. municipality or region), then its borders would be considered as the area of assessment.

I.2 Definition of concerned land uses / activities

According to the definition, vulnerability is not intrinsic to environment, but can only be defined in relation to potential intervention. The definition of planned activity or land use is therefore the following step of the scoping phase. This is a relatively straightforward task if we plan for a single activity / object (i.e. a highway or a wind power plant), but becomes more demanding in case of assessment for comprehensive / land-use plans, especially on the strategic level where prospective uses are not well defined yet. In any case, all uses demanding space, which are or can be foreseen should be considered in the assessment.

The level of detail of description is adapted to the level of planning and the type of potential impacts. The categories can be kept more general if their impact on the environment is considered to be similar (i.e. all housing types can have similar impacts) and should be further divided if the impacts are very diverse (i.e. different types of industry). Available information is another important factor affecting the level of

description. If this is scarce, then standardised list of activities from, i.e. statistical classification can be used. Each activity is then described in terms of its technology and actions needed for its operation (an example is presented in Table A1).

These and not the "activity" are namely the actual source of impacts. All phases of the operation need to be taken into account: preparatory work, building, operating and decomposition phase.

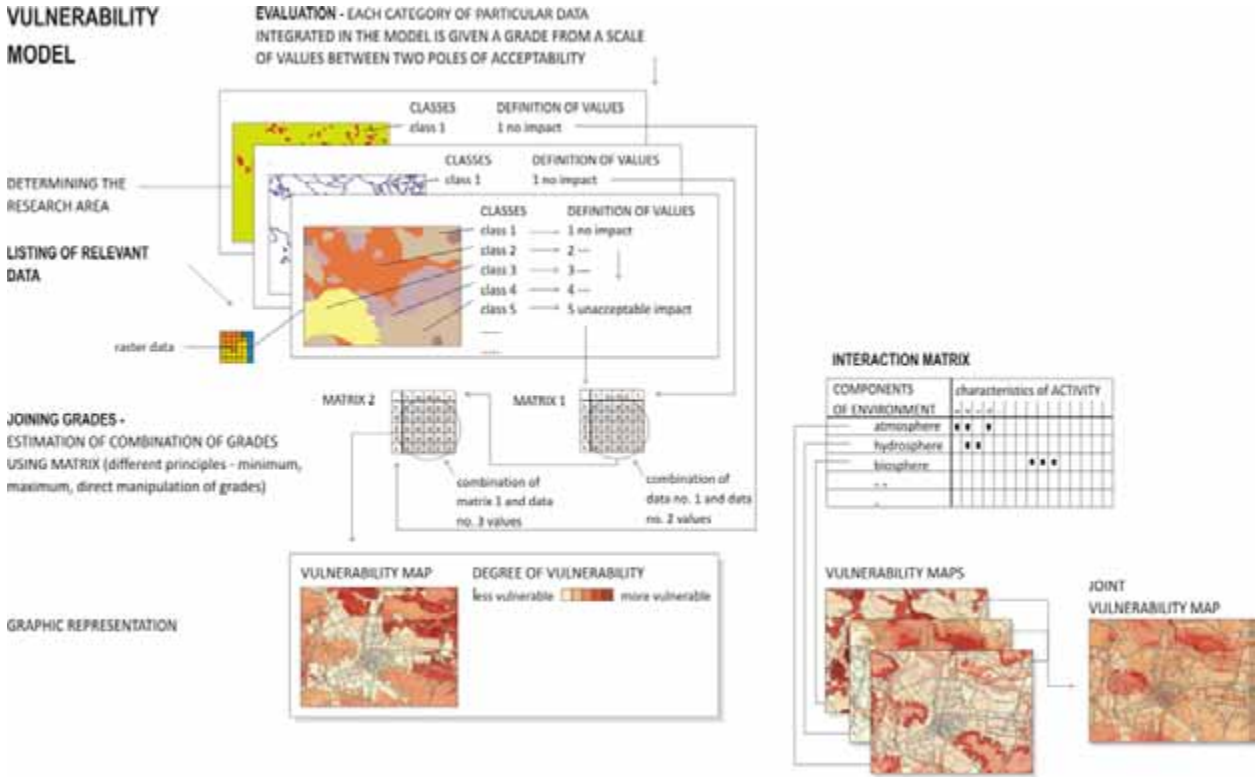


Figure A10: Main steps of the vulnerability assessment procedure (Mlakar 2004)

Table A1: Example of structured description of an activity

Activity/land use	Groups of actions	Actions
Industry	Preparation of building site, building of the objects and infrastructure	Removal of vegetation Transformations of geomorphology: leveling of the terrain, digging the foundation pits, disposing of building material Regulations of streams, drying up the wetland Transport of the building material on/from the building site
	Emergence of structures	Emergence of structures
	Operation of the facility	Use of energy for heating and operation Water take-up Release of used water Emissions in the air Disposing of waste Noise and vibration from operation of machinery Transport of raw material and products to/from the facility

Some of these actions may be common to several activities/land uses. In cases where vulnerability assessment is prepared for a set of different activities (for example, in case of a land-use

plan), it may be more operational to take these generic actions as the basic factor of impacts. Examples of such generic actions include: removal of vegetation, earthworks, transport of building material, disposals of material, energy use, presence of people, noise, etc. This approach reduces the number of impact models.

I.3 Definition of concerned environmental components

Environment is a system of subsystems and components, too complex to be dealt with in a holistic manner. A number of typologies of environmental components can be found in the literature (Marušič 1994b). They differ mainly to whether environmental articulation is viewed as a real-world system or as a system of values. While the former is typically found in studies of environmental impacts, treating the environment as a system of values may be more applicable in the planning and management context. Most importantly, it enables us to treat inherently different values independently and to avoid imposing trade offs between incommensurable value systems. It is therefore useful to apply procedural division for different nature of environmental protection aims. For example, Marušič (1996) identifies three fundamental conservative value systems:

- Protection of human environment (from all forms of environmental pollution) vulnerability is here determined as a function of environmental component's relevance for human well being. For example, air near hospitals, schools or housing areas is more vulnerable for pollution from industry than air in agricultural areas or in the forests.

Table A2: An example of describing environmental components as parts of a system

Protection aim	Environmental sub-systems	Environmental components
Protection of nature	Atmosphere	air
		climate
	Geosphere	bedrock
		soil
		geomorphology
	Hydrosphere	ground water
		surface water
		sea
		snow-ice
	Biosphere	flora
		fauna
		habitats
		biodiversity
Protection of natural resources		forests
		agricultural land
		water resources
		mineral resources
Protection of human environment	Quality and safety of life	noise
		natural and technologic hazards
		visual qualities
		recreation
		social services
	Cultural and social aspects	property
		cultural heritage
		settlements and infrastructure

- Protection of natural resources: vulnerability is determined as a function of environmental component's relevance for exploitation of present and future generations. For example,

fertile agricultural land is more vulnerable for pollution from industry than built-up land or forests.

- Conservation of nature and natural processes: vulnerability is determined as a function of environmental component's "naturalness". For example, air or soils in natural areas or forests is more vulnerable for pollution from industry than built-up or agricultural land.

The (same) change of a particular environmental component can therefore be valued differently depending on how the characteristics of the affected component are ranked within given conservation aim.

It should be noted, however, that other ways of decomposing the environment as a system are possible and may be more operational in certain situations. Definition of components must consider the level of the assessment and the characteristics of environment: all the features and values that may be affected by proposed activities need to be taken into account.

I.4 Identification of impacts / vulnerability models: interaction matrix

In this step, the interaction of environment and proposed activity is analysed to determine the causal relation and to identify the potential negative impacts. The main tool for this step is interaction (or impact) matrix (Leopold 1971), which is traditionally applied in environmental impact assessments. It involves testing sub-components of an action (intervention) against a set of environmental components. The columns are filled in with the activities / actions; the rows with environmental components. Each intersection represents a potential impact.

The information filled in the matrix cells can be of different type and level of detail. On the first level, only a binary (yes/no) information can be given, identifying the existence of an impact of a particular action on a particular environmental component (Figure A11). However, any available further information is useful for the next steps of impact modelling. Traditionally, the input included two types of information: the extent of environmental change (quantification) and its meaning (qualification or evaluation). It is also useful to describe the levers and mechanisms of functioning of the activity in the environment and identify the ways in which the impacts are caused, i.e. "*installing a new hydro-power plant causes the existing river bed to be dammed: this leads to change of water dynamics, changes in water temperature, its gravel transport, etc. As a consequence, habitats are no longer suitable for water flora and fauna...*" (another example is presented in Figure A12).

The better information we have on the proposed activity, its extent, technology, etc. and on the characteristics of the environment, the more accurate can these descriptions be. In lack of information, we can make use of the generic descriptions of impacts, which can be found in the literature. Impacts are usually identified and described by expert judgments, based on existing knowledge, literature and case studies. Simulation models, if available, are another good source of information. Ideally, this step is a result of exchange and verification of knowledge within an interdisciplinary team of several people.

Not every environmental component / action will be identified as an impact. Some types of actions may have no relevance for certain parts of environment, i.e. a dam of a hydro-power plant may cause no impact on agricultural land. Among those identified as interactions, not all will be equally strong or detrimental. It may be advisable to distinguish among the levels of the interactions to avoid having to deal with an uncontrollable number of impacts. Rough categories such as strong / mild; direct / indirect; negative / positive can be used. Strong, direct negative impact will certainly be considered for a detailed analysis. Depending on the aim and frame of the assessment, other impacts can be also included.

Other ways to reduce overcomplexity are:

- a more general model can be used to represent a set of more specific ones (in case where different actions have a similar impact on one environmental component),
- more environmental components can be joined in a more complex environmental subsystem (i.e. streams, lakes, rivers can be joined in "surface water"), and
- the planning question should be considered: not all of them are comprehensive and the number and choice of impact models should be made to best answer the question.

	cleaning surface	earth works making the ditch	land stabilization	assembling the pipe	putting down the pipe into the ditch	filling up the ditch	maintenance of the pipeline
atmosphere air							
soil		X	X			X	
geology		X	X			X	
relief		X	X			X	
surface waters	X	X					
under-ground waters	X	X	X				
snow, ice					X		
biosphere		X				X	
biotops	X						
flora	X						X
fauna	X						X
resources potentials							
agric. l.	X	X	X				X
forests	X						
water	X						
energy							
tourism	X						
amenities	X	X					
social qualities							
cultural qualities	X						

Figure A11: An example of interaction matrix with binary information on existence of impacts. Impact causing factors are actions needed for gas pipeline installation and operation

IMPACT MATRIX					
Conservation goals	*environmental systems/components*	**earth - cut/fill operations**	**construction works**	**presence of people and domestic animals**	**land reclamation works**
NATURE CONSERVATION	Atmosphere	emissions from constructi	emissions from construction machinery	smoke - from heating facilities	
	Geosphere - soil and geomorphology	increased erosion exposure			
		transforming of relief			
		loss of special geomorphological formations	hiding of special geomorphological forms		
		degradation of natural quality soils			
		worsen of the soils (pollution, degradation)	spills of oil, combustions - pollution of soil	damage on the soil surface	
	Hydrosphere - surface waters	spill of oil, gasoline - pollution of surface waters	spills of oil, combustions - pollution of waters	communal waste, sewer	destruction or change in existing drainage pattern
		regulation of stream and spring bodies	transforming natural bodies of surface waters		reshaping of water bodies
		change of biological conditions (flow, temperature...)	changing of hydrological conditions (change of water flow)		
	Biosphere	cut off of vegetation cover	impact because of noise	disturbance of animals because of noise	destruction of river banks vegetation and hedgerows - change of habitats
		reduced biological diversity	impact because of presence of people	catching wild animals, destroying nets	
		destruction of natural habitats	impact on natural corridors	cutting plants	
		change of habitat quality, connectedness, corridors			
CONSERVATION OF RESOURCES	Timber potentials	elimination of fires cover	destruction of forest habitat		
			reduced accessibility to forests		
	Potentials for agricultural production	erosion of productive soil	reducing of the agricultural productive land		*POS*
	Water resources	spill of oil, gasoline - pollution of drinking water	spills of oils, combustions into surface and underground water	communal waste, sewer	
				consumption of water - impact on available quantity	
	Potential for tourism & recreation		diminishing of the land suitable for tourism, recreation, reduced visual amenity		
			closing the recreational paths		
		reduced visual attractivenes			
	Potential for housing	reduced visual attractiveness	construction on land suitable for housing		

Figure A12: An example of interaction matrix with more comprehensive information on impacts. Impact causing factors are generic actions related to different activities / land uses

II.1 Definition of environmental unit for assessment

The choice of spatial unit should observe the criteria regarding its size and shape:

- the unit is homogeneous in terms of the expected impact (at the level of inquiry);
- the unit should provide the results that are useful for taking decisions.

The common types of units in planning are physio-geographic (landscape) units, administrative units and raster cells. Physio-geographic (landscape) units are by definition homogeneous in terms of their (main) natural features. It is reasonable to expect that the impacts of an activity would be relatively similar across the unit. These units are useful especially as management support, where the types and ways of land use strongly depend on natural characteristics of an area (for example the use of natural resources, nature conservation, recreation). However, in case where impacts depend on one specific characteristic of the environment, this unit can be insufficient. They are also not useful when we plan for a new activity, such as settlement and infrastructure, which size and/or shape does not conform to the units (Figure A13). In this case, the results of vulnerability assessment cannot be used to optimise the location of the object, but can still give information on how strict mitigation measures need to be taken in case that certain object is located within the unit.

Administrative units are adjusted to the decisions within the administrative procedures (for example, definition of management regimes,

issuing building permits or concessions for use of resources). However, it is rarely the case that these units correspond to either natural features or structure of planned activities, and are therefore not the best choice for solving planning or management problems.

The third option, raster cell is most neutral and flexible. It is defined as a regular geometric unit of a chosen size and assumed homogeneity. In order to correctly assume homogeneity of impact, the cell must be a common denominator of different environmental features and different types of planned land uses. This usually leads to cells of a rather small size (10 or 25 m). For the use in decision-making, the results can be interpreted by aggregating cells into larger units. For purposes of spatial planning, raster cell is usually the best option. Its applicability has been further increased by advances in computer technology, which enables processing of a large amount of data meaning that very small cells can be used, where homogeneity is not a concern any more. However, it should be noted that by shrinking the size of a cell alone, the accuracy of the information cannot be indefinitely improved, since it depends on the quality of used spatial data, and the accuracy of their retrieval.

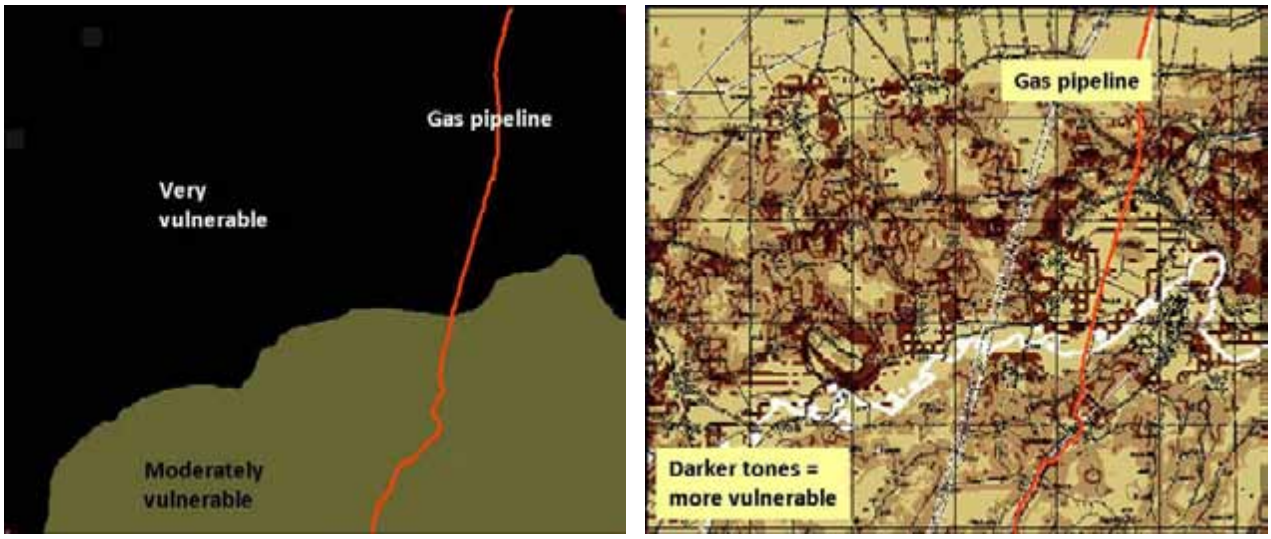


Figure A13: An example of applicability of different spatial units (left – landscape units, right – grid cell) for locating gas pipeline

II.2 Definition of vulnerability concept for each model and definition of criteria

The next step is developing the vulnerability concept for each of the impacts, which were identified in the scoping phase. The model must answer the question, which characteristic of the environment will affect the size of the impact and in what way. The size of the impact depends on the extent of the expected change and on quality of the affected environment. Installation of the same construction may, for example, require different amount of change depending on the characteristic of the environment: road on flat and hard lands will require less earth work than a road on steep slopes or wetlands. The loss of value in case of change will also be larger if the characteristics of the affected environment qualify it as valuable (i.e. cleaner water; more fertile land). The value depends on the protection aim, meaning that one characteristic of environmental component (for example, the level of water pollution) can be treated differently, leading to separate vulnerability models for each protection aim.

Example: The impact of housing development on biosphere:

The main cause of the impacts is removal of existing vegetation due to construction work. Disturbances due to construction works, noise and transport may reach larger area around the construction site. In the operation phase, the air and water emission, noise from traffic and presence of people and pets are the main causes of impacts on biosphere.

Less human interference and the more natural state of the existing biosphere means higher vulnerability. The level of "naturalness" can be inferred form existing land cover/use and biodiversity. The existing natural features of high value, rare and endangered habitats and species are more vulnerable. Areas of higher landscape diversity (forest edges, riparian and coastal areas) reveal potentials for higher biological values and are therefore also considered more vulnerable. Green areas within and close to urban areas have high importance for human environment and ecological connectedness and are also considered more vulnerable.

II.3 Identification of indicators and data sets

This step involves selection of data that describe the vulnerability criteria. Although the experts preparing the analysis are often tempted to check the availability of data and build the model according to what is available, it is only at this stage that they should concern with the issue of data availability. This always persisting problem can be solved in different ways:

- data, identified as really inevitable, may be considered to be retrieved for the purpose of assessment. Not all data generation is very time consuming or expensive;
- missing data may be replaced with one or more substitutes or modeled from available data;
- data may simply be left out: not all data is really important. Data overload can blur the result and does not answer the question.

Table A3: Model parameters: indicators for impact assessment and the required data (the case of impact of settlement expansion on biosphere)

Indicator	Data
Natural qualities	Land cover /land use, Valuable natural features Rare and endangered habitats and species Natura2000 sites
Biodiversity	Habitat map Biodiversity index Ecological/migration corridors
Landscape diversity	Forest edge Habitat map Digital elevation model
Urban green areas	Land cover

The originally conceived impact models may eventually have to be changed due to data issues. In any case, the models developed so as to answer the problem give better results than those, which were constructed so as to explore the available data banks.

III.1 Evaluation of vulnerability for each model

In this step, the size of the impacts is determined according to impact indicators (data) values in every spatial unit (cell) (see Table 4). Vulnerability is expressed in a chosen measurement unit and ascribed to each cell. It can be interpreted as the extent of the expected impact in this spatial unit in case of realisation of the proposed intervention. The need for synthesis in the following steps of the assessment requires that the level of vulnerability be expressed on a unified scale. Ideally, the thresholds between the classes of the scale are defined. However, this is hardly achievable for most of the impacts. The minimum requirement for the validity of such a scale is that the lowest and highest classes are unambiguously defined. The threshold of the upper class is usually determined by legal requirements such as emission limits (for the extent of change) or natural/cultural values with protection status (for quality of the environment). The lowest class threshold would be an impact bellow the level of detection. The exact (quantified) thresholds for classes in between are usually difficult to determine. However, they should be described by criteria as clearly as possible for each impact separately.

The number of classes can be different and depends on the required results. Usually four or five classes are sensible, easy to handle and sufficiently precise. Two or three class scales may prove to be too robust to differentiate between

similar vulnerability levels. With higher number of classes, the thresholds can be increasingly difficult to define.

0 – no or negligible impact

1 – small impact

2 – medium impact

3 – large impact

4 – very large – destructive impact

Table A4: Example of indicator values for impact of industry on hydrology

Impact indicator	Data	Data class	Vulnerability class
Hydrologic features with buffer zones	Rivers and streams according to their natural value	Class I, I-II and II, 20 m buffer	4
		Class I, I-II and II, 20 – 100 m buffer	3
		Other classes, 20 m buffer	3
		Other classes, 20 - 100 m buffer	2
Hydrologic areas and features of higher nature conservation value	Areas of hydrologic heritage with buffers	Area of hydrologic heritage	4
		Hydrologic monument, 50 m buffer	4
		Hydrologic monument, 50 – 100 m buffer	3
Areas of high dynamic of hydrologic processes and high biodiversity	Wetland	Wetland	4
	Flooded areas	Frequent floods	4
		Rare floods	3

The individual indicators' values now have to be combined to "calculate" the vulnerability score. A formula or, more generally, a model for combining the indicators has to be developed. Different ways are possible:

(1) Linear models combine individual vulnerability classes according to some linear function such as addition. This approach enables handling a large number of indicators and use of scale with any number of value classes. It is easy to use and explain. The main problem is the levelling out, i.e. loosing the extreme values. Information on high vulnerability according to one indicator can be lost due to low vulnerability of other indicators. This is possible to ameliorate by use of weights but then the simplicity and clarity of the model are lost. Another weakness is that linear model assumes independency among the indicators, which is usually not the case, and absolute comparability among the value classes, which can also not be assured without thresholds.

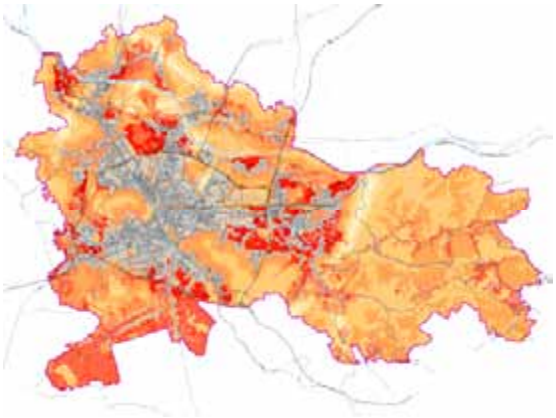
(2) Logic rules (sieve-mapping, adoption of minimum / maximum value, frequency of value class, etc.). This is another simple and transparent option, but has limited sensitivity for differing among the levels of impacts severity. According to the precautionary principle in environmental protection, the rule of maximum is advisable (meaning that the overall vulnerability score would comply with the most vulnerable component). This approach results in high vulnerability values across the area, which can be too limiting for the decision problem at hand. It also levels out areas where only one component is vulnerable with those of several vulnerable features.

(3) The issues of factor interdependence as well as limited comparability of the scales can be solved by using direct combination of indicators. The final vulnerability score is determined based on expertly defined rules, defined in the reduction matrices. This approach enables to fit the evaluation model to the problem at hand and the results, which leave more decision space and flexibility. The problem is traceability and transparency of rules, especially in cases where many indicators have to be combined. The construction of the model is demanding and

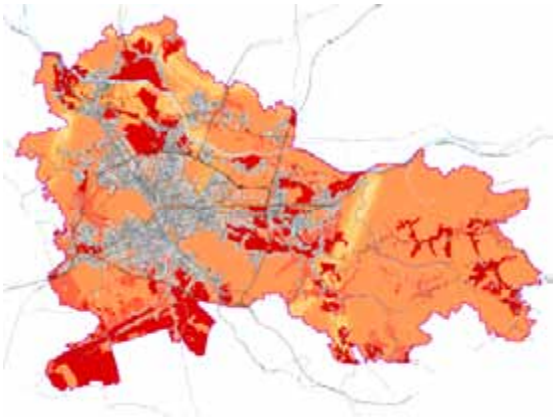
requires an experienced expert. Change of model parameters is difficult and requires a complete reconstruction of the model.

Different methods would normally bring different results. Therefore, the choice of the method should be well argumented and should consider the following criteria:

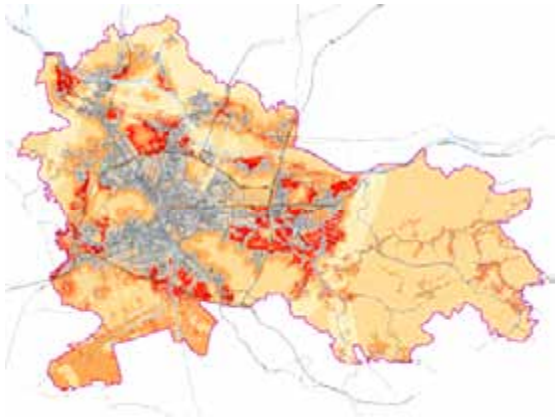
- type of problem to be resolved,
- technical, financial and time restrictions,
- available spatial data, and
- experience of the assessor.



(A) Linear model (normalised sum)



(B) Logic rules (adopting the maximum value)



(C) Combination of values using reduction matrices

Figure A14 (A, B, C): A comparison of different approaches for combination of indicators (vulnerability of landscape scenery due to new settlement for Ljubljana municipality, source: Marušič and Mlakar 2004).

In any case, no synthetic vulnerability should be taken for granted without careful interpretation and consideration of any partial result that has a bearing for the decision process. Use of multiple methods or sensitivity analysis is a way to check and to improve consistency and reliability of the aggregation.

III.2 Synthesis: aggregation of individual models

The analytical part of the vulnerability assessment results in a number of models, describing the relatively homogeneous and commendable parts of the problem. Use of the vulnerability assessment in decision-making processes requires that information be provided in a synthetic, ready to interpret way. Therefore, some kind of synthesis of the results is required. In case of complex problems (involving many sub-models), a step-by-step process is advisable. Aggregation by meaningful sub-models also contributes to better traceability and transparency of the modelling process (Figure A15). For the purposes of spatial planning the models would be aggregated across the environmental components, so that the result is overall environmental vulnerability for a chosen activity (Figure A16). It may be advisable to separately present the models according to the protection aim, i.e. nature conservation, protection of natural resources and protection of human environment, since these may reflect the difference of the intention also in spatial distribution of vulnerability classes (Figure A17).

For the purposes of management of natural resources, the models can be aggregated across the activities, so that the result is an overall vulnerability of i.e. water resources. In this case, aggregation of activities in terms of their technological similarities may be useful (i.e. infrastructure, waste treatment, building).

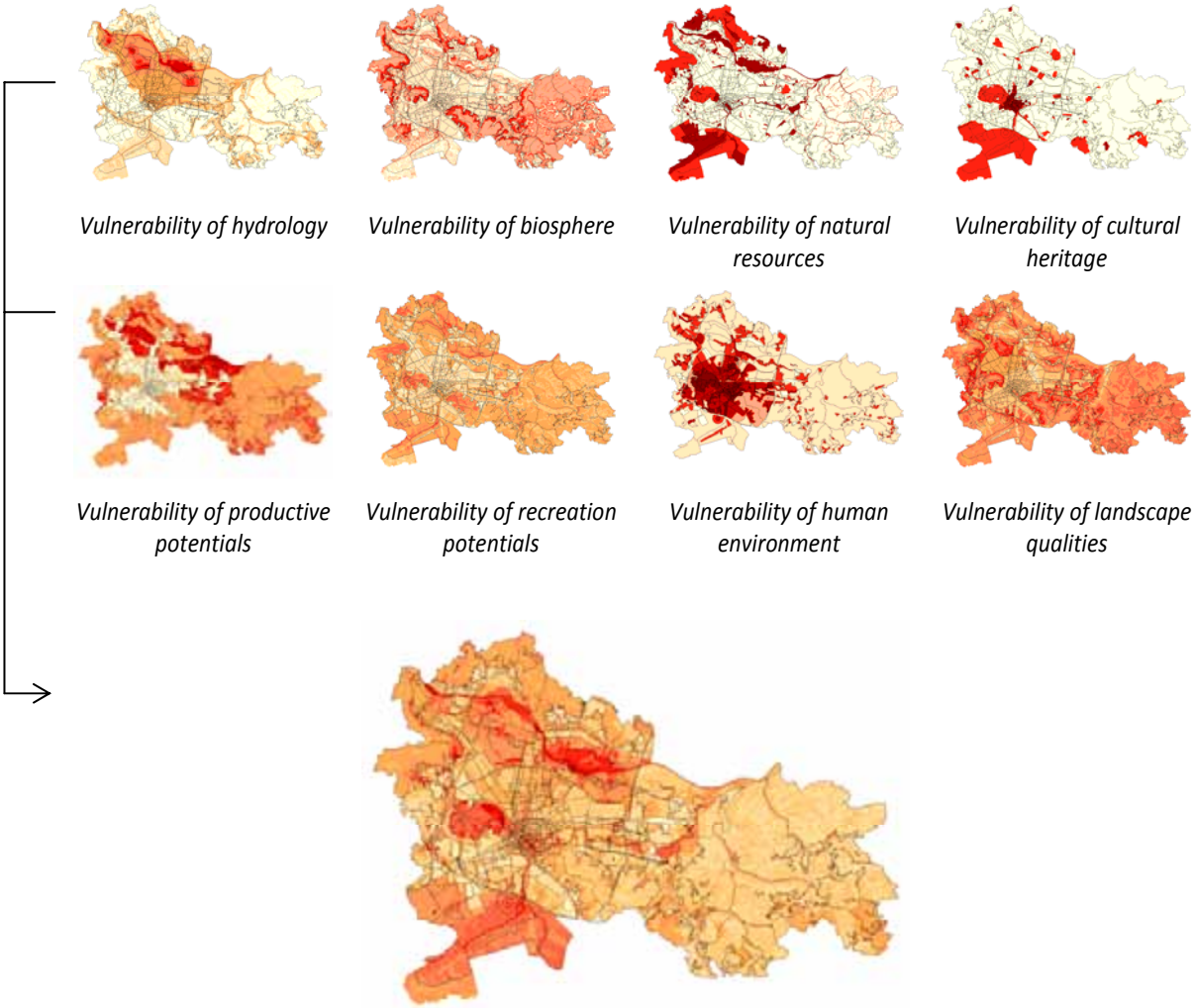


Figure A15: Aggregation in overall vulnerability should be done by meaningful submodels (example of vulnerability due to processing industry; source: Marušič and Mlakar 2004).

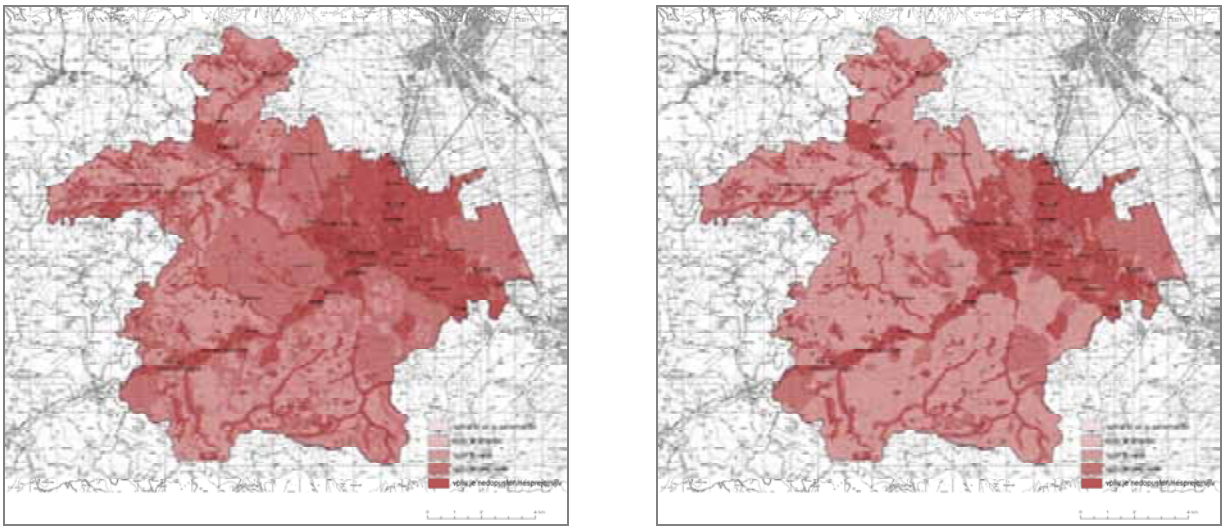
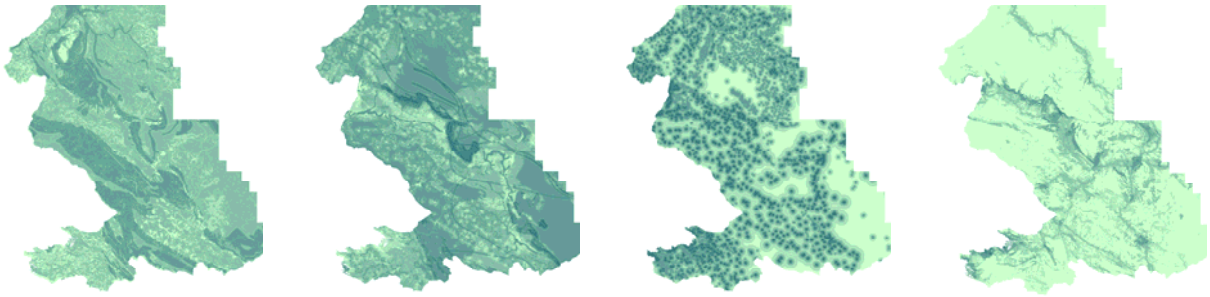


Figure A16: For the purposes of spatial planning, the overall vulnerabilities for each of different land uses should be presented (example of vulnerability for industrial zone and truck parking,(source: Golobič et al. 2006)



Natural resources *Nature conservation* *Human environment* *Scenic values*

Figure A17: Aggregation of models according to the type of protection aim discloses differences in spatial distribution of vulnerability classes (example of vulnerability due to wind turbines; source: Brečevič et al. 2001).

5. Integration of landscape planning concepts in formal planning procedures

The main concern of spatial planning is optimising the use of territorial resources by distribution of land uses. In pursuing this aim, contemporary sustainable planning process must observe the requirements of environment protection as well as the requirements of good governance, i.e. openness and participation of concerned public. The following chapter will describe how vulnerability analysis can contribute to both aspects.

5.1 Environmental considerations in the spatial planning process

Two main concepts of introducing environmental considerations in the frame of spatial planning are remediation of degraded area (*ex-post*, remedial approach) and prevention of potential degradations (*ex-ante*, preventive approach). Preventive approaches can further be divided into standardisation and optimisation (Figure A18). Vulnerability assessment is a key approach of optimisation-based environmental consideration. By simulating potential negative impacts of the planned activity on environment, it can inform the planning process where NOT to locate certain land use. This type of input supports development and choice among alternative planning options and optimization of site for individual land use/ facility. On more detailed planning levels vulnerability assessment can be used as a base for defining technological requirements and criteria for land use.

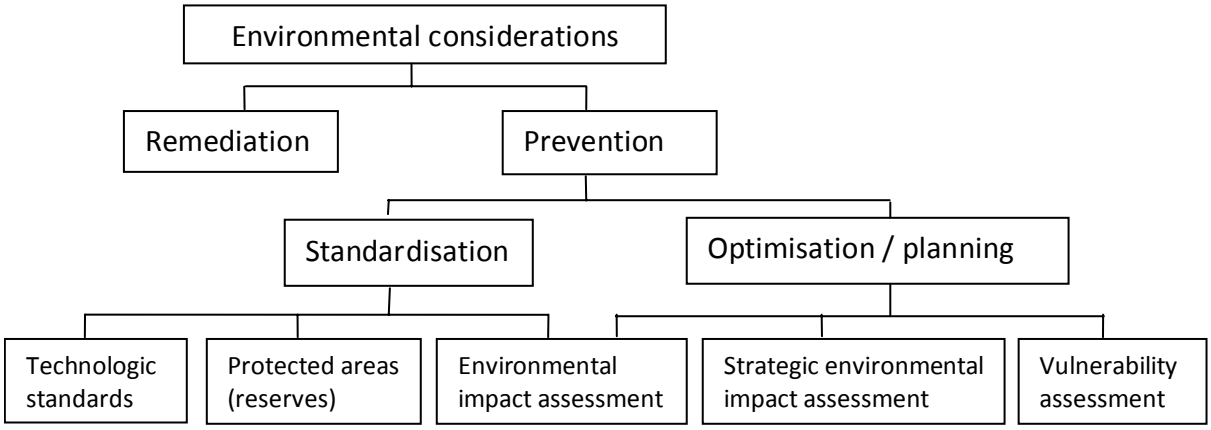


Figure A18: Ways of introducing environmental considerations in spatial planning framework (adapted from: Marušič 1999)

5.2 Applications of vulnerability assessment within the planning process

The main applications of vulnerability assessment are:

- identification of potential sites for proposed uses and their optimisation in terms of environmental impacts (development models),
- identification of least vulnerable corridors for infrastructure,
- assessment of alternative proposals in terms of their environmental impacts,
- identification of areas of strategic importance for protection of natural resources and nature conservation (including ecologic networks),

- definition of criteria, regulations and guidelines for land uses,
- Strategic environmental impact assessment (Dir. 42/01 EC).

Most of these applications are relevant at different levels of planning and for different types of planning tasks / documents. The overview is given in Table A5.

Table A5: Overview of applications of vulnerability assessment in spatial planning framework

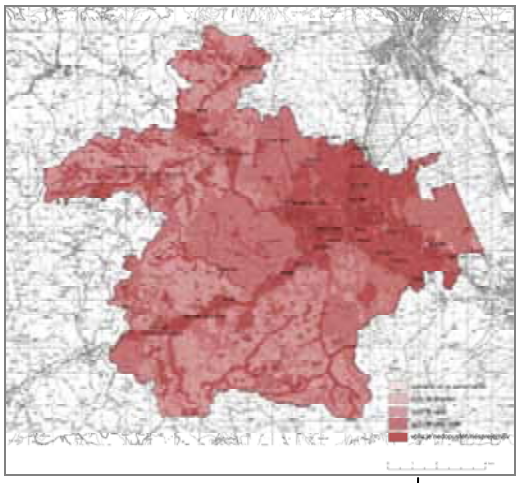
Spatial planning documents	Relevant contents of plan	Application of vulnerability assessment
Municipal / regional plan (strategic level)	- growth of settlement areas, -strategic areas for conservation, -infrastructure corridors, -distribution of services and industry, -definition of redevelopment /regeneration areas,	-identification of potential sites and their optimisation in terms of environmental impacts of proposed uses (development models), -identification of least vulnerable corridors for infrastructure, assessment of alternative proposals in terms of their environmental impacts, -identification of areas of strategic importance for protection of natural resources, nature conservation (including ecologic networks), -Strategic environmental impact assessment (Dir. 42/01 EC).
Municipal land use plan	-boundary of built-up areas, -land-use designation, -implementation criteria, regulations and guidelines, -urban regulations.	-identification of potential sites and their optimisation in terms of environmental impacts of proposed uses (development models), -definition of criteria, regulations and guidelines, -Strategic environmental impact assessment (Dir. 42/01 EC).
Detailed plan	-sites for complex development (infrastructure, industrial zones, intensive settlement development), -protected areas and regimes, -redevelopment/regeneration areas.	-identification and assessment of alternative proposals in terms of their environmental impacts, -definition of criteria, regulations and guidelines.

5.2.1 Identification of potential sites and their optimisation in terms of environmental impacts of proposed uses

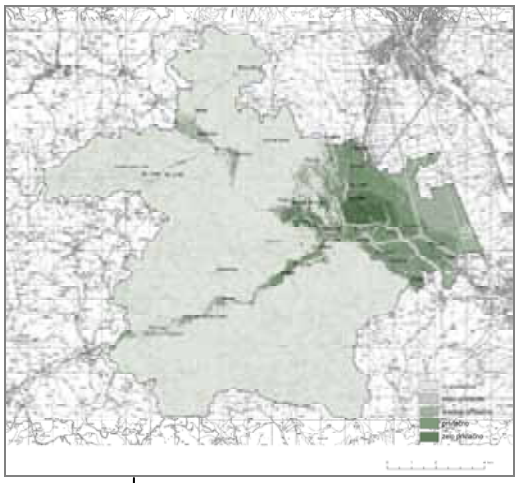
Vulnerability assessment differentiates the planning area according to the level of vulnerability of environment. It identifies very vulnerable areas, which should be avoided when an activity / land use is located. In the planning process, vulnerability map is confronted with developmental demands or proposals. If these are not yet known, they can be simulated by evaluating spatial potentials (attractiveness analysis) or another type of spatial modelling.

The areas with highest potentials, which are at the same time least vulnerable, may be considered optimal or most suitable for development. If such sites cannot be found then the demands of either development or environment protection may have to be redefined or another solution (for example technological) needs to be found.

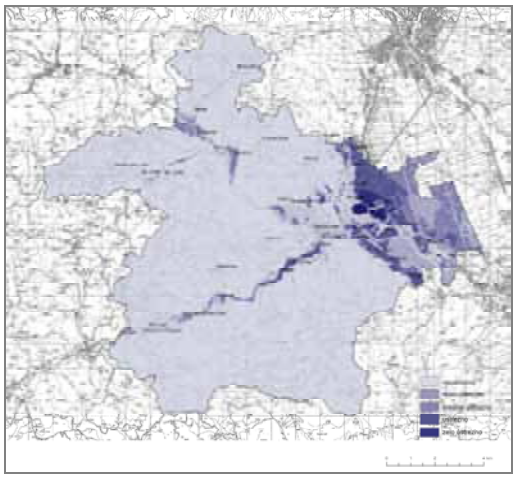
The identified most suitable areas are then subject of a detailed assessment in terms of criteria of site availability, ownership, and detailed site characteristics.



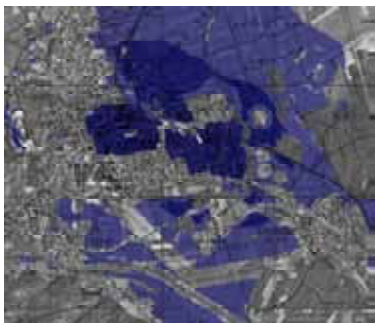
Vulnerability due to industry



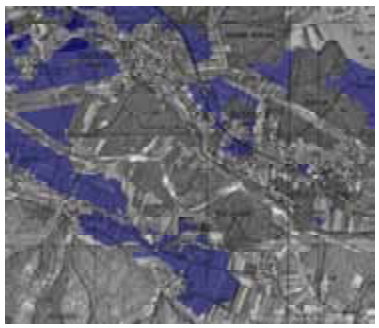
Attractiveness for industry



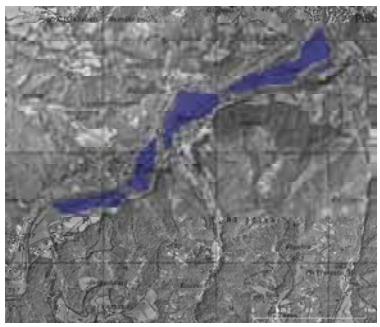
Suitability for industry



Suitability for industrial zone – site A



Suitability for industrial zone – site B



Suitability for industrial zone – site C

5.2.2 Identification of least vulnerable corridors for infrastructure

This is essentially the same way of applying the vulnerability assessment as above. The difference is in the way of synthesising the results, which takes into account the topology of infrastructure. The aim is to identify a spatially contiguous belt of required width and lowest vulnerability. Most GIS enable this operation (least cost), requiring the following inputs: digital vulnerability map, starting and ending points, potentially required intermediate points (i.e. infrastructure nodes).

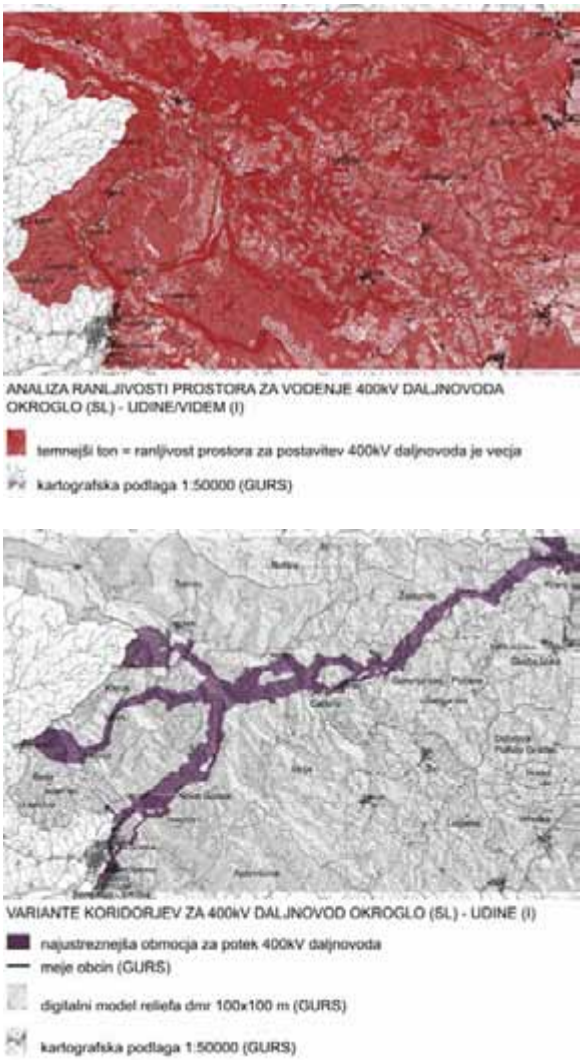


Figure A19: An example of least vulnerable corridor for electric power lines (right), computed on the base of vulnerability map (left) (source: Marušič and Cof 2007)

5.2.3 Assessment of alternative proposals in terms of their environmental impacts

Developing and comparative assessment of a set of alternative planning options in an increasingly accepted approach to ensure that the optimal solution is finally chosen. The criteria for assessment refer to different aspects of benefits and costs. They usually include economic effects, technological functionality and feasibility, impacts on development potential and use of resources, impact on society, equity, health, and environment. Evaluations are based on multicriteria assessment methods, since most of these effects cannot be measured in financial or other quantitative units. Vulnerability assessment can be used to evaluate the alternative proposals from environmental aspect.

For the assessment, the vulnerability map(s) are overlaid by mapped development proposals. The quickest method of evaluation is gestalt, by visual analysis. However, the method of vulnerability assessment also enables some level of quantification, which is usually required for the synthesis and decision-making. The performance of each alternative proposal can be computed as an average vulnerability of overlaid cells, or frequency distribution of different vulnerability classes. Because vulnerability map covers the entire area of a set of considered alternatives, it does not only identify the environmentally most acceptable option, but can also give proposals on how to further optimise it or even helps to disclose a new, potentially better option.

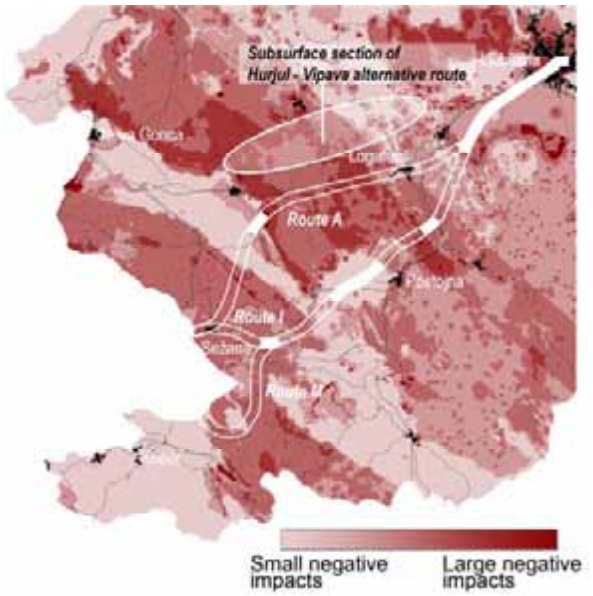


Figure A20: Assessment of alternative options of Trieste – Ljubljana High-speed rail: Vulnerability map of underground environment was used to assess the subsurface sections and helped to identify alternative route (source: Kontič et al. 2005)

5.2.4 Identification of areas of strategic importance for the protection of natural resources and nature conservation (including ecologic networks)

Decisions about which parts of a territory will be dedicated to development and which should be excluded is a part of strategic planning for a region or local community. The areas of strategic importance for the protection are those, which are recognised as endangered or valuable due to their role in ensuring a healthy human

environment or as a natural resource to be preserved for future generations. These areas are given a formal protection status with corresponding restrictions of use. The vulnerability assessment can be used to identify these areas by overlaying maps for different environmental components and land uses. The areas where several high scores accumulate should be given priority for strategic protection. Information on the types of most vulnerable environmental components and the types of most endangering land uses can be used for designation of protection regimes.

The definition of a protected area based on the vulnerability assessment should consider the following criteria:

- accumulation of highly vulnerable environmental components,
- high density of smaller highly vulnerable areas,
- potential for interconnectedness of highly vulnerable areas,
- territorial management issues: possibility to apply a common management framework or include it into existing management scheme.

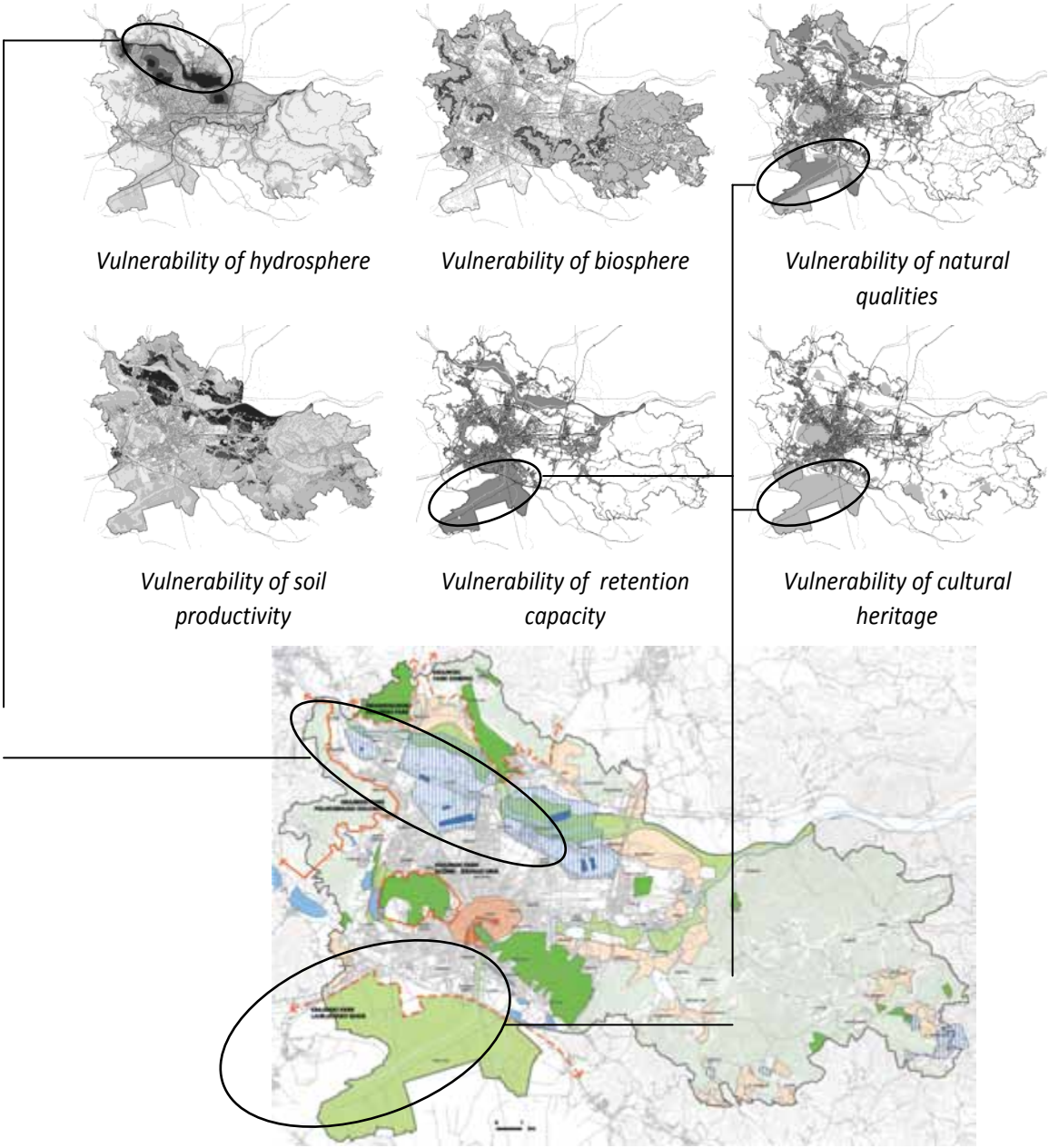


Figure A21: Designation of areas of strategic protection in the municipal spatial plan (below), based on the results of vulnerability assessment (above) (source: Spatial plan for Ljubljana municipality, 2002; qtd in: Marušič and Mlakar 2004)

5.2.5 Baseline for the definition of criteria, regulations and guidelines for land use

Technologic standards are the most commonly used approach for securing environmental requirements. In the spatial planning, this means that different technology or design solutions can be applied for the same land use or activity, according to type of environment. The land-use plans usually divide the planning area in planning units. Each unit has attributes of a type of land use and a set of related criteria, regulations and guidelines for a detailed planning. The vulnerability assessment can be used to determine the type of technology and minimum requirements that apply to certain land use in relation to the level of vulnerability and characteristic of most vulnerable environmental components.

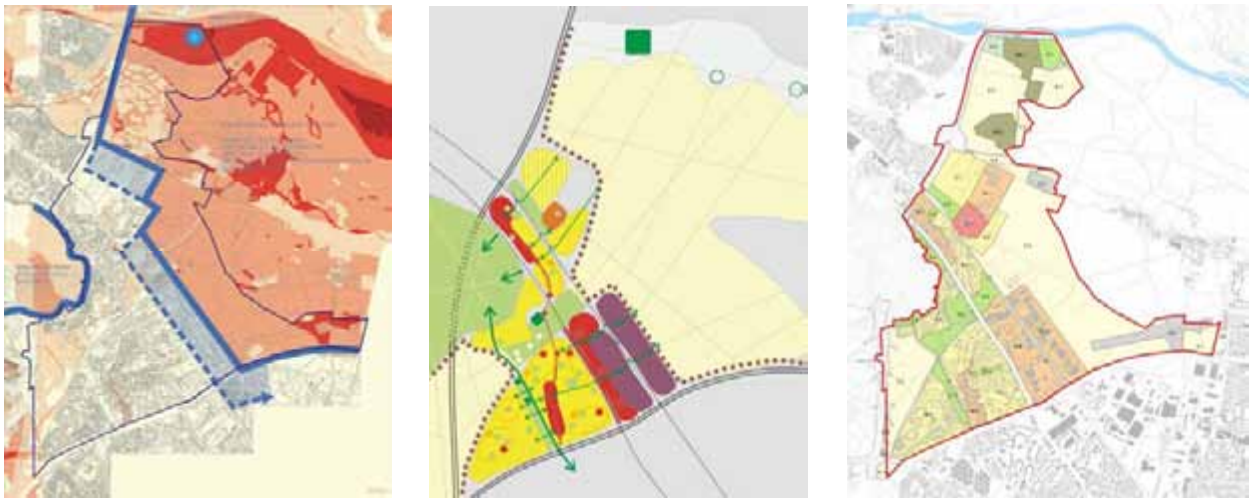


Figure A22: An example of the use of vulnerability assessment (left) for the development of a design concept (centre) and designation of spatial units with related regulations (right) (source: Mlakar et al. 2004)

5.2.6 Strategic environmental impact assessment

The Strategic Environmental Assessment (SEA) Directive (2001/42/EC) requires that the effects of certain plans and programmes on the environment be assessed before they are being adopted. The Directive includes "town and country planning or land use" among the documents that need to be assessed. The aim of this assessment is not just to give an environmental "clearance" for the document, but also to influence the process of its development in terms of its environmental impacts. Therefore, the assessment should begin and proceed in parallel to plan development. However, the general and vague designations of documents in their draft phases do not allow to relate the proposed actions to specific environment and to quantify the impacts. The majority of traditional environmental impact modelling is rather useless for this purpose, resulting in SEAs, which are either very vague and indecisive, or prepared *ex-post*, as a justification of already, agreed upon plans. Another strengths in comparison to majority of their environmental impact methods are that they are territorially sensitive, which is important in the case of assessing spatial plans. The use of vulnerability assessment in SEA can provide the inputs, which are useful for optimisation of the plan.

The vulnerability assessment must consider the structure of the activities/land uses as given in the assessed document. The evaluation of impacts of the proposed land uses can simply be given with reference to the vulnerability class at the site of proposed intervention. In cases where environmental thresholds do not exist, the judgment about acceptability of the impact can be given based on comparison between the vulnerability of the proposed site with alternative sites. In case where vulnerability assessment indicates potentially very high impact of proposed action, the following steps can be proposed:

- Search for an alternative site with lower vulnerability, and accordingly a proposal for a change of plan.

- If no such site can be found, then the technical condition and mitigation measures are proposed to reduce the environmental damage.
- If neither of the two is possible, the proposed development might have to be cancelled or moved to entirely different location.

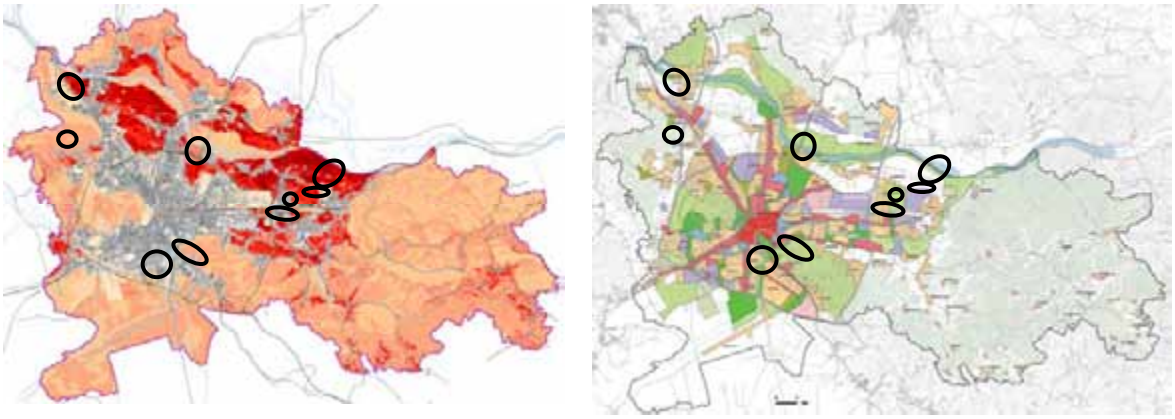


Figure A23: SEA for municipal plan (right, important projects are marked with black circles) based on vulnerability assessment (right, example for impact on soil productivity) (source: Spatial plan for Ljubljana municipality, 2002; qtd in: Marušič and Mlakar 2004)

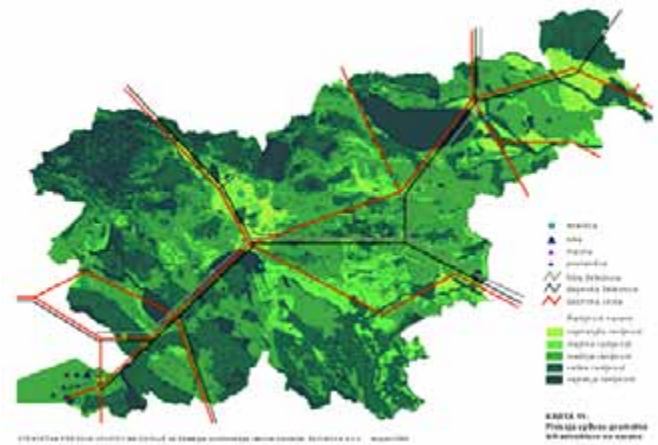


Figure A24: Example of SEA for the national plan; example of infrastructure corridors, based on vulnerability assessment (source: Stojič et al. 2003)

6. APPENDICES
EXAMPLES OF VULNERABILITY ASSESSMENT APPLICATION

Appendix A
Application of vulnerability assessment in the preparation of a land-use plan – the case of Piran municipality

Source: Knowledge base for the preparation of a Piran Municipality spatial plan; environment protection issues, commissioned by the Piran Municipality and prepared by Prostorsko načrtovanje Aleš Mlakar s.p. and Aquarius d.o.o. Ljubljana in September 2008

A.1 Background and scope of the study

A.1.1 Background

After 2007, the local communities and municipalities in Slovenia started preparation of a new generation of spatial plans following the requirements of a new Spatial Planning Act (*Zakon o prostorskem načrtovanju*, Ur. l. RS, No. 33/2007). The municipality as a body responsible for the plan preparation, commissioned several expert teams to prepare studies from diverse fields of expertise including environment protection. The expert input on environmental protection must follow the needs of a Strategic Environmental Impact Assessment (SEA), which is required for land-use plans by the Environment Protection Act *(Zakon o varstvu okolja*, Ur. l. RS, No. 41/2004). The methods and contents of SEA are regulated in its bylaw (*Uredba o okoljskem poročilu in podrobnejšem postopku celovite presoje vplivov izvedbe planov na okolje,* Ur. l. RS, No. 73/2005). The aim of this study is to provide the knowledge and method to ensure an early and effective consideration of environmental issues in the planning process by optimisation of planned land uses. This includes, but goes beyond the sectoral contents, and represents a common comprehensive environmental framework for developing the main planning document for the municipality.

The study contains the following parts:

- Strategic planning guidelines: summary of the existing strategic documents referring to environment protection, such as the Strategy of spatial development of Slovenia (Ur. l. RS, No. 76/2004) and the National environmental protection programme 2005 - 2012 (Ur. l. RS, No. 2/2006).
- The environmental vulnerability assessment for new settlements with the aim of determining areas where new settlement should not be proposed (as an early warning measure).
- Designation of areas of different types of protection based on the existing regulation and detailed expert analysis. The municipal area is divided based on the main spatial characteristics, which need to be considered in developing the vision of sustainable development.
- Planning guidelines and operational recommendations for a detailed planning.

The following chapters will mainly focus on presenting part (2) of the study: the vulnerability assessment.

The Piran municipality area was also included in the vulnerability assessment for the Coastal Region, which was prepared in the framework of the CAMP Slovenia project, by ACER (2006).

A.1.2 Definition and description of analysed area

The Municipality of Piran lies at the southwestern part of Slovenia and covers 46.6 square kilometres (Figure A25). It has close to 17,000 inhabitants and 17.9 km of the coastline, which is about half of the total Slovenian coast. It is the most developed Slovenian municipality in the tourism sector and one of the most important congress, spa, casino, and nautical tourism centres in the northern Mediterranean.

Settlements

At the end of the Piran peninsula, which gradually narrows between the Strunjan and Piran Bay, lays the old seaport of Piran. The city has preserved the medieval layout with narrow streets and compact houses, which from the coastal plains rise to the top of the ridge and give the whole area a typical Mediterranean look. There are a number of other mainly touristic settlements along the seacoast among which it is important to mention Portorož with its Marina. Primarily, in recent years, the ridge-stretched settlements emerge on the hill-ridges near the sea and dispersed form of settlements on the southern slopes near the sea. The traditional compact settlement structures are thus gradually disappearing. Extensive plains along the coast are not populated due to the lower bearing capacity of the soil and high ground water. The population in the coastal part of the municipality is increasing while it is declining elsewhere over the hills.

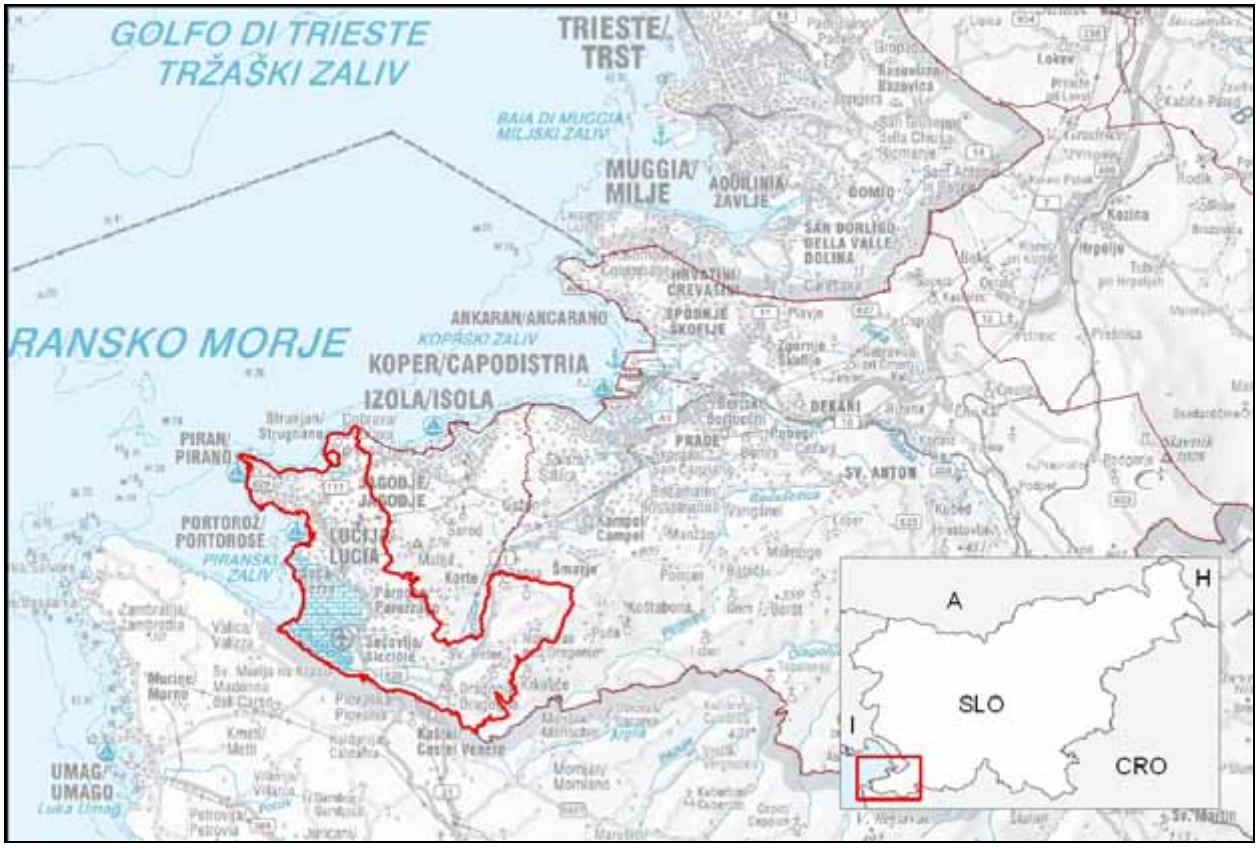


Figure A25: Piran Municipality

Landscape

The characteristic of the landscape is the transition from the narrow valleys, surrounded by relatively steep slopes and covered with forests to large and often marshy plains with a sea coast. In the past, marshy plains were ameliorated and cultivated (Bonifika). In addition, extensive salt-pans were created on such contacts of rivers and sea. Besides cliffs, salt-pans mark the image of the Slovene coastline. Most of the smaller salt-pans are now abandoned. Among larger ones, only Sečovlje salt-pans are still functioning. In the hilly part of the municipality, the northern steeper slopes appear in contrast with the less steep southern slopes. Northern slopes are mostly overgrown with forests. In accordance with the fact that forests were the most well preserved on steep slopes and in areas unsuitable for agriculture, they have mainly ecologic and erosion protective function while very few are intended for the production of wood. South slopes have been largely transformed into terraces with small land allotment and with mostly permanent crops (vineyards, orchards, olive groves) and mixed culture. Terraces with mixed crops have been gradually abandoned. The most recognisable landscape patterns in the municipality are: flysch cliffs, coast with historical settlement on peninsula, salt-pans, agricultural land on seaside plains, agricultural land on terraced slopes, urbanised terraced slopes and terraced slopes in overgrowing. The so called “areas of national recognition” specified in the Spatial Planning Strategy of Slovenia are the areas of Strunjan and Šavrini. Among exceptional landscapes are also Sečovlje salt-pans, Strunjan salt-pans, and the area of the Padna village.

Air and climate

The area of the municipality has the coastal sub-Mediterranean climate with rapid intrusions of cold north Bura wind. In accordance with Slovenian bylaws, the municipality belongs in area SI 4, which belongs to II. level of air pollution. This level indicates that one or more pollutants (nitrogen dioxide, PM10 particles and ozone) are higher than the limit value and lower than the sum of the limit values and tolerance

values. The pollution is mainly related to unregulated traffic regime with traffic congestions (particularly during the tourist season) and also to the lack of large green areas along the coast and urban parks within large settlements.

Geomorphology

Flysch hills with elongated ridges run from the east to the west. The northern slopes are steeper in comparison with the southern. Streams and rivers cut numerous ravines and valleys in Šavrini hills and in the lower parts of valleys produced fairly wide and broad plains. The most extensive plain in the municipality represent Sečovlje salt-pans. Prominent transitions of land into the sea represent steep flysch walls – cliffs that occurred as a result of sea impacts on soft rock. Because of the flysch bedrock, almost the whole area of the municipality is prone to erosion.

Hydrology

On heavy rain, most of the streams and rivers become torrents and flood. Larger flood areas are around the two largest rivers in the municipality, Dragonja and Drnica. At the estuaries of rivers, coastal wetlands have been created: Strunjan Laguna with Štjuža, two lakes in Fiesa, and salt-pans (Sečovlje and Strunjan). Sečovlje salt-pans are with 650 ha the largest coastal wetland. In 1993, they became the first Slovenian Ramsar locality. The sea is very shallow (maximum depth is 30 m) and is thus ecologically very sensitive. Sea water is moderately eutrophic. Mainly because of shipping and nautical tourism, as well as municipal sewage outfalls, marine sediments are moderately polluted. An excessive intake of sewage to the sea through water treatment plants is causing occasional occurrence of algal blooms, hypoxia in the bottom layers and the growth of non-native species. One of the major problems of the municipality is the lack of water. The Municipality of Piran does not have its own drinking water sources. The vast majority of the population is supplied with drinking water from a regional network.

Nature

The Slovenian Sea with its characteristics such as small depth and estuaries rich in nutrients is a relatively rich home to marine plants and animals. The marine ecosystem is due to intense shipping constantly threatened, primarily because of the potential inputs of non-native species, and uncontrolled discharges from ships. There are nine Natura2000 sites and eight protected areas in the municipality. The latter are:

- Sečovlje salt-pans landscape park as the most important ornithological and faunal site in Slovenia; Sečovlje salt-pans were the first Slovenian locality on the Ramsar List of Wetlands of International Importance (1993);
- Strunjan landscape park with 3 core protected areas: nature reserve Strunjan with a 4 km long and up to 80 m high naturally preserved flysch cliff, nature reserve Strunjan-Stjuža with a unique salt-water biotope and the Pine avenue;
- the Fiesa lakes natural monument;
- the cape Madona natural monument with the extremely diverse underwater world; and
- Dragonja landscape park with naturally well-preserved area of river Dragonja.

Cultural heritage

There is a rich cultural heritage in the municipality, mainly due to the preservation of old cities and somewhere also cultural landscapes. There are also two areas of complex cultural heritage protection: (1) Strunjan peninsula with salt-pans and typical dispersed settlement with typical rural architecture and terraced cultural landscape and (2) Šavrini hills with many well-preserved forts, traditional settlements on the ridges, traditional architecture, and terraced cultural landscape around the settlements with a typical mixed culture.

A.1.3 Definitions of concerned land uses / activities

The vulnerability assessment refers to a certain activity / land use. In our case, the chosen category of land use was “settlements”. Expansion of settlements is the most common initiative to be dealt with by planning documents and also the most general land-use type, so that the findings are easiest to be transferred for other, more specific land uses.

A.1.4 Identification of impacts / vulnerability models

Identification of impacts is based on the interaction matrix. The overview is presented in Table 6.

Vulnerability models were prepared for the impacts of settlement expansion on:

- air and climate,
- soil and geomorphology,
- hydrology,
- flora, fauna and habitats,
- nature protection areas,
- noise,
- cultural heritage,
- landscape qualities,
- forests and forestry, and
- agriculture and agricultural land.

A.1.5 Definition of environmental unit for assessment

A grid cell of 10 x 10 m was used as a unit of analysis, meaning that values of indicators are determined for each cell, calculated according to the model and then attributed to the cell as a vulnerability class. The size of a cell is adapted to the basic unit of a considered land use: a building as a part of a settlement area.

Table A6: Expected impacts of settlement expansion on the individual environmental components

Protection aim	Environmental systems	Environmental component	Impacts due to settlement expansion
nature conservation	atmosphere	physical properties	
		chemical properties	
		climate	
	geosphere	bedrock	
		soils	
		geomorphology	
		natural qualities	
	hydrosphere	ground water	
		surface waters	
		sea	
		natural qualities	
	biosphere	flora	
		fauna	
		sea flora	
		sea fauna	
		ecosystems and habitats	
		natural qualities	
protection of resources	natural and land use resources	production forest	
		agricultural land	
		water resources	
		mineral resources	
		energy potential	
		recreation potential	
		potential for housing	n/a
		potential for infrastructure	
protection of human environment	safe and healthy environment	clean air	
		clean water	
		clean soils	
		noise	
	cultural and social qualities	landscape	
		cultural heritage	
		ownership	
		present use	
		other social qualities	

A.2 Vulnerability models

A.2.1 General description of the models

Each of identified models is presented in the following subchapters by the following items:

- description of potential impacts of settlement expansion on environmental component concerned, based on identified properties of environment and land use,
- description of the model concept with definition of vulnerability criteria,
- presentation of model results on a vulnerability map,
- interpretation of model results with special attention to extremely vulnerable areas,
- relation to other findings, relevant for planning, summarised as planning recommendations.

The data were selected from the following available spatial data banks:

- digital spatial data base of Piran Municipality,
- cultural heritage register, Ministry of Culture, Slovenia,
- on-line Nature Protection Atlas, Ministry of the Environment and Spatial Planning, Slovenia,
- on-line Environmental Atlas, Environmental Agency, Slovenia,
- data provided by the Ministry of Agriculture, Forestry and Food, Slovenia,
- data provided by Slovenia Forest Service, and
- digital elevation model.

Some additional data were prepared by mapping the required information or by inferring (modelling) from existing data.

Modelling was done by GIS software ProVal2000. Data-classes were ascribed values from 1 (no impact) to 10 (impact exceeding threshold). Parameters were combined either by matrix-rules or by normalised sum.

A.2.2 Air and climate

Potential impacts of settlement expansion on air and climate include changes of microclimate properties and increase of air pollution.

Vulnerability criteria are:

- green areas within settled areas are considered more vulnerable due to their microclimate regulative function,
- green corridors and “wedges”, which connect coast with natural hinterland are considered more vulnerable,
- belts along and around streams and lakes are considered more vulnerable.

Data used: settlement areas, forest areas, streams and rivers.

less more vulnerable

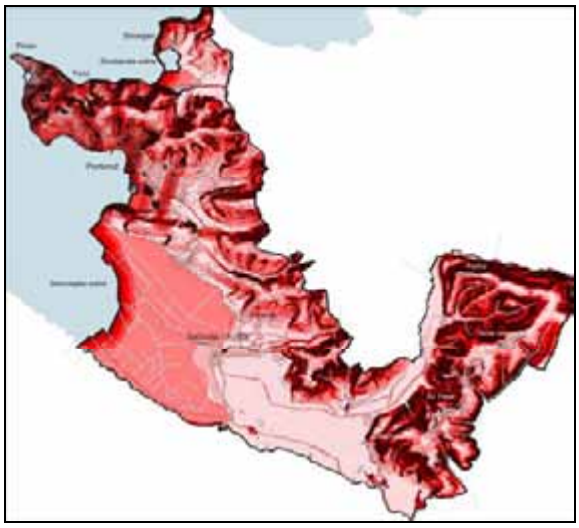


Figure A26: Vulnerability of air and climate due to settlement expansion

Green areas are disclosed as more vulnerable, especially forest patches within the dense settlements. Model also discloses connections between forested hinterlands and urbanised areas, such as steep slopes and gorges. Preserved natural areas as well as coast with background are more vulnerable. Areas of intensive agriculture in lowland are least vulnerable.

Planning recommendations

Green areas within dense settlements should be retained as much as possible to preserve the microclimate role of existing open areas. This will contribute to the vitality and healthy environment of the existing settlements and improve the quality of life of their inhabitants. Building and management of construction areas must strictly adhere to air protection regulation, including monitoring and protection/mitigation measures, if required. Energy supply should increase the share of renewables. The municipality should support the energy saving and passive building. The coastal areas in the municipality should be relieved from traffic. The underground garage along the main road Izola-Portorož-Sečovlje should be considered, as well as construction of walking and biking ways to and along the coast. Public transport needs to be better developed.

A.2.3 Soil and geomorphology

Potential impacts of settlement expansion on soil and geomorphology are:

- change of typical geomorphologic features,
- soil pollution,
- change of soil structure,
- loss of soil as resource,
- increase of erosion.

Vulnerability criteria are:

- preserved typical geomorphologic features are more vulnerable (ridges, terraces, gorges),
- outstanding geomorphologic features are more vulnerable (preserved coastal features; cliffs),
- soils of higher quality are more vulnerable.
- erodible areas are more vulnerable,
- existing settlement areas are least vulnerable.

Data used: DEM, altitude belts, geology map, soils map, land use.

The model discloses areas of preserved geomorphologic features (cliffs, some coastal areas, salt fields, lakes, ridges) as most vulnerable (Figure A27). Prime soils on alluvial flatlands along some streams are also vulnerable. Less vulnerable are densely as well as dispersedly built-up areas.

Planning recommendations

Outstanding geomorphologic features, which are important for identity of the municipality (above all cliffs and other parts of the coast), must be preserved. Any action that might change their qualities or increase erosion must be avoided. Their visual presence must also be protected. The traditional agricultural cultivation on terraces should be preserved. Areas that are already partly degraded due to dispersed settlement should be planned in detail in order to rationally use space for new housing by densification and simultaneous improvement of road and sanitary infrastructure. Alluvial plains along rivers are the most important soil resource and should be preserved. Agricultural measures can be maintained. Measures for areas requiring improvement or renaturation include removal of parking from between Frnaža and Bernardin along with reorganisation of traffic and introduction of recreational and swimming area; improvement of communal piers in Sv Jernej canal, improvement of existing dike along cape Seca for recreational / swimming use.

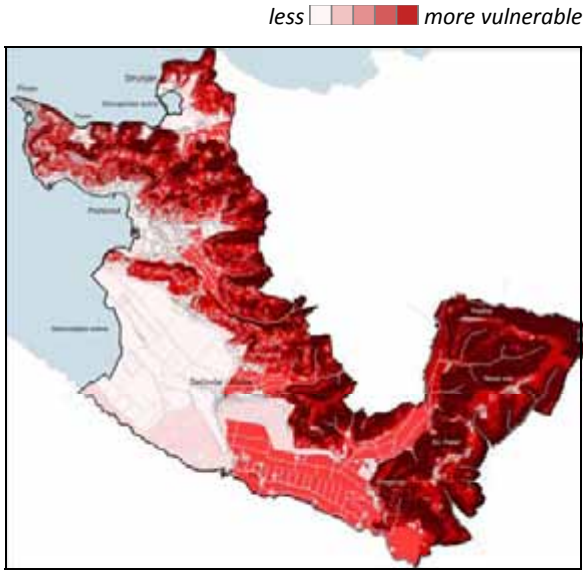


Figure A27: Vulnerability of soil and geomorphology due to settlement expansion

Figure A28: Environmental baselines: soil and geomorphology aspect

A.2.4 Hydrology

The potential impacts of settlement expansion on water are:

- pollution of rivers, sea and coastal areas,
- exposure of groundwater and water resources to pollution,
- degradation of streams and water sources due to technical measures,
- change of hydrological conditions.

Vulnerability criteria are:

- preserved natural streams are more vulnerable for pollution or physical interventions,
- preserved coastal areas and those, which are used for swimming are more vulnerable,
- areas along streams with important hydrological functions are more vulnerable,
- water protection areas, especially the strict ones, are more vulnerable,
- flooding areas are more vulnerable,
- areas prone to eutrophication are more vulnerable.

Data used: streams and rivers, flooding areas, classification of streams according to their natural state, aquifers, water protection areas, classification of swimming waters.

The result (Figure A29) exposes as most vulnerable Strunjan and Sečovlje salt fields and the coastal sea between Strunjan and Piran. All swimming waters are also vulnerable. More vulnerable are plains and water contribution areas of streams, also the periodic ones in gorges.

Planning recommendations:

Coastal areas

Interventions in coastal areas[1] are only allowed for:

- public infrastructure and objects,
- measures for improvement of hydromorphologic and biologic properties of water,
- nature conservation measures,
- necessary infrastructure for use of water; technical objects for flood protection and protection against pollution of water.

The whole coastal sea (2 km belt from the coast) is defined as sensitive area because of its swimming function as well as because of eutrophication processes.

The existing eco-morphological state of streams must be preserved. Close to nature, options must be chosen in case of regulations.

less *more vulnerable*

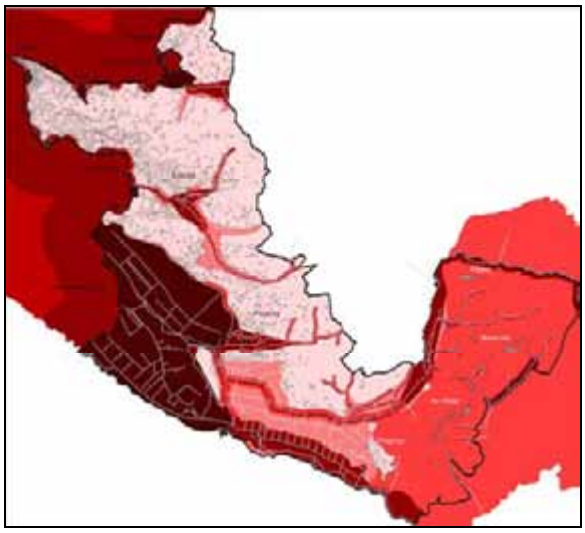


Figure A29: Vulnerability of water due to settlement expansion

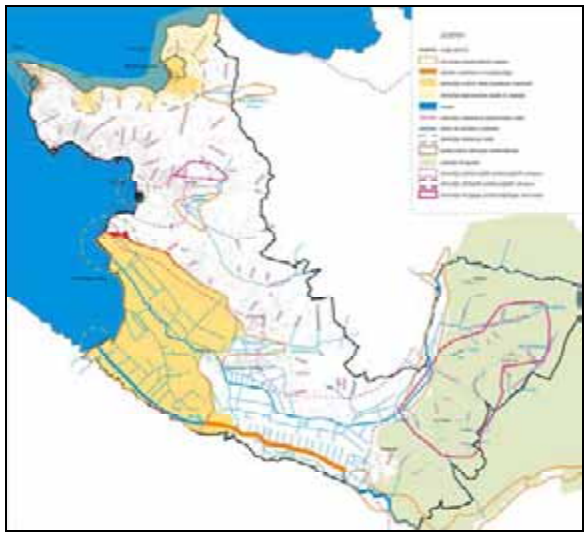


Figure A30: Environmental baselines: water protection aspect

[1] For Dragonja river the coastal belt is 15 meters from each river bank; for other rivers and streams 5 meters. Sea coastal area is defined with highest tidal level. By-coastal area is 25 meters from this line.

Endangered areas

According to the potentially detrimental processes related to water, the following areas can be defined:

- catastrophic floods areas,
- regular flood areas,
- areas of regular anti-erosion measures,
- areas of complex anti-erosion measures,
- areas of strict anti-erosion measures.

Land uses and interventions in flooding areas, which may have harmful impact in case of flooding, are prohibited as well as those, which may increase danger of floods.

Interventions, which may increase danger of erosion, emergence of torrential streams, removal of green cover, filling up the water sources are prohibited in erosion prone areas and areas endangered from land sliding. Building in these areas should be avoided or done only after careful detailed geological analysis and planning.

Sea flooding and sea level rise due to global warming

Sea floods lower lying coastal areas when sea level exceeds average level for 85 cm. Beaches, salt fields and some piers road infrastructure and even some houses are flooded yearly. Extreme floods would affect large parts of the old city centre of Piran, large parts of coastal infrastructure, many buildings in Lucija, parts of Sečovlje including the Sečovlje airport and production facilities.

Due to global warming, the sea level along the Slovenian coast would rise for 22 cm until 2050 and 50 cm until 2100. A 50 cm rise means that the average sea level would be very close to flooding level, causing floods almost weekly. For extreme floods, it would mean 1.5 m of water on lower coastal areas. This level would endanger 7,53% of inhabitants and would cause serious troubles in retail, transport and other activities. The recommendations, therefore, include:

- new settlement in areas of yearly and extreme sea floods must be avoided,
- existing settlement in potentially endangered areas in the future should be strategically relocated,
- timely preparation of measures for adaptation and mitigation of damage caused by floods in the future (reservation of areas for housing relocating of endangered people).

A.2.5 Fauna, flora and habitats

Potential impacts of settlement expansion on fauna, flora and habitats are:

- destruction or change of properties of special habitats, diverse biotopes and areas of special protection interest due to their removal or change of physical conditions.

Vulnerability criteria are:

- more diverse biotopes are more vulnerable,
- areas of special natural qualities are more vulnerable (forest edge, preserve biotopes, hedges, forest patches, preserved coastal areas and sea ecosystems),
- streams and vegetation along the streams are more vulnerable.

Data used: land cover, hydrology, classification of forests, settlement areas.

The most vulnerable are the areas of special habitats in the salt field and preserved parts of the coast (Figure A31). Also vulnerable are mainland areas covered with forest, especially along the streams and emergent streams, which contribute to biodiversity of the area. Also vulnerable are forest edge and patches between the settled and agricultural land. Less vulnerable are intensively managed agricultural lands, fields and gardens.

Planning recommendations

Areas under special attention for protection are:

- Sečovelje salt fields (also protected under Ramsar convention),
- Strunjan salt field with Stjuža,
- Strunjan cliff,
- Piran cliff, coastal sections: Pacug – Fiesa, Strunjan – Pacug,
- Sea and sea shore,
- Lakes in Fiesa,
- Forests,
- Areas along streams,
- Dragonja river area.

Land use of these areas should be maintained or rather improved in terms of their natural qualities (especially in Sečovlje and Strunjan salt fields, cliffs, lakes in Fiesi). Any intervention must be carefully assessed. Intensive touristic and recreational uses should not be placed along the shore and in sensitive habitats. More sustainable types of recreation should be promoted, which require minimal interventions (walking, biking, bird-watching, swimming). In newly planned settlements, sufficient land must be set aside for a network of green areas. Streams must be managed in sustainable and nature friendly way.

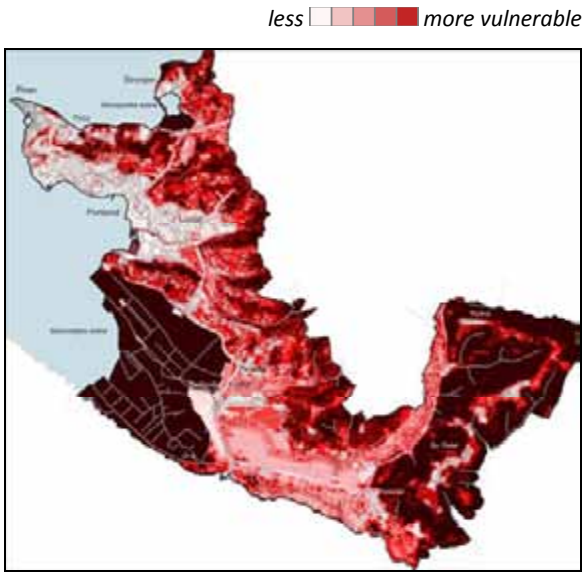


Figure A31: Vulnerability of flora, fauna and habitats due to settlement expansion

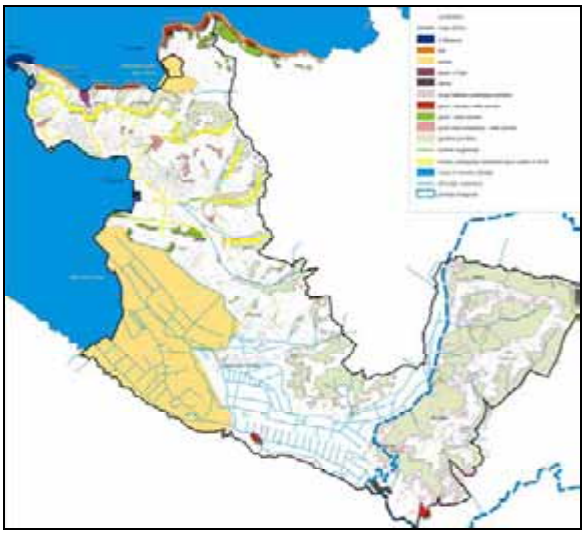


Figure A32: Environmental baselines: flora, fauna and habitats aspect

Interventions on the sea shore that may endanger biodiversity must be avoided. Marinas can only be planned on the already degraded shore. Forests should be maintained, especially those covering steep slopes and cliffs.

A.2.6 Nature protection areas

Potential impacts of settlement expansion on nature protection areas are:

- destruction or change of properties which are reason for protection,
- impacts on protection regimes.

Vulnerability criteria are:

- small protected areas (natural monument, strict nature reserve and nature reserve) are more vulnerable,
- point and line natural features are more vulnerable,
- large protected areas (national, regional and landscape park), ecologically important areas, areas Natura2000 are relatively less vulnerable,
- areas proposed for protection are relatively less vulnerable,
- areas where different protection statuses overlap are more vulnerable.

Data used: nature protection areas.

The most vulnerable are areas with overlapping protection statuses such as areas of Strunjan and Sečovlje salt fields and hilly eastern part of the municipality. These areas are protected as valuable natural feature, ecologically important areas, Natura 2000 or a landscape park. More vulnerable are also individual (point) valuable natural features in northern part of Piran peninsula.

Planning recommendations

Land use and intervention in these areas must follow the guidelines and regimes, provided by relevant document of nature conservation sector (tese were also summarised in the study).

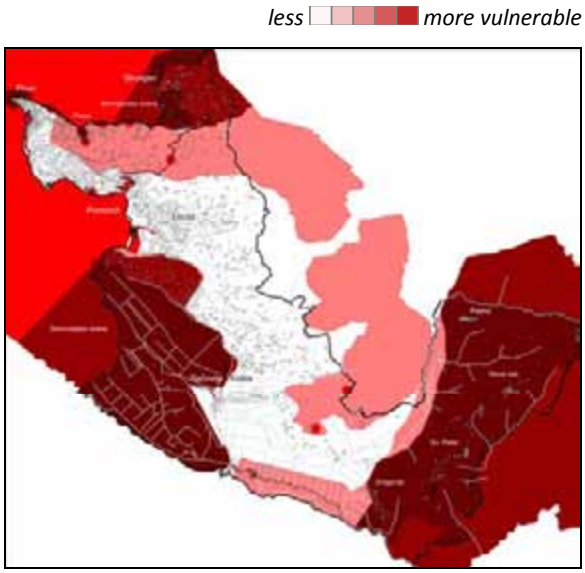


Figure A33: Vulnerability of nature protection areas due to settlement expansion

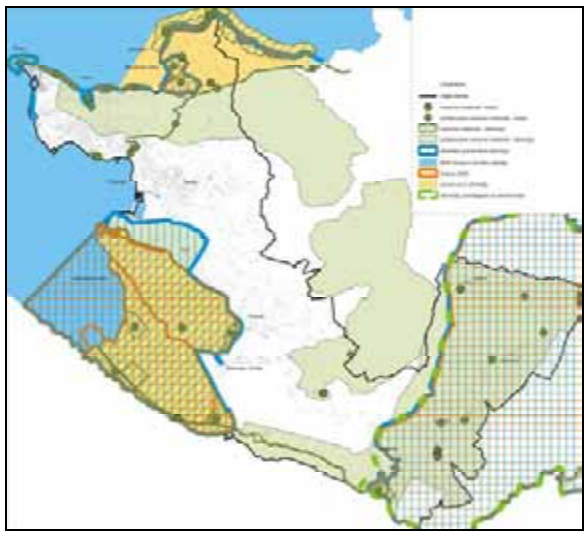


Figure A34: Environmental baselines: nature protection areas

A.2.7 Noise

Potential impacts of settlement expansion include:

- increase of noise in settled areas and nature protected areas,
- quality of life reduction and potential impact on human health.

Vulnerability criteria are:

- most vulnerable are areas of exclusive housing, health services, tourism and nature protection areas,
- less vulnerable are areas of central services, dispersed settlements and green and water areas,
- least vulnerable are production areas, infrastructure, agricultural areas and forests.

Data used: planned land use, settlements, road classification according traffic frequency.

Most vulnerable are densely settled and touristic areas in Portorož, Piran and Lucija as well as some smaller settlements in the municipality (Figure A35). Especially vulnerable are areas along important roads. Less vulnerable are city centres in Piran, Portorož and Lucija as well as dispersedly settled areas. Vulnerable parts of open landscape include nature protection areas Sečovlje and Strunjan salt fields and green areas within settlements. Least vulnerable to noise are industrial areas of Liminjan and Dragonja, all transport areas as well as land for agricultural and forestry production.

Planning recommendations

Expansion of settlement should be planned in suitable distance from main roads, airport, industrial areas and sites for sports and other public events. For each source of potential considerable noise (i.e. industrial facility), a noise simulation study must be conducted. Coastal areas should be relieved of noise by building underground parking facilities along the inner main road, by building biking and hiking ways to and along the coast and promoting public transport.

less *more vulnerable*

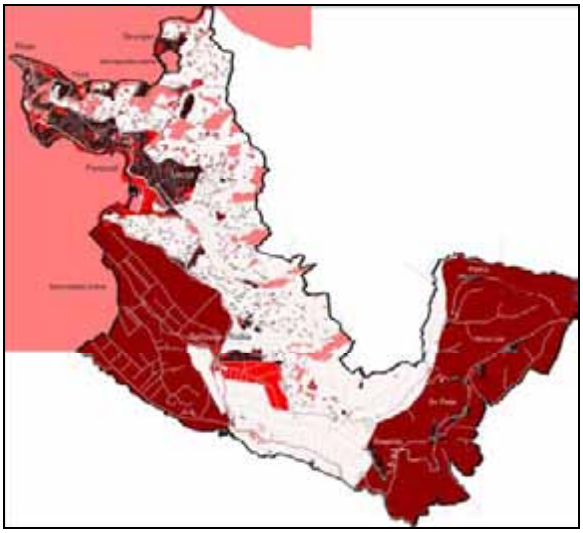


Figure A35: Vulnerability to noise due to settlement expansion

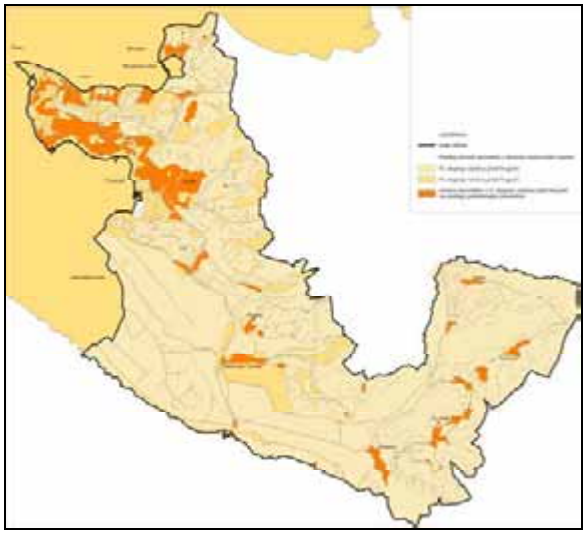


Figure A36: Environmental baselines: proposed categories of noise protection

A.2.8 Cultural heritage

Potential impacts of settlement expansion on cultural heritage are:

- destruction or damaging of cultural heritage areas and buildings,
- diminishing the complex value of cultural heritage areas.

Vulnerability criteria are:

- cultural heritage objects are more vulnerable, as well as their impact areas,
- relatively less vulnerable are areas of complex protection,
- more vulnerable are areas where different types of cultural heritage overlap.

Data used: areas and objects of cultural heritage.

less *more vulnerable*

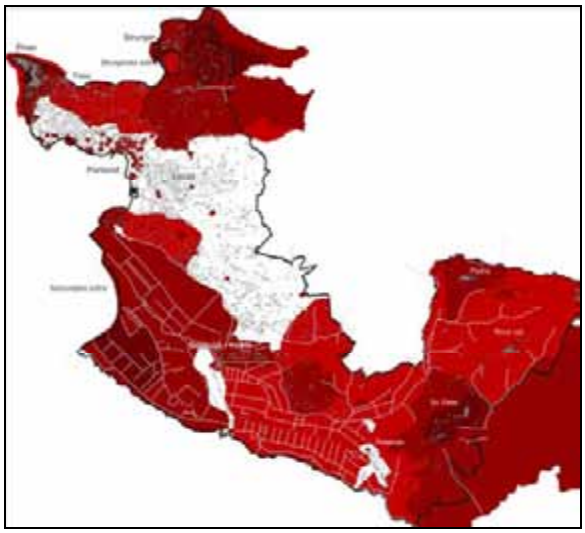


Figure A37: Vulnerability of cultural heritage due to settlement expansion

Areas of protected cultural heritage are around cape Strunjan, Piran, Seča and villages Padna and Sv. Peter. Their impact areas include Piran, old salt fields in Sečovlje, Košta, Sv. Nedelja, Sv. Peter and Padna. The majority of cultural heritage objects are in towns of Piran, Bernardin, Portoroz and Lucija.

Planning recommendations

Land use and intervention in these areas must follow the guidelines and regimes, provided by relevant document of cultural heritage protection sector (These were also summarised in the study).

A.2.9 Landscape qualities

Potential impacts of settlement expansion are:

- change of typical views,
- concealment of visually attractive parts of landscape and landmarks,
- change of typical landscape structure,
- reduction of landscape diversity.

Vulnerability criteria are:

- visually more exposed areas are more vulnerable,
- areas of high landscape diversity and identity are more vulnerable,
- less vulnerable are infrastructural corridors and other degraded landscapes.

Data used: land use / cover, hydrology.

Most vulnerable are areas of preserved cultural landscape, intertwined with natural elements: cultivated terraces, olive groves, vineyards and orchards together with traditional settlement patterns (Figure A38). Also vulnerable are areas of homogeneous land use such as compact parts of forests, especially on visually exposed slopes. Very vulnerable are areas of Strunjan and Sečovlje salt fields and other coastal areas.

Planning recommendations:

Based on the analysis of the existing landscape patterns and landscape typology the area of municipality was divided into the following landscape quality areas:

- areas of exceptional landscape on national level, where all activities must be submitted to the natural and cultural landscape values;
- areas of preserved cultural landscapes of high value, where new settlement should be avoided, especially on geomorphologically prominent sites;
- areas of preserved cultural landscape, where traditional settlement and other land-use patterns should be preserved; new settlement is only allowed in selected parts;
- areas of transformed cultural landscape, where typical agricultural pattern and parcelation should be preserved;
- degraded landscapes, where existing density of settlement should be preserved or increased in selected areas. Green areas within the settlements must be preserved or improved. Parts along the shore need common design approach; car traffic should be reduced and a “promenade” established. Specific degraded areas must be reconstructed according to detailed plans.

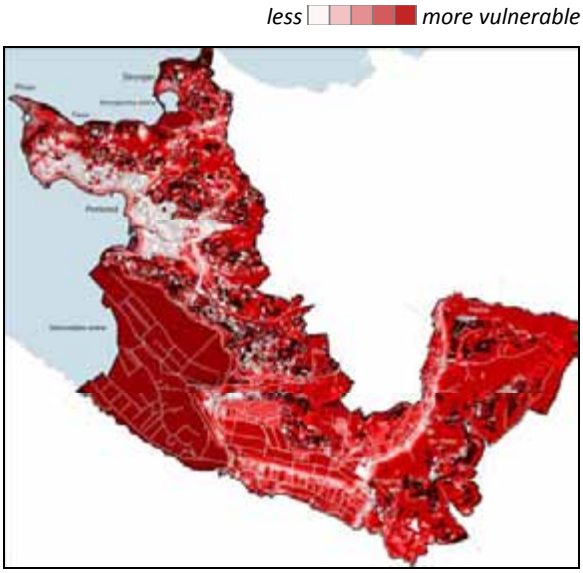


Figure A38: Vulnerability of landscape qualities due to settlement expansion

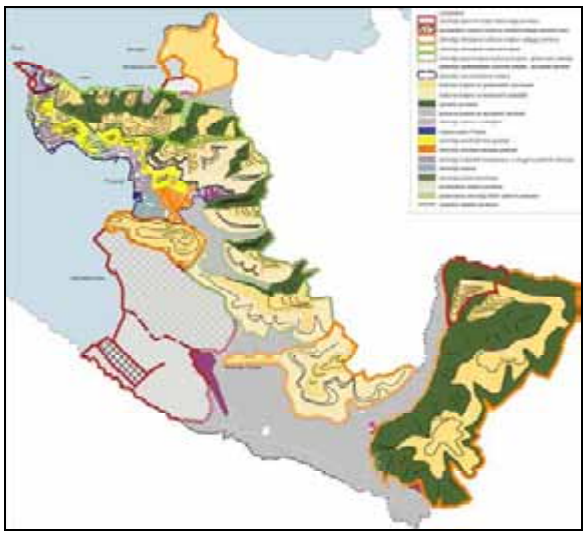


Figure A39: Environmental baselines: aspect of landscape qualities

A.2.10 Forests and forestry

Potential impacts of settlement expansion on forests and forestry are:

- loss of forest lands,
- diminishing value of certain forests' functions.

Vulnerability criteria are:

- most vulnerable are protective forests,
- more vulnerable are forest with special function,
- vulnerable are forests with multiple functions.

Data used: land use, protective forests, forests with special function.

Widest areas suitable for forestry production and so more vulnerable are along the eastern edges of the municipality (Figure A40). Most vulnerable are forests on steep and erosion-prone slopes. Vulnerable are also forests with strong ecologic function, especially biotope and climate on ridges in north and north-east parts of the municipality as well as forests around touristic areas with important recreational and aesthetic value.

Planning recommendations:

Special attention must be given to "green wedges": connections between forested hinterland and urban areas. They should retain or increase prevailingly green character. Recreation in forests must be nature close and sustainable, restricted to hiking and biking paths. Building should be avoided. Additional reforestation within the settlements should be considered to improve living quality. Forests along the coast must be preserved to retain their anti-erosion, climate and biotope functions.

New infrastructure must be planned so as to avoid impacts on forests and to enable migration of animals.

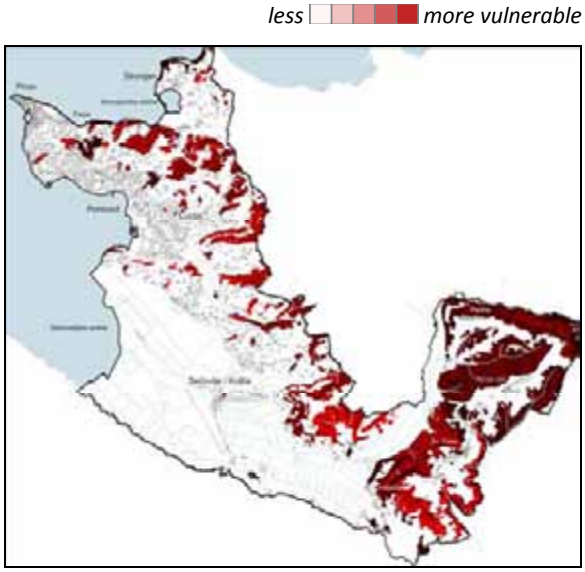


Figure A40: Vulnerability of forests and forestry due to settlement expansion

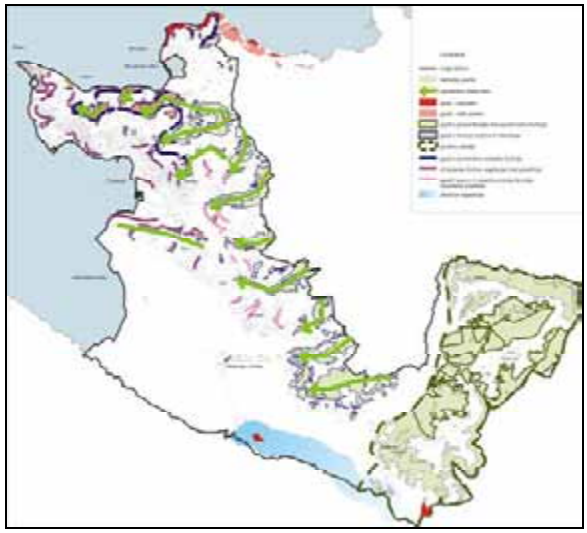


Figure A41: Environmental baselines: forests and forestry aspect

A.2.11 Agriculture and agricultural land

Potential impacts of settlement expansion on agriculture and agricultural land are:

- physical loss of agricultural land,
- division of arable complexes into smaller parts,
- soil contamination.

Vulnerability criteria are:

- more vulnerable are areas with more fertile soils – soils with higher production potential,
- more vulnerable are areas, which facilitate the agriculture production – flat areas and slope shelves with southern exposition in higher areas.

Data used: soil number, slope and exposition to sun. (Data on soil number give the information about the suitability or potential for agricultural use based on pedologic characteristics.)

Flat areas with high quality soils are the most vulnerable (Figure A42). The widest among them is the alluvial plain of the river Dragonja in the southern part of the Municipality. Vulnerable are also wide and flat hill-ridges with quality soils. Areas unsuitable for cultivation due to northern exposition and larger slopes are least vulnerable.

Planning recommendations are given according to:

- classification of agricultural land into “best-” and “other agricultural land”,
- overall features of individual agricultural areas.

The classification is in accordance with Agricultural Land Act (Ur. l. RS, No. 59/1996) while recommendations are in accordance with Spatial Planning Act (Ur. l. RS, No. 33/2007).

Planning recommendations for “best-” and “other agricultural land”

Provided that it is not possible to use “other agricultural land” that is less suitable for agricultural production, following interventions are allowed to be implemented on “best agricultural land”:

- those who directly serve the agricultural, forestry or tourism activities,
- those intended for the general use (local built public good),
- for the implementation of environmental protection, nature conservation and cultural heritage protection as well as of recognisable landscape features protection,

less *more vulnerable*

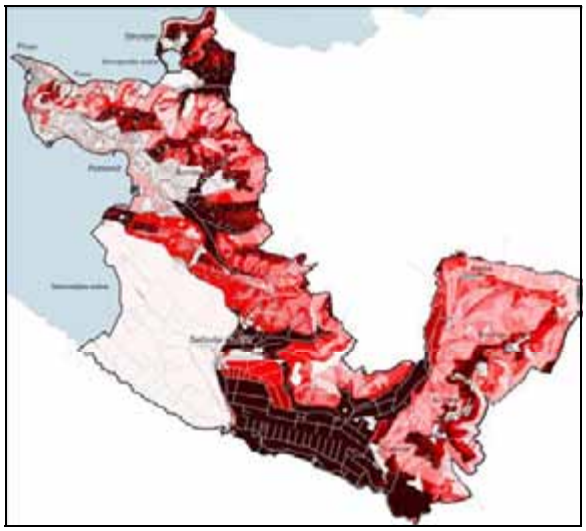


Figure A42: Vulnerability of agricultural production potential due to settlement expansion

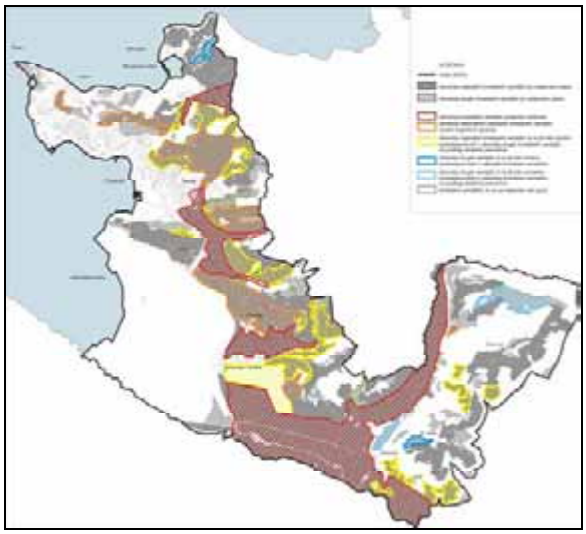


Figure A43: Environmental baselines: agriculture and agricultural land aspect / possible reclassification of the best and other agricultural land

- for the purpose of sport and recreation,
- for the use of natural assets and remediation of abandoned areas of exploitation,
- for the purpose of defence and protection against natural and other disasters.

Planning recommendations for typical agricultural areas

Based on the analysis of the agricultural land, features and potential for development of agriculture, the area of municipality was divided into the following agricultural areas:

- areas of agricultural land of special value on alluvial plain, where settlement expansion is prohibited;
- areas of agriculture development due to emphasised conservation of cultural landscape, especially terraces, where agricultural land should be maintained and the development of agriculture promoted in order to maintain the cultural landscape;
- areas of agricultural land with good production potential, where it is reasonable to preserve agricultural land and to restrain settlement expansion (only concentration within settlement areas is allowed);
- areas of dense agricultural area on flat hill-ridges, where agricultural land should be preserved and settlement expansion restrained (only concentration within settlement areas is allowed);
- areas of agricultural land with moderate production potential;
- fragmented agricultural land due to dispersed building; where existing settlement is too dense agricultural land may be allocated to settlement.

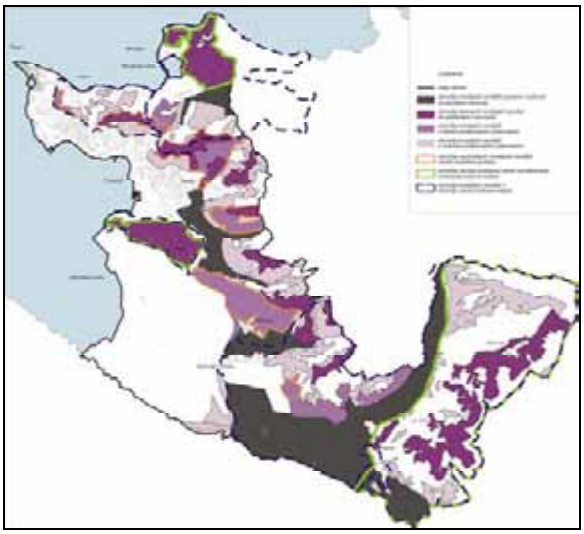


Figure A44: Environmental baselines: agriculture and agricultural land aspect / classification of typical agricultural areas

Additional recommendations

- potential water resources should be explored together with potential water accumulations for irrigation,
- in areas of permanent crops soil surveys should be done; based on their findings, appropriate measures for production optimisation should be identified;
- in a truly development-oriented agricultural areas land consolidation and land improvement should be carried out.

A.3 Joint vulnerability

A series of maps showing vulnerability of individual environmental components due to settlement expansion were combined into a joint spatial vulnerability in two ways:

- average value rule: a map of joint vulnerability shows an average degree of vulnerability considering individual models;
- maximum rule: a map of joint vulnerability for each part of the area shows the highest value of vulnerability from any of the individual models.

Joint vulnerability according to the maximum rule (Figure A45) shows the entire municipal area as highly vulnerable. To joint vulnerability contribute vulnerabilities of the individual environmental components which refer to different parts of the municipal area.

Joint vulnerability according to the average value rule (Figure A46) is more structured and enables the identification of relative differences between areas.

The results of both shows as more vulnerable, in particular:

- naturally preserved areas of the coast and ridges,
- areas of preserved cultural landscape, particularly terraced southern slopes,
- dense forest areas,
- areas of special value (salt-pans).

Less vulnerable are due to existing settlement degraded ridges and urbanised coast with the hinterland.

less *more vulnerable*

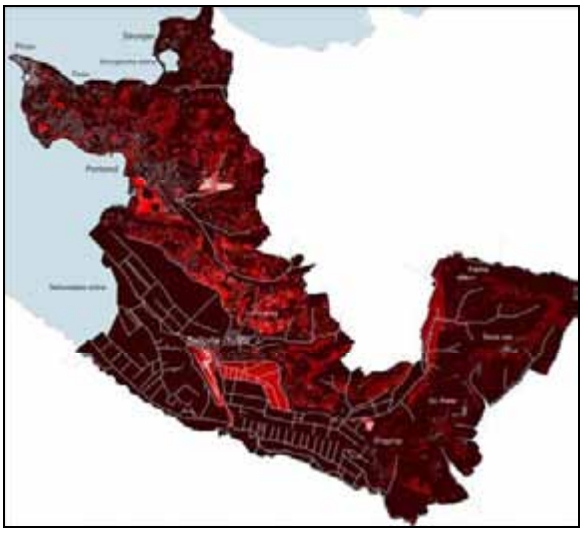


Figure A45: Joint vulnerability – maximum values

less *more vulnerable*

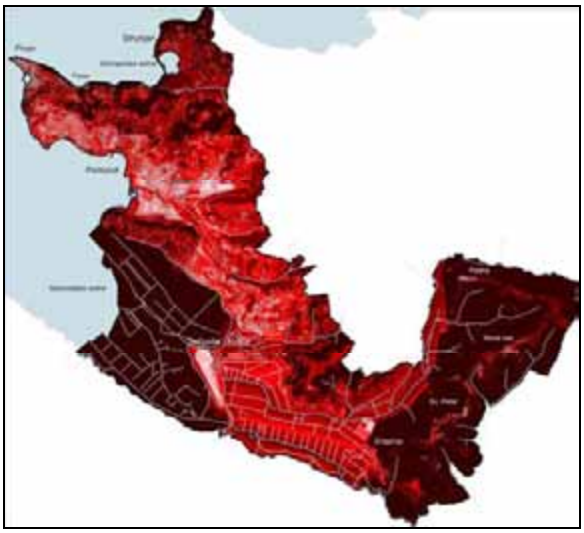


Figure A46: Joint vulnerability – average values

A.4 General environmental baselines

In the context of comprehensive spatial planning and proceeding from identified environmental baselines, general guidelines for environmentally acceptable spatial development are given as well as planning guidelines for specific environmentally significant areas in the municipality.

Figure A47: General environmental baselines

A.4.1 General guidelines

General guidelines for environmentally acceptable spatial development can be summarised into following points:

Consistent prevention of further dispersed construction

New building should be directed into existing settlement areas. This is a precondition for maintaining an attractive image of the cultural landscape, recreational and tourism potential, for reducing emissions from individual sources of pollution and for economical distribution of public infrastructure. The concentration of existing settlements should strictly consider and respect the areas of protection and restraints, the accessibility to public transport and should be directed into already degraded areas.

Provision of suitable living environment and health care of the residents

A suitable living environment can be ensured by a set of interrelated measures which relate mainly to ensuring an adequate supply of drinking water, discharging of rainwater and cleaning of water, maintaining of green area system, and reducing of traffic emissions with the establishment of an attractive system of public passenger transport and stimulation of its use, with administrative measures, and with the concept of traffic which would ease the burden on the coastal strip – notably, the construction of underground garages along the main road in the hinterland with the access routes and public transport systems to the coast.

Protection of agricultural land

In the agricultural areas with high quality, any interventions should be restricted. Areas of alluvial plains should be given special protection with strict prohibition of settlement expansion. Potential water resources for irrigation should be explored. In areas of permanent crops, soil surveys should be done. Based on their findings, appropriate measures for production optimisation should be identified. In truly development-oriented agricultural areas, land consolidation and land improvement should be carried out.

Cultural heritage protection

Formulation of detailed spatial development conditions or active urban policy is required for settlements defined as urban heritage. Special attention should be given to the conservation of heritage landscapes as important elements of municipal identity, whose existence is largely dependent on the promotion of the continued existence of agriculture.

Disencumberment and comprehensive regulation of coastline

Building in the coastal area must be prevented. The coast must be comprehensively planned with

reconciliation of developmental needs with protection baselines and with a clear idea of what to do with a particular part of the coast.

Sea floods and sea level rise

Due to the high sea flood risk throughout the coastal area of the municipality, immediate appropriate measures are required. These relate mainly to (1) strict avoidance of new interventions in the flood-prone areas, and (2) planning and implementation of flood protection measures along the coast, where they are possible and meaningful. Reasonable is also timely preparation of measures to adapt to the global sea level rise and to reduce its impacts (e.g. strategic protection of areas suitable for new or alternative urban development, planning of protection measures along the coast).

Regulation of public transport and stationary traffic

Effective system of public transport should be ensured. Parking places should be arranged in the hinterland of the coast along the main road (preferably underground garages) and thus replacing current less environmentally acceptable unbridled parking.

Integrating the principles of landscape ecology in urban planning solutions

New conceptions of urban development should include the system of green areas and green belts for recreation, separation of incompatible land uses, reduction of the effects of emissions, crossing of animals, and improvement of microclimate conditions. Particular attention should be paid to the so-called urban drainage, especially retention of clean rainwater for watering and irrigation needs.

Definition of planning units with regard to environmental baselines

Planning units or land-use areas to which specific spatial planning and development measures are applied should be most consistent with environmental baselines or with areas of environmental protection, human health, nature protection, and cultural heritage protection regimes.

Integration of environmental protection doctrine in the instruments for the implementation of a plan

Environmental baselines must be integrated also in various implementation and management instruments, such as education, research, monitoring, system of financing, maintenance programmes, etc.

A.4.2 Areas with planning guidelines

Significant areas of environmental protection were defined based on vulnerability analysis and on spatial division according to individual environmental components. Planning guidelines were ascribed to each of them. Presenting all defined areas and guidelines related to them would be too extensive. Therefore, only sea and sea coast area with planning guidelines are presented, mainly for purposes of illustration.

Figure A48: Naturally preserved Piran peninsula coast

Sea and sea coast

The Slovenian sea is an area of great biodiversity and a wide range of well-preserved habitat types. Underwater world should be thus taken into account in planning the coast. Great importance of the coast and high pressure of users require comprehensive and integrated planning of the

coast that should reconcile developmental needs and protection interests in detail and ensure an attractive image of the coast. Detailed spatial arrangements should be obtained by an open competition for the entire coast of the municipality.

For individual parts of the sea coast, the following applies:

- The coast along the Bay of Strunjan should be maintained in its natural state; appropriate footpaths to parking areas in the hinterland should be planned and conducted.
- The coast in the area of Piran should be maintained in its existing state; a network of small parks should be established that would increase the proportion of green areas in densely built structure of the city.
- Central parking area in Piran is an important potential swimming location in Slovenia. It should be converted in a sustainable way into a swimmer-friendly coast (e.g. Le Mourillona in Toulon). A parking for residents should be settled in an underground garage and for visitors in the hinterland.
- The area between Marina Portorož and Bernardin should maintain the characteristics of “urban coast”; special attention should be paid to the redevelopment of the industrial buildings area Droga Kolinska; walking and cycling connections should be conducted in terms of better access to existing park areas. Heavy traffic and parking around hotels should be redirected and relocated to the hinterland.
- Potential increase in capacity of Marina Portorož should be reached primarily by regulations of sea gulfs in the Interior of the coast. Expansion of the Marina to the sea is less acceptable because it would affect the underwater habitats and morphology of cape Seča. Multifunctionality and landscape architectural arrangements of this part of the coast must be ensured.
- The fill between Marina Portorož and channel Sv. Jernej is inappropriate. A swimmer-friendly coast and longitudinal cycling and walking paths should be arranged; trees between the coast and cliffs should be planted while cliffs must be fully retained. The channel Sv. Jernej should be restored and berths arranged. The additional berths arrangement would represent an alternative to the possible extension of the Marina Portorož. At the same time, supporting infrastructure (access road, sanitary facilities, etc.) should be arranged.

Figure A49: Inappropriate fill of cape Seča

Figure A50: Disordered berths and the coast along the channel Sv. Jernej

Appendix B
Application of vulnerability assessment in a site selection process – the case of wind turbines

Source: Analysis of the Primorska region potentials for wind farms – attractiveness and vulnerability of space, commissioned by Elektro Primorska d.d., co-ordinated by IREET, d.o.o. et al., Attractiveness and vulnerability analysis prepared by Urban Planning Institute of RS, Ljubljana, 2001

B.1 Background and scope of the study

B.1.1 Background

The Energy Act of the Republic of Slovenia (Ur. l. RS No. 79/99) provides that the energy policy shall, through appropriate measures, give priority to the use of renewable types of energy and to replacing energy resources, which accelerate the greenhouse effect (CO2) and generate nitric oxide (NO) into the atmosphere. This goal is consistent with the energy policy of the European Union (Energy for the future: renewable sources of energy - White Paper for a Community strategy and action plan). Elektro Primorska d.d., a Slovenian distribution company, took the first important steps in the field of wind power exploitation. The study "Analysis of the Primorska region's potentials for wind farms – attractiveness and vulnerability of space" served as an expert base for this project.

Eight sites in the Primorska region were proposed for wind farms: Bate, Trstelj, Sinji vrh, Nanos, Golič, Kokoš, Volovja Reber, and Slatna (Figure A51). The main aim of the analysis was thus to evaluate the suitability of the proposed sites for wind farms and to give the proposal for the selection of the best site.

However, the analysis covered the entire area of the Primorska region, including areas that were already known in advance that they are less suitable for wind farms. One of the key reasons is that rejection of certain parts of the area before any analysis of the entire area is performed is not justified. It cannot be known in advance whether suitable sites can really be identified in allegedly relevant areas. Another reason is that with multi-criteria evaluation of proposed and potential new sites based on non-quantifiable values, the suitability of a site can be determined only relatively. Acceptability of the site, therefore, depends on how well or bad is the evaluated site in relation to other possible choices.

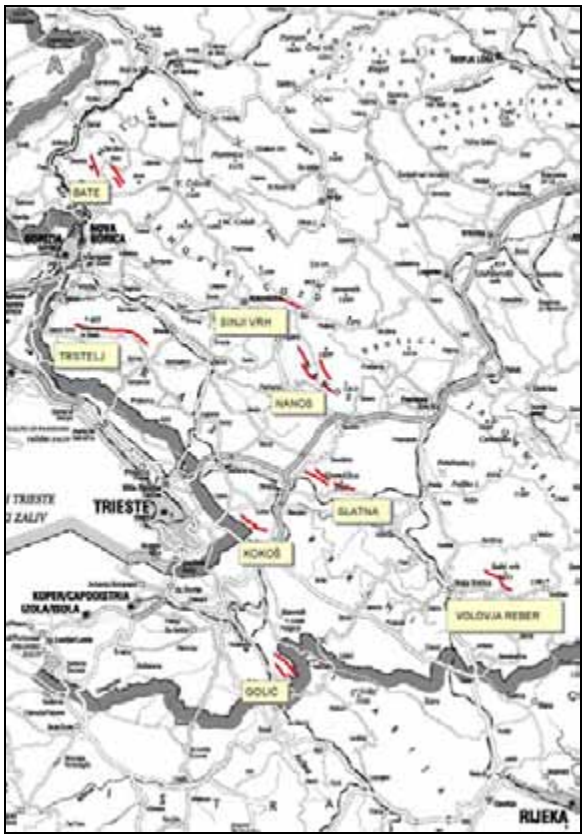


Figure A51: Proposed sites for wind farms in the Primorska region

The study first examined potential impacts of wind farms on reducing greenhouse gas emissions. According to the estimations, a wind field with 86 wind turbines would prevent the emission of 1.6 tons of CO_2 into the atmosphere within its life-time and thus save 10 million Euros. In addition to this mitigating effect on climate changes, one can also expect positive effects on local and regional environment by reducing the concentration of NO_X and resulting in less ground-level ozone. The study then examined integration of wind farms into the energy system of Slovenia and the impact that wind farms might have on the future Slovenian electricity market. According to the simulations, the wind farms' integration into the energy system would not cause problems. The second part of the study is the suitability analysis of the Primorska region for wind farms. The analysis helped to identify the most suitable sites for the future wind farm in the region. The basic idea was to find the right balance between space characteristics, as

required by the specific technology of the wind farms, and space restrictions, imposed in order to safeguard the environment. For this purpose, attractiveness and vulnerability analyses were performed. This presentation of the study will focus mainly on the vulnerability analysis as a part of the process of locating wind farms within the Primorska region.

B.1.2 Suitability analysis - working method

In the suitability analysis, the aspects of attractiveness and vulnerability of space are treated separately. Aspect of the benefits or the appropriateness of space depending on the investor's requests is evaluated by attractiveness analysis. This is to identify those spatial conditions, which reveal the locations where the project is the most profitable. For wind farms, the far most important spatial condition is windiness, which was modelled separately by meteorological models and later included in the analysis. Vulnerability analysis enables the second aspect of the spatial assessment - integration of negative impacts. The basis for evaluation of spatial vulnerability was a model of potential impacts on the environment.

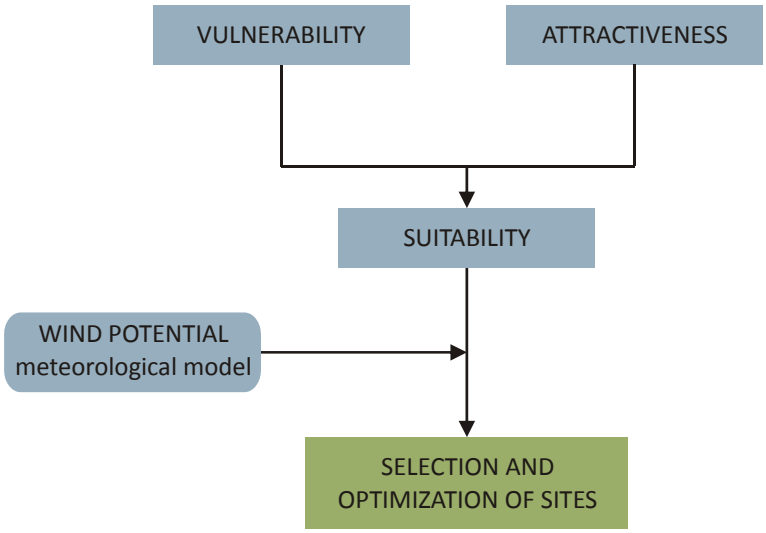


Figure A52: Components of suitability analysis

Such approach to the suitability analysis enables different types of assessments and analyses in the process of site selection:

- Optimisation of the general-approximate position of structures in the space;
- Checking the compliance of the proposed sites with technological requirements of the planned activity;
- Checking the compliance of the proposed sites with environment-safeguarding restrictions;
- Assessment of proposed sites in respect of several criteria.

The work process consists of the following steps:

- Definition of analysed area
- Description of activity and interventions in physical environment;
- Space requirement of activity as a basis for attractiveness models' definition;
- Potential environmental impacts as a basis for vulnerability models' definition;
- Interaction matrix;
- Selection and processing of spatial data;
- Definition of attractiveness models;
- Definition of vulnerability models;
- Implementation of models and display of results on maps;
- Proposed sites' assessment based on vulnerability and attractiveness models.

B.1.3 Definition of activity

The reasons for an increased interest in wind energy are the relatively simple technology of wind farms, and in particular its negligible emissions to the environment. The main elements that make up a wind turbine are a pillar and a rotor. The proposed technology involves a

pillar of between 43 and 48 m and a rotor consisting of three approximately 24 m long blades and a carrier cap. Rotor as well as generator and a system for the deflection are bound to the basic element of a wind farm - an integrated speed transmission, which is fastened on top of a central pillar.

A wind turbine requires a small area of land - a foundation usually takes approximately 11x11 m of surface. A wind farm requires also space for access roads. Distance between two wind turbines is somewhat dependent on the configuration of the terrain and is about 70 m. Tall buildings or forests must be removed from their immediate vicinity; grassland, pasture or shrubs are the most appropriate land cover. Dependence on wind required that locations for wind farms are on exposed positions. In Slovenia, such sites are located primarily on ridges and peaks at a relatively high altitude (700 – 1,100 m above sea level). Wind farms will be connected to the existing electric power system. If no power line is in the vicinity, the construction of power line infrastructure must be considered as a part of planned intervention. The appropriate transport infrastructure is required to enable construction of facilities and their maintenance. Service road is required to each particular wind turbine. Service life of a wind turbine is 20-25 years.

Figure A53: Wind farm (photomontage) (Brečevič et al. 2001)

B.1.4 Definition and description of analysed area

The area of Primorska region comprises 22 municipalities on surface of 4,335 km2, namely: Koper, Izola, Piran, Pivka, Postojna, Ilirska Bistrica, Nova Gorica, Brda, Kanal, Miren-Kostanjevica, Šempeter-Vrtojba, Divača, Hrpelje-Kozina, Sežana, Komen, Ajdovščina, Vipava, Bovec, Tolmin, Kobarid, Cerkno, and Idrija.

Figure A54: Analysed area - 22 Slovene municipalities

Landscapes of the Primorska region encompass the Slovene coastal area and its hinterland as well as the Karst area and the interior Primorska all the way to where reaches the impact of the sub-Mediterranean climate. The climate is also the most determining factor of the Primorska landscapes. This is the climate of northern peripheral areas of the Mediterranean, which is characterised by higher temperatures, strong wind, rare snow and frost, drought, more sunny days, etc. that is reflected also in the typical vegetation. The climate becomes harsh closer to the eastern border of Primorska region, which is shown in a change of vegetation, agricultural use and relief. The coast is characterised by coastal plains, some remains of salt-pans and terraced slopes. The coastal hinterland is hilly, with the streams along the bottom of valleys. The coastal part of the region is parted from the internal karst with Karst edge, which is a prominent feature of the Primorska landscape and, in the past, an important dividing line between cultures. In the north part of the region is a dry karst, plateau world with specific forms of village architecture.

An intensive use of agricultural land is characteristic of the Primorska region. Cultural landscapes are largely marked by vineyards and fruit trees. In the past, agricultural land use was intense also in the less fertile soil, the Karst rendzina and steep slopes of the coast. Today, such land is spontaneously overgrowing with forests, while some of its parts were reforested with non-indigenous tree species already in the past (e.g. karst – with black pine). Bare rocky karst has almost disappeared, except in some small-scale patches and lowland scree slopes on the edge of Trnovska plateau. Alluvial plains in the valleys are swampy especially in areas of soft rock.

Traditional settlements were located in the landscape with regard to weather conditions. In the karst area and in Slovenian Istria, which are characterised by strong wind *burja*, settlements were mainly located in areas that were not exposed to the wind. Goriška brda is a north-western part of the region in similar geologic and relief, but in different climate conditions, with settlements on ridges. Settlements are, especially near cities, losing their traditional patterns, and are becoming more dispersed and generally less controlled.

B.1.5 Selection and processing of spatial data

The selection and use of spatial data follow the spatial vulnerability criteria. The majority of the data were obtained from existing databases. Interpretation of data and definition of models were expertly performed while the evaluation of individual models was performed in the interdisciplinary expert workshops.

The vulnerability modelling was done on a raster grid of 25 x 25 m. The selected cell size corresponds to the criterion of planned intervention, the precision of most of the data used and the extent of the area. Geoinformation software application ProVal was used for modelling.

B.2 Identification of impacts

Wind farms have impacts on the environment in the time of their construction and during their operation. At the time of construction, interventions that affect the environment are mainly related to the preparation of land while constructed facilities cause impacts already by the mare presence but above all with the operation.

Construction and operation of wind farms cause impacts on environment directly by occupying physical space and indirectly by their proximity. They cause impacts on all environmental components – on nature, space as natural resource, and above all on human environment.

Table A7: Identification of interventions

Activity	*Group of interventions*	*Intervention*	*Task*
Wind farm	Preparing land for construction and installation of facilities	Modifying relief	Surface leveling Filling depressions Construction of terraces
		Changing land cover	Removing of vegetation
		Changing water and waterside area	Regulation of watercourses Changing coastlines Drying out wet land
		Transporting material	Transporting surplus material Transporting material for filling
	Presence of wind farms	Presence of facilities	Presence of facilities
	Operation of wind farms	Producing noise	Rotation of rotor

Table A8: Identification of impacts (■ small or negligible, ■■ medium, ■■■ considerable expected impact)

Interventions: *Environment:* *systems, use, potentials*	Preparing land for construction and installation of facilities	Presence of facilities	Operation of wind farms
Protection of nature			
Atmosphere			
Physical properties			■
Chemical properties	■		
Climate			
Geosphere			
Bedrock	■		
Soil	■		
Relief, geomorphology	■■		
Hydrosphere			
Groundwater	■		■
Surface water, sea	■		
Biosphere			
Terrestrial flora	■		■
Terrestrial fauna	■■	■	■■■
Biotopes	■■	■	■
Protection of natural resources			
Timber forest	■■	■■	
Agricultural land	■	■	
Water resources		■	
Mineral resources		■	
Protection of human environment			
Unpolluted atmosphere	■		
Noise free environment	■		■■
Landscape scenery	■	■■■	■

B.2.1 Impacts on nature

Atmosphere

Wind turbines do not affect the chemical characteristics of the atmosphere. This effect is caused by emissions from traffic, which are produced during the construction and installation of facilities, but they are negligible.

Geosphere

Subsoil, soil and relief can be affected during the preparation of land for the installation of wind turbines by:

- surface leveling and filling depressions,
- removing rocks and stones,
- changing the soil characteristics due to removing top layer of soil, and
- changing the soil characteristics due to the use of heavy machinery.

The consequences of interventions are:

- changing physical and chemical characteristics of soil,
- erosion and removal of soil and
- changing natural geomorphologic forms.

For wind turbines flat and exposed areas are the most appropriate. All the steeper areas need to be leveled, filled or otherwise transformed. Therefore, the steepest areas are the most vulnerable. Vulnerable are also areas with low soil stability and erosion prone areas, where additional interventions and measures are needed in the stage of construction. Areas with rare or quality soil or soil, whose creation has lasted a long time, are vulnerable as well.

Hydrosphere

Interventions, which can affect the water and the aquatic environment in the stage of preparing the land for wind turbine installation, are:

- regulation of watercourses,
- drying out wet land and
- machinery – discharges of petroleum products and machinery oils.

The consequences of interventions are:

- surface water pollution and
- ground water pollution

Wind turbines can affect the hydrosphere also in the stage of their construction and installation. With building foundations, transport and interventions required for construction or reconstruction of access roads, they can pollute waters, change the watercourses or the water regime.

Very vulnerable are ground waters located in permeable aquifers due to the discharges of petroleum products and machinery oils. Due to potential pollution, surface waters are also vulnerable among which are more vulnerable clean and naturally preserved ones as well as completely degraded waters, that, if we want them return to life may not be even more polluted. Completely naturally preserved watercourses are very vulnerable due to potential regulations as well as flood areas, which need to be properly regulated.

Biosphere

Construction, installation and operation of wind turbines may affect the biosphere with the following interventions:

- land cover change,
- changes – barriers in the atmosphere.

Less likely are the affects due to regulating watercourses or land drying.

The consequences of those interventions are:

- direct destruction of plants,
- deterioration of the species' living environment - barriers for birds in the air, disruptions for other animals,
- destruction of or damage to habitats (modified soil conditions, microclimate characteristics, changes in land cover, increased noise).

Vulnerability of the biosphere in the stage of construction depends on the frequency of individual species' occurrence and the number of species, which occur in the affected area. More vulnerable are areas with rare species (including exceptional, typical, etc.), areas with species, specialised to a specific living environment, and naturally preserved areas. Indirect affects on the biosphere are caused by construction and presence of facilities and traffic. From this perspective, more vulnerable biotopes are those that are rarer (also exceptional, typical and alike),

more adapted to specific environmental conditions and are naturally preserved.

Impacts of wind turbines are most prominent on birds and large mammals.

Birds

Researches show that the mortality of birds due to wind turbines is generally low (the victims are often larger birds, which are typically highly threatened), while in areas of a lot of birds along their migration routes or corridors is significantly higher and contribute to reduction of birds' populations. Wind farms also affect the birds by habitat loss usually in the territory of the radius of approximately 250 to 500 m around a wind turbine.

The entire analysed area is an important habitat for many rare and endangered bird species and also an area of the traditional migratory routes and wintering and resting places for birds. The largest impact is likely on birds of prey and owls, which are all on the list of endangered species in Slovenia, among which are of particular importance: Griffon Vulture *Gyps fulvus,* Golden Eagle *Aquila chrysaetos*, Short-toed Eagle *Circaetus gallicus*, and Eurasian Eagle-owl *Bubo bubo*.

Figure A55: Griffon Vulture

Large mammals

The impacts of wind turbines on other animals has not been studied yet but one can expect the impacts on large mammals, particularly on wolf and lynx, which are most sensitive to disturbances in an environment, and possibly on bear, deer and other animals. Expected impacts are mainly due to reduction or destruction of habitats and migration routes of these species.

Other disturbances (mainly noise) are also expected due to allocating the facilities in naturally preserved areas. The whole western part of Slovenia is an important area of brown bear *Ursus arctos*, wolf *Canis lupus* and lynx *Lynx lynx*, which are all on the Red list of endangered mammals in Slovenia, and at the same time an area of important migratory routes of animals.

Figure A56: Golden Eagle

B.2.2 Impacts on space as natural resource

The interventions needed for construction, installation and operation of wind turbines can destroy or only limit the use of natural resource. One can speak of partial destruction, since after the removal of facilities, the land can be returned to its original state.

Forest

The consequences of installing and operating (maintenance of corridor) of wind turbines are:

- removal of trees in the area of wind turbines and for a width of approx. 30 m around it,
- changing tree species composition due to establishment of different forest edge.

More vulnerable are forests with high growing stock and slower restoration of growing stock.

Agricultural land

Wind turbines affect the agricultural land mainly in the stage of construction, namely, by destruction of agricultural land or by temporal use restrictions. Vulnerability of agricultural land depends in their potential for agricultural production.

Water resources

Water resources can be affected by emissions from traffic during the installation of facilities and by possible discharges of large quantities of oils, which can contaminate them. Vulnerable are all water resources, among them the most drinking water catchments.

Mineral resources

In the case of mineral resources, wind turbines represent only temporary restriction on the potential for exploitation of mineral resources. The installation of wind turbines in principle does not affect bedrock.

B.2.3 Impacts on human environment

Visual qualities (landscape scenery)

Landscape scenery can be affected by several types of interventions: changing terrain, changing land cover and especially by mare presence of facilities. Wind turbines are most perceivable in a completely flat area or on hill ridges on fringes of larger plain areas. Vulnerability of landscape scenery depends on its visibility (from settlements, major roads) as well as on its cultural and social values. The more is an area visible, a higher cultural and other social value it has, the more vulnerable it is.

Cultural qualities

Wind turbines can affect the cultural qualities of areas (the affect is larger if there is a recognised cultural heritage category), its identity and symbolic and other values of areas. These effects are somewhat dependent on the visibility of facilities, but they can be also related to merely knowing about the presence of facilities. Areas with greater symbolic and cultural-heritage values are more vulnerable.

Noise

Noise is caused by rotation of blades, causing high frequencies, movement of blades past the tower, causing low frequencies, and by mechanism, especially cogwheels. Produced noise can be particularly disturbing for housing and other accommodation objects (hospitals, nursing homes) and educational institutions. Noise acceptability thresholds are usually attained at a distance of about 250 m from a wind turbine. More vulnerable are areas near existing settlements. Slovenian Decree on noise in the natural and living environment (Ur. L. RS, No. 45/1995) defines 4 levels of protection against noise as well as noise thresholds. Levels are defined according to the sensitivity of a particular area of natural or living environment for noise effects. The most vulnerable are areas of 1st level of protection against noise. These are natural areas intended for tourism and recreation, immediate surrounding of hospitals, areas of health resorts and areas of national parks or nature reserves. The higher is the level, the lower is vulnerability.

B.3 Vulnerability models

Vulnerability criteria are derived from the identified potential impacts on environment. Separate models were prepared for each of the 3 basic protection aims (nature protection, protection of natural resources and protection of human environment). Since the issue of landscape scenery change was considered to be highly relevant, a separate model for vulnerability of visual and cultural qualities was prepared.

B.3.1 Vulnerability of human environment

With the model of human environment vulnerability, impacts due to increase of noise, traffic, and electromagnetic radiation, as well as danger of ruination of constructions were assessed. Noise and electromagnetic radiation are considered most relevant. On the basis of data on emissions, caused by wind turbines, and regulations that determine acceptable levels of noise and EM radiation in the living environment, the distance zones from dwellings have been determined.

Data	*Category*	*Eval.*
cultural monuments		
	cultural monument + up to 25 m	5
	25 – 50 m	4
	50 – 100 m	3
	above 100 m	1
outstanding landscapes		
	outstanding landscape	3
	no feature	1
landscape parks		
	landscape park	3
	no feature	1

Vulnerability$_{visqual}$ = Visibility (roads + settlements + viewpoints) * WEIGHT

More vulnerable areas are densely populated, low-lying parts of the Primorska, which are also less attractive for locating wind farms (Figure A57). The proposed sites for wind turbines are located in remote and uninhabited areas, where the vulnerability of human environment is low.

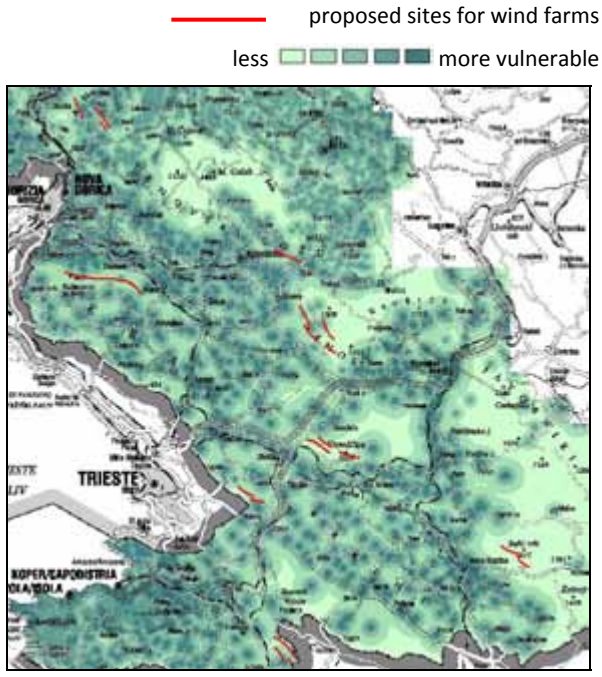


Figure A57: Human environment vulnerability due to wind turbines

It can be assumed that there will be no serious conflicts due to noise, the possibility of ruination and other direct disturbances to the human environment in the phase of the wind turbines operation. Charging of local roads during the construction and installation of wind turbines, the potential noise, the presence of workers and different machines will be of limited duration so they are also not likely to cause conflicts.

B.3.2 Vulnerability of visual qualities

With the model of vulnerability of visual and cultural qualities, impairment of visual qualities of the landscape and impacts on its cultural, symbolic, and identity qualities were assessed. The impacts of wind turbines on the visual qualities of an area are directly related to its visual exposure. A computer programme was used to calculate visibility, which tells from how many points / pixels of the selected observation sites (such as major roads, settlements and viewpoints) the individual point / pixel is visible. Another parameter concerns visual priority, whereby the areas, designated as exceptional landscape, landscape park, cultural monument and its surrounding have been given priority. Most visible areas, which are at the same time of high visual quality, are considered most vulnerable.

Data	*Category*	*Eval.*
cultural monuments		
	cultural monument + up to 25 m	5
	25 – 50 m	4
	50 – 100 m	3
	above 100 m	1
outstanding landscapes		
	outstanding landscape	3
	no feature	1
landscape parks		
	landscape park	3
	no feature	1

$Vulnerability_{visqual}$ =

Visibility (roads + settlements + viewpoints) * WEIGHT

proposed sites for wind farms

less more vulnerable

Figure A58: Visual qualities vulnerability due to wind turbines (and overhead lines)

The vulnerability map of visual qualities (Figure A58) shows that the areas around the proposed sites are relatively highly vulnerable, because they are visibly exposed and the landscape is of high quality. Nevertheless, due to fragmented spatial vulnerability obtained, there is still enough room for maneuvers left; namely, by paying enough attention when planning the sites in detail, it should be possible to further optimise the proposed sites. As it can be seen from the map, most of the proposed sites have already been optimised to a significant extent in this respect.

B.3.3 Vulnerability of natural resources

With the model of natural resources vulnerability, we assess impact on agricultural land, forest, and water sources.

Agricultural land is in principle not very vulnerable, because only small area is directly affected (100 m^2 per pillar). The remaining area may be left in the regular agricultural use. Impacts on agriculture are also caused by access and service roads.

Constructing a wind farm in a forest, this would require a large-scale deforestation and forest vulnerability would, therefore, be very high. Because we had no detailed data on quality of forests' timber potential, we evaluated general vulnerability as medium.

Major impacts on the water resources are not expected, however, it is necessary to take into account the risk of oil discharge that could have significant impact primarily on permeable soils. Vulnerability of groundwater aquifers was obtained by combining data on the soil permeability with the data on the presence of aquifers.

Data	*Category*	*Eval.*
agricultural land		
	land is not suitable for agric.	1
	less suitable land for agric.	1
	medium suitable land for agric.	2
	suitable land for agric.	3
	very suitable land for agric.	4
Forests		
	timber forest	3
	special purpose forest	3
	protective forest	3
	no forest	1
vulnerability of groundwater aquifers		
	very high vulnerability	3
	high vulnerability	2
	medium vulnerability	2
	low vulnerability	1
	no aquifer	1

In the model, individual vulnerabilities are grouped by following logical rules:

- forest + agricultural land: maximum value rule
- (forest + agricultural land) + water resource: see matrix below

	forest + agr. land			
water res.	1	2	3	4
1	1	2	3	3
2	2	2	3	3
3	3	3	4	4

proposed sites for wind farms

less more vulnerable

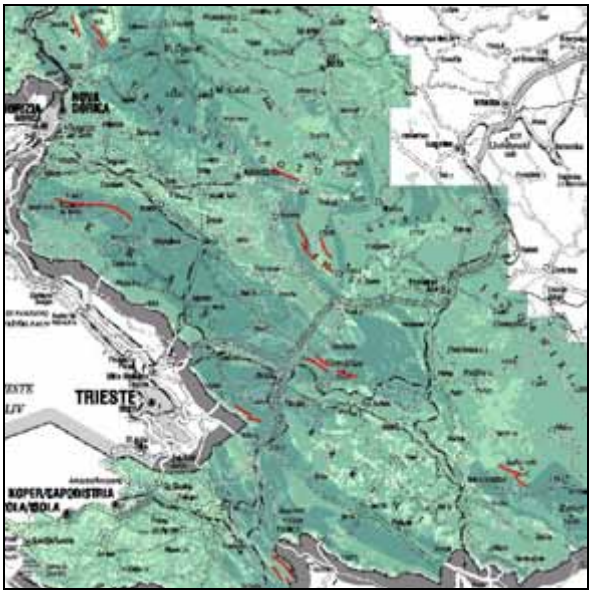


Figure A59: Natural resources vulnerability due to wind turbines

The proposed sites are on the areas with medium to low vulnerability of natural resources (Figure A59). The effects of wind turbines on natural resources are generally not big and, moreover, they might be mitigated through technical and technological solutions. The vulnerability model points out above all the necessity of such measures in the sites with natural resources of greater quality, for example:

- to prevent polluting substances run-off into the subsoil, water traps shall be constructed in potentially affected areas;
- on agricultural land, the micro location of wind turbines shall be determined in a way that the pillars will not hinder the cultivation, communications within the agricultural lots and similar.

B.3.4 Vulnerability of nature

The model of nature vulnerability includes the following components of the natural environment: geosphere, hydrosphere and biosphere, while major impacts on atmosphere are not expected. All the components are considered to be primarily vulnerable due to potential changes in their natural (conservation) values and to a lesser extent also due to complete destruction of particular parts of the area. Transition zones (buffers) have also been taken into consideration. Data on permanent or frequent stay of animals and on migration corridors was used to asses the impacts on animals' habitats (birds and large mammals). Areas, which are exceptionally naturally preserved, were given higher priority, since the installation of wind turbines would there lead to a greater disturbance of a habitat's natural state.

Data	*Category*	*Eval.*
geomorphologic features		
	Peak	3
	Ridge	3
	Passé	2
	Channel	3
	cavity, sinkhole, gorge	3
	no feature	1
erosion areas		
	erosion area of Ist category	1
	erosion area of 2nd category	2
	erosion area of 3th category	3
	erosion area of 4th category	4
	no feature	1
Springs		
	Spring	5
	distance up to 50 m	4
	distance from 50 to 100 m	3
	no feature	1
flood lands		
	flood land	4
	no feature	1
naturally preserved watercourses		
	entirely naturally preserved w.	5
	distance up to 50 m	4
	distance from 50 to 100 m	3
	partially naturally preserved w.	4
	distance up to 50 m	3
	distance from 50 to 100 m	2
	regulated watercourses	3
	distance up to 50 m	2
	distance from 50 to 100 m	1
	no feature	1
natural preservation		
	largest natural preservation	5
	large natural preservation	4
	medium natural preservation	3
	small natural preservation	2
	smallest natural preservation	1
stagnant waters		
	stagnant water	5
	distance up to 50 m	4
	distance from 50 to 100 m	3
	no feature	1
natural monuments and reserves		
	natural monument or reserve	5
	distance up to 50 m	4
	distance from 50 to 100 m	3
	distance above 100 m	1
nature protection areas		
	regional or landscape park	4
forests		
	timber forest	3
	protective forest	5
	special purpose forest	4
	no feature	1
settlements, highways		
	settlement	1
	highway	1
birds areas		
	most important birds areas	4
	important birds areas	3
	other features	1
migratory corridors of animals		
	migratory corridor of wolf (50m)	5
	zone up to 100 m from corridor	4
	zone up to 250 m from corridor	3
	other areas	1
	migratory corridor of bear	4
	zone up to 100 m from corridor	3
	zone up to 250 m from corridor	2
	other areas	1
	migratory corridor of deer	3
	zone up to 100 m from corridor	2
	other areas	1

The model was calculated by the maximum value rule.

The most vulnerable areas are those where habitats and corridors of different species coincide with well-preserved natural areas (Figure A60). These areas include the sites, which are according to previous researches important on national or international level as nesting sites or corridors of threatened bird species: the south-west edge of Trnovo plateau, Nanos, the western edge of Snežnik highlands, and a vast part of Kras.

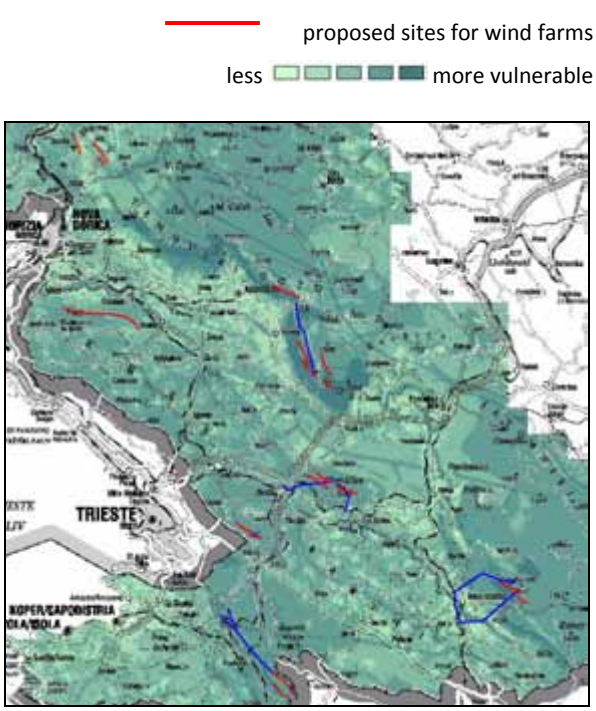


Figure A60: Nature vulnerability due to wind turbines (and overhead lines)

High vulnerability is also shown in the karst areas of dry grasslands on the southern slopes of the Primorska peaks, which are among the most valuable habitats also on the European level. These specific conditions enable the creation of endemic flora and fauna, among which is a large number of very rare and endangered species of meadow plants and insects, including many butterflies. Most vulnerable parts of nature largely coincide with areas that have already been declared a nature protected area or are proposed for it. The importance of this model in relation to protected areas is in hierarchical and spatial fragmentation of actual values.

The map shows that practically all proposed sites lie within the most vulnerable areas.

B.4 Assessment of proposed sites based on vulnerability models

The assessment of proposed sites was based on the presented vulnerability maps as well as on the maps of spatial attractiveness for wind turbines. Maps below show attractiveness of the Primorska region for wind turbines in respect of the two most important types of wind: burja (strong north-east wind) (Figure A61) and south-west wind (Figure A62). Besides windiness, distance from roads, distance from the existing energy network, and slope were also considered as attractiveness criteria.

proposed sites for wind farms

least attractive most attractive

Figure A61: Attractiveness of the Primorska region for wind turbines: burja (strong north-east wind)

Assessment was also based on modeled spatial vulnerability and attractiveness for overhead lines.

The criteria of functionality (i.e. windiness) excluded 3 proposed sites (Bate, Trstelj, and Sinji vrh) at the very beginning of the assessment. The remaining 5 sites that were assessed for their suitability for wind farms are: Nanos, Golič, Kokoš, Volovja Reber, and Slatna (Vremščica).

proposed sites for wind farms

least attractive most attractive

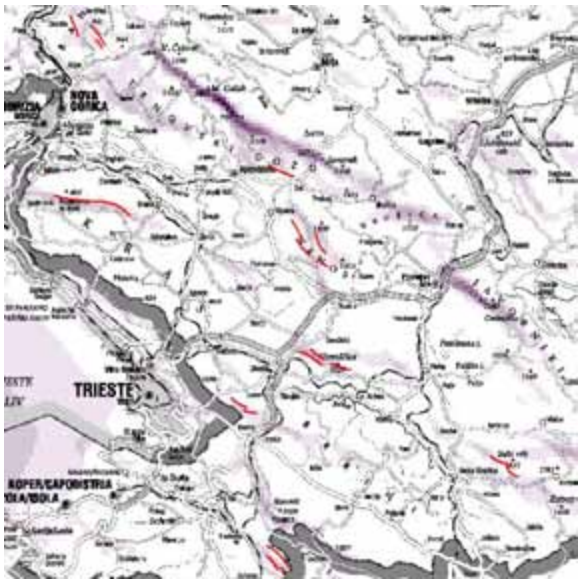


Figure A62: Attractiveness of the Primorska region for wind turbines: south-west wind

B.4.1 Results of proposed sites' assessment

This chapter presents the results of sites' vulnerability assessment according to the individual vulnerability models and (synthetic) results of multicriteria assessment considering the results of vulnerability as well as of attractiveness aspects of the assessment. Each aspect was represented by 4 criteria; attractiveness by infrastructure availability, electro-energetic potential, windiness, availability of space; vulnerability presented by impact on nature, natural resources, human environment and visual qualities (in Figure A64 and the following). Each criteria was given a mark on a common 1-10 scale; "1" meaning extremely unsuitable site; exceeding legal thresholds and "10" extraordinary suitable; ideal site with no detrimental impacts.

Nanos

Vulnerability of nature

In terms of nature vulnerability, the site Nanos is bad (2). In particular, this applies to both east

lines, passing by the steep, naturally preserved areas and close to the border of the regional park. Bad is in particular from the view of the impacts on animals, as it lies in the area of vital importance for bird protection and in migratory corridors. It is also the location of karst dry grasslands with rare and special plant and animal species. Slightly less of a concern is only the extreme eastern line.

Vulnerability of natural resources

The site is assessed as slightly above average (6) in terms of natural resource vulnerability. Significant impacts on forest and agricultural land are not expected since there are only low quality forests and bushes as well as low quality agricultural land on the site. Vulnerability is slightly higher in the areas above the most vulnerable aquifers in the south-western part.

Vulnerability of human environment

Due to its remoteness from human habitation the site was rated favourably (8) in terms of human environment vulnerability.

Figure A63: Wind turbines at Nanos site (photomontage)

Vulnerability of visual qualities

Although the main part of the proposed wind turbines' site is properly withdrawn behind the edge and, therefore, less visible, some parts of south-eastern line are still very clearly exposed. To withdraw them from the view, they should be moved a bit more inside. Wind turbines would be visible also in both eastern lines. The site was given a medium score (5).

Figure A64: Wind turbines at Nanos site (photomontage)

Joint assessment

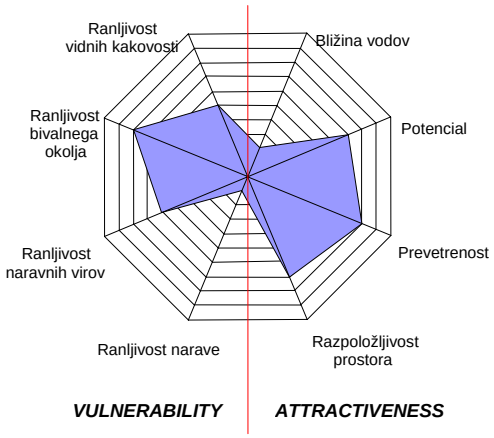


Figure A65: Star chart for Nanos site: right side of the "star" presenting attractiveness criteria: infrastructure availability, energetic potential, windiness, availability of space; vulnerability presented on the left side of the star by: impact on nature, natural resources, human environment and visual qualities (clock-wise).

The attractiveness of the Nanos site is medium. The wind potential is not the best and it would be very difficult to construct access roads and overhead lines without a major effect on the environment. Taking into account also safety restrictions, only a very limited space is then available. In respect of effects on the intact natural environment and on some populations of animals, wolves, bears, and especially birds, the site was assessed as unacceptable.

Golič

Vulnerability of nature

In terms of vulnerability of nature, the site is bad mainly due to its high nature conservation value. The site is also bad in term of the impacts on birds as it is positioned in the core area of the Karst edge, which is of outmost importance for the bird protection. The site is also within the proposed Karst regional park. Overall the site is rated low (3 out of 10) in terms of impact on nature.

Vulnerability of natural resources

In terms of vulnerability of natural resources, the site is not very problematic (7), since it does not involve intervention in either the forests or the high-quality agricultural land. Vulnerability is slightly higher because of the position above the very vulnerable aquifers.

Figure A66: Wind turbines at Golič site (photomontage)

Vulnerability of human environment

Due to its remoteness from human habitation the site was rated favourably (8) in terms of human environment vulnerability.

Vulnerability of visual qualities

On a general level of assessment, the site is favourable in terms of visual qualities (8).

Joint assessment

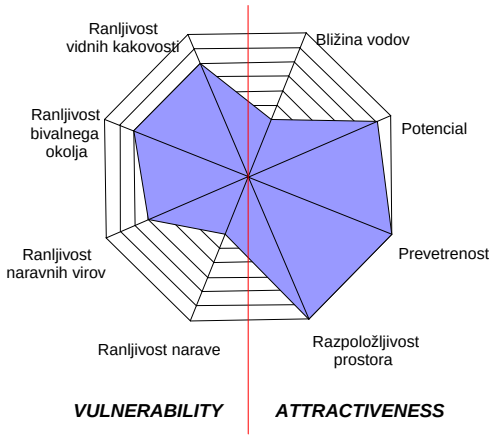


Figure A67: Star chart for Golič site

The Golič site is the best among all sites in respect of attractiveness. It has a lot of energetic potential, good ventilation, and relatively large space available. The only limitation is the difficulty of overhead lines' construction. Regarding vulnerability, the site is less favourable, especially so because the impacts on nature would be big. Namely, the intervention would take place in a very well preserved natural environment with specific and sensitive habitats, shaped by the dynamics of natural processes. Impacts on birds would be noticeable, too. We must also point out the possible effects of overhead lines on visual and cultural qualities of the space; these are otherwise not affected by wind turbines.

Figure A68: Wind turbines at Golič site (photomontage)

Kokoš

Vulnerability of nature

Kokoš is in view of the nature vulnerability least problematic (5 out of 10). Although the vulnerability is high across the area, it does not reach the highest values. The site is not extremely naturally preserved and not very important for birds.

Vulnerability of natural resources

Vulnerability of natural resources is quite high especially in the eastern part of the proposed site. The reasons are primarily the existing forest and a position above very vulnerable (Karst) aquifers. Having regard to the appropriate safeguard measures against oil discharges and considering the lower quality forests, the impacts may be assessed as medium (5).

Vulnerability of human environment

Although the settled areas are closer to this site than to the others, we can expect no significant impacts on human environment. The site can be assumed suitable (mark 7 out of 10).

Vulnerability of visual qualities

Proposed site is at the edge of very visibly exposed area. By moving the wind turbines, a bit more south, smaller visible exposure would be reached. This may improve acceptability and score (5) of the site in terms of the impacts on visual qualities.

Figure A69: Wind turbines at Kokoš site (photomontage)

Joint assessment

The Kokoš site is one of the worst in view of energy (small wind potential and poor ventilation, and especially limited space available), but its attractiveness is increased by the facility of connecting to the current network. Moreover, the site is relatively acceptable in respect of space vulnerability, as the intervention would not be big and the effects on environment consequently smaller. Effects on the state of natural preservation and on birds, as well as visible effects and effects on natural resources (especially forest) would be noticeable, but still within the boundaries of acceptability.

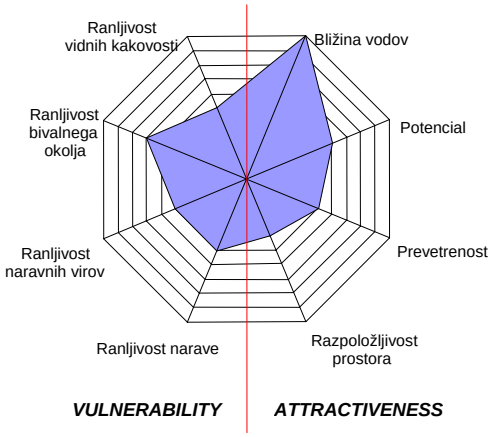


Figure A70: Star chart for Kokoš site

Volovja Reber

Vulnerability of nature

Volovja Reber lies in one of the largest areas of relatively preserved nature in Slovenia, dominated by dry grasslands and forest, which are very important natural habitats of many plant and animal species. The area is of utmost importance for the bird protection and an important corridor for large mammals and has been proposed for nature protection area (Regional Park). The location is therefore bad in terms of the nature vulnerability (2). Shift to the east would make the site more acceptable.

Figure A71: Wind turbines at Volovja Reber site (photomontage)

Vulnerability of natural resources

The proposed site for wind turbines is middle vulnerable (5). The site is mostly outside the forest and the agricultural land is of low quality. The vulnerability is bigger in the southern area, which lies above very vulnerable aquifers.

Vulnerability of human environment

Due to its remoteness from human habitation the site was rated as preferable among the proposed sites (9 out of 10) in terms of human environment vulnerability.

Vulnerability of visual qualities

The southern part of the proposed site is not visible from the major observation points. More problematic is the northern part of the site, which is quite visible. Overall, the site was given a rather good mark (7).

Joint assessment

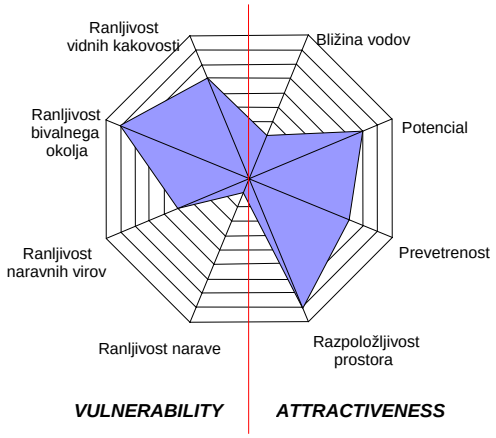


Figure A72: Star chart for Volovja Reber site

Good energy potential and ventilation, together with large space available, make the Volovja Reber a rather attractive site. The difficulty of overhead lines' construction slightly reduces the attractiveness; but, in view of vulnerability criteria, the site performs much worse. Impact is big especially in terms of natural environment including birds.

Figure A73: Wind turbines at Volovja Reber site (photomontage)

Slatna

Vulnerability of nature

The site Slatna is in terms of the nature vulnerability hardly suitable (2). Vulnerability is very high across the whole area; at some points, it reaches the highest value. Slatna is naturally well preserved, is an important habitat of flora and fauna, is of great importance for birds and is a part of an important deer migration corridor.

Vulnerability of natural resources

Vulnerability is middle (6). Most of the construction will be on agricultural land, appropriate for extensive cultivation. Vulnerability of the site is higher due to its location over very vulnerable aquifers.

Vulnerability of human environment

The site is not very vulnerable in terms of human environment (8). It can only conflict with the current rather intensive recreational use of the area.

Vulnerability of visual qualities

Of all the proposed sites, wind turbines on Slatna would certainly be the most visible especially the line running over the hill-top. Visible is also the south-west line. The latter could be withdrawn from the most vulnerable position with a shift a bit more north. Both northern parts are slightly less visible. In terms of visual vulnerability, the site scored low (3).

Joint assessment

The Slatna site has got a lot of energy potential, but is less attractive in respect of windiness and space available. Construction of overhead lines would be a very difficult task here. Moreover, the site is vulnerable in respect of impacts on the environment, especially its natural component. Wind turbines would affect animals, especially birds. Among all sites, this one is rated as worst in terms of impacts on visual qualities, as wind turbines, together with the overhead lines, would be very exposed and visible.

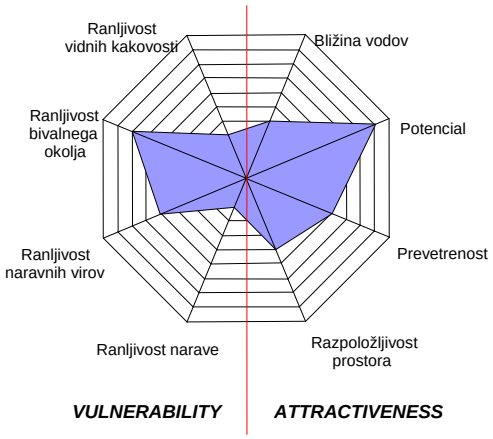


Figure A74: Star chart for Slatna site

Figure A75: Wind turbines at Slatna site (photomontage)

B.4.2 Selected sites

None of the proposed sites performs equally well in terms of attractiveness and vulnerability criteria. Majority are worst in terms of their impact on nature. Out of the proposed sites, Golič and Kokoš sites were found as the most suitable. The Golič site was selected mainly due to its attractiveness for wind farms, while the Kokoš site was selected as acceptable mainly in respect of environmental vulnerability.

Figure A76: Wind turbines at Golič site (photomontage)

Golič

Recommendations:

- On the basis of a more detailed examination (especially botanical), it is necessary to find micro locations that avoid areas with rare plant species.
- It is necessary to review the overhead lines' route in respect of effect on cultural heritage and visual quality of space and, if necessary, change it.
- It is necessary to study in detail the visible exposure of wind turbines and of the overhead lines from the local roads and nearby settlements, and optimize the location if necessary.

Kokoš

Recommendations:

- It is necessary to study in detail the visible exposure of wind turbines and optimize the location if necessary. By shifting wind turbines to the south, the site would become more acceptable in respect of visual quality of the space.
- It is necessary to eliminate the possibility of oil discharge, as the proposed site is above very vulnerable karstic water supplies.
- It is necessary to reduce the effect of (re)construction of roads by carefully planning access roads (change of timberline, excavation works, dump material, felling).

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LANDSCAPE CHARACTER ASSESSMENT

Thematic Study **B**

COASTAL LANDSCAPES OF TUNISIA WITH SPECIAL FOCUS ON CAP BON

A Proposed Landscape Character Assessment

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Authors: **Vogiatzakis, I.N. & Cassar, L.F.**

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1. Summary

Coastal landscapes of Tunisia are faced with the increasing human-induced pressures including population increase, overgrazing and tourism development, as demonstrated by the review presented herein. These problems, combined with the lack of public awareness, political commitment (demonstrated by inadequacy of legislation and/or ineffective enforcement) and inter-sectoral co-operation, hinder the protection and sustainable planning of natural and cultural landscapes. In Europe, an analysis of the existing monitoring programmes at the national level shows that the Landscape Character Assessment (LCA) has become an important tool for conceptualising and integrating spatially a range of factors that influence the state and trend of terrestrial ecosystems. The LCA is a set of tools considered to be scientifically sound, region-specific and stakeholder-orientated, and designed to describe the landscape character. The development of landscape typologies provides the spatial framework for monitoring ecological processes but also for the derivation of sustainability indicators.

An important question to address in the landscape planning is how a landscape can accommodate the change. Some landscapes are inherently sensitive whilst others may only be sensitive to a specific external pressure. The landscape typology allows the assessment of the sensitivity of the landscape to a particular type of change or development. The use of GIS technology enables data integration, increasing detail and efficiency in environmental resource inventory and analysis. The landscape typology provides the spatial framework for making judgements about the relative sensitivity of different types of landscapes, their current condition and their vulnerability to change. This includes historical and aesthetic properties of a landscape as well as its ecological characteristics.

The national or regional policy objectives, which might be relevant for the use of the LCA, span a range of sectors such as agriculture, tourism, landscape protection, etc. For example, in agriculture, the preservation of the landscape character can be achieved through improving the land use or through promoting better practices that take into account the natural and cultural environment. The spatial and rural development planning should take into account the regional identities and should limit the expansion of settlements where necessary.

The success of an LCA depends on the quality of the datasets available. A previous study on the Mediterranean landscapes (Vogiatzakis *et al*. 2005) has confirmed the lack of truly Mediterranean datasets. In the case of Tunisia, the datasets used exhibit a high diversity in terms of quality and resolution. The preliminary research in Tunisia revealed that (free-readily accessible) thematic data resources with a high spatial accuracy are not widely available. However, and despite the difficulties in using these data, the need for clearly demonstrating (as this is a demonstration project-knowledge transfer) the LCA methodology to Tunisian partners overrides such concerns. When better digital datasets become available, they can be used following the suggested methodology to improve the landscape typology and mapping. The Landscape Character Assessment as demonstrated herein is a powerful tool that can provide an important strategic overview within which to develop policies for a multifunctional landscape in which the conflicting demands of agriculture, development, recreation and nature conservation need to be resolved.

2. Landscape Character Assessment

2.1 Background and Rationale

The process of *characterisation* comprises the identification of areas of distinct character, the classification and mapping of those areas and the description and explanation of their character. The landscape character is defined as a distinct, recognisable and consistent pattern of elements in the landscape. It is a functional hierarchy of abiotic, biotic and cultural components (Mücher *et al*. 2003). The Landscape Character Assessment is a set of techniques and procedures used to classify, describe and understand the evolution and physical and cultural characteristics of the landscape.

The rationale behind the landscape character mapping is that particular combinations of physical and cultural factors occurring in different areas result in similar landscapes. The approach is based on a series of natural (i.e. landform, geology, soils) and cultural factors (i.e. land use, settlement pattern) that are used to describe the variability in the landscape at various spatial scales depending on the research scope. The data sources may include the existing published sources, field survey information and the input of stakeholders to identify and describe areas of common character. The LCA can operate at a range of scales from continental to national and regional.

The stages of a Landscape Character Assessment include:

- defining the scope of the study;
- undertaking a desk study to identify areas of common character;
- carrying out a field survey to gather further information about the landscape;
- classification and description to define and communicate the landscape character types and areas.

2.2 Methodology

The methodology employed in this study is based on the approach developed by Griffiths et al. (2004) also proposed in a recent report by PAP/RAC (Vogiatzakis *et al*. 2005). However, some modifications were necessary to account for differences of the Tunisian coastal landscapes. The system is hierarchical (Figure 2), based upon the successive sub-division of the mapped attributes. The landscape is divided first into physiographic units from the contour and geological data. The resulting units are then further sub-divided by soil type and finally by cultural patterns to derive the building blocks of the system, the Landscape Description Unit (LDU). Figure 3 illustrates the general approach and shows how the physical and cultural attributes are successively combined to derive the LDUs. These units are subsequently amalgamated into Landscape Types (Figure 2) with similar physical and cultural attributes using cluster analysis (e.g. TWINSPAN) (Hill 1979).

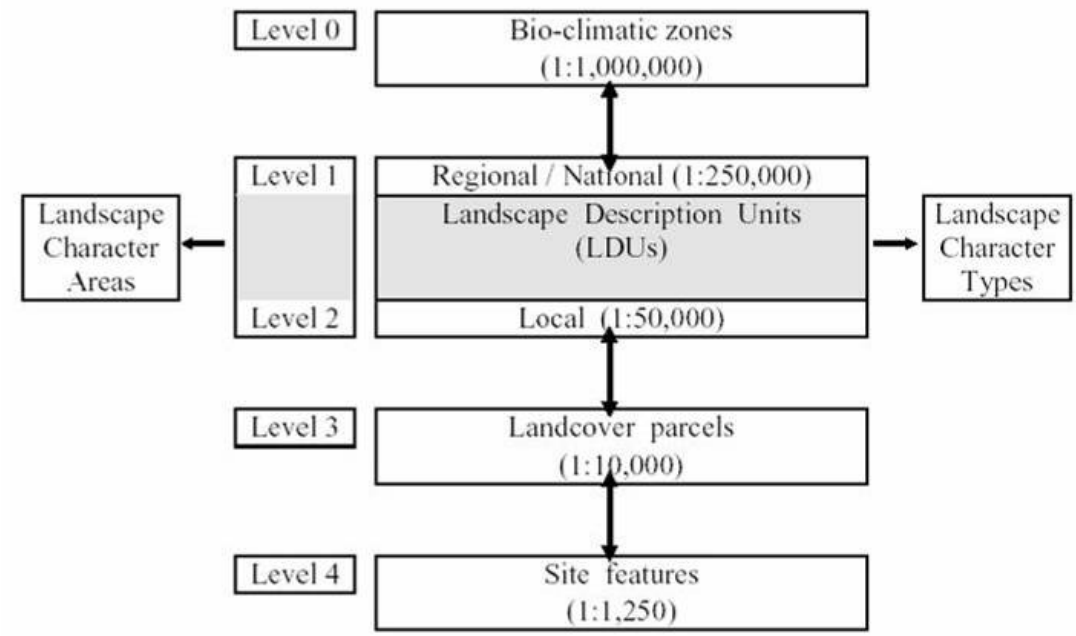

Figure B1: The landscape Description Unit Spatial Framework (Griffiths et al. 2004)

2.3 Developing the Typology

A distinction is made between a landscape typology and the application of that typology to generate a classification. The classification is the result of using the typology to map the area of interest, in this case the Mediterranean coast. In some cases, mapping can be achieved manually, based upon an interpretation of the mapped variables. Increasingly, this kind of mapping is undertaken within a GIS environment, based upon visual interpretation of digital map layers using a technique called "on-screen" digitising, although alternative more computer intensive methods have been used (Mücher 2003).

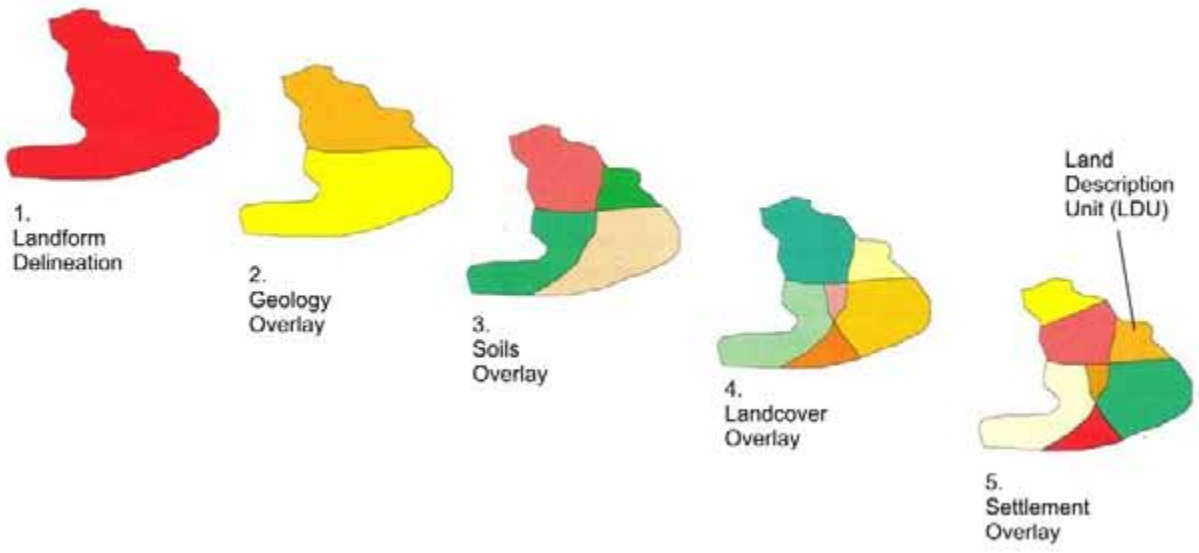

Figure B2: Schematic diagram of the overlay procedure during desktop mapping

An important component of this study is to develop a specifically coastal landscape typology for Tunisia that can be applied at a wide range of spatial scales from national to local. The development of the typology should follow the territorial limit of local coastal administrative units (UNEP/MAP 2005). Some of the most common variables employed more often in LCA include climate, landform, geology and land-cover (see review in Vogiatzakis *et al.* 2005).

The data for these attributes are stored in a database within a GIS software (e.g. ArcGIS). This is then followed by the overlay and subsequent subdivision of these variables into discrete homogeneous units. This operation can be carried out "manually" or automatically. Although the first approach can be time consuming for large datasets, it allows the user greater control over the process enabling decisions over the subdivisions, e.g. by following natural breaklines for landform delineation or by amalgamating very small polygons of a geological attribute. In the second approach, decision rules can be derived to extract the information needed from the individual variables' layers which can be then simply overlaid automatically within the GIS. This is generally faster but the presence of tiny polygons (slivers) which can be propagated along the process result in an unnecessary and not always meaningful number of polygons which then have to be filtered out from the final output.

The next step is the use of statistical procedures to determine the rules to decide between classes in order to produce repeatable results with minimal personal bias. Clustering techniques have been also applied at the global level for developing coastal typologies (LOICZ 1995; 1998). Therefore, in this study the data can be analysed using TWINSPAN analysis (Hill 1979), a polythetic divisive classification technique, in PC-Ord (McCune and Mefford 1999). Although initially developed for the classification of species data, TWINSPAN is also appropriate for landscape classification because it uses sample composition, in this case physical and cultural attributes, and the strength of affiliation of the attributes to different sample groups (Griffiths *et al.* 2004). TWINSPAN is also generally regarded as a robust analysis for data where there are many zeros in the data set. This generates groups of landscapes with similar attributes that will form the proposed coastal landscape types.

2.4 Data Sources – Availability

Although it is commonly accepted that a scientifically sound typology should be based on detailed information on the distribution, quality and quantity of biophysical variables, in many cases such information may only be derived from heterogeneous data sets of differing quality (Table 2). Quality is compromised by, for example: modernity, spatial scale, and area coverage.

For mapping purposes the coastal zone was defined as the boundaries of the Tunisian administrative units bordering the coast (Figure 1). Before the process of mapping can begin all of the relevant, readily available information for the study area needs to be collated as a series of digital map layers within the GIS. A review of available datasets that can be employed for these studies in the Mediterranean are found in Table

B1. It is proposed that the typology developed for Tunisia can be based on the following variables:

- **Climate:** Climate zones may be defined using precipitation and temperature data.
- **Landform** - the relative relief and shape of the land surface as derived from interpretation of a Digital Elevation Model or topographic map. Classes may include valleys, rolling lowland, plateau, high hills.
- **Geological structure**: A simplified geological base map showing Geology-structure/age is prepared first from Geological Maps. Geology-structure refers both to geological Period and to broad differences in lithology.
- **Land use**: the broad pattern of primary land use at the landscape scale as derived from existing land use maps.

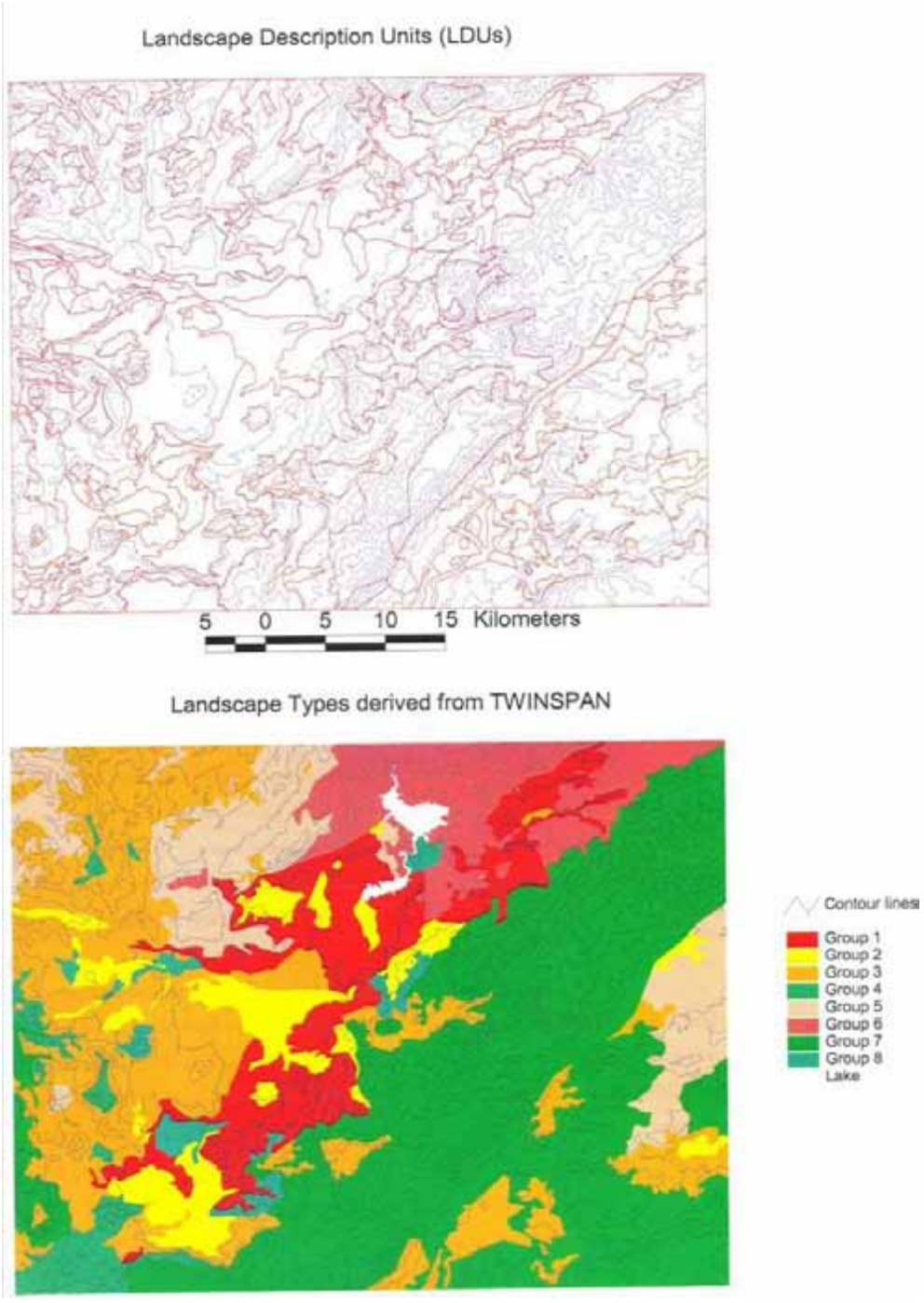

Figure B3: From Landscape Description Units to Landscape Types

Table B1: Potential Datasets for Landscape Character Assessment

	Source	Description
Climate	UEA, UK	The Climate Research Unit (CRU) at University of East Anglia offers several high-resolution global datasets. These include precipitation, temperature, relative humidity etc. Averaged climate data at individual country level are also available (http://www.cru.uea.ac.uk/cru/data/hrg.htm).
Topography	USGS	U.S. Geological Survey (USGS) is distributing elevation data from the Shuttle Radar Topography Mission (SRTM). The SRTM data were collected specifically with a technique known as interferometry, Data available to the geospatial data user community include 1-arc-second (approximately 30-meter) resolution data over the United States, and 3-arc-second (approximately 90-meter) data over non-U.S.territory (http://erg.usgs.gov/isb/pubs/factsheets/fs07103.html).
	USGS	GTOPO30 is a global digital elevation model (DEM) available by the USGS. Within this dataset elevation is regularly spaced at 30-arc seconds (c. 1km). The DEM is based on data from 8 different sources of elevation. The co-ordinate system is decimal degrees of latitude and longitude referenced in WGS84 (http://edcdaac.usgs.gov/gtopo30/README.asp). From this DEM other parameters can be derived such as slope and aspect.
Geology and Soils	ESB	The Soil Geographical Database of Europe at scale 1: 1,000,000 managed by the European Soil Bureau (ESB). A rasterised map with a grid resolution of 10km x 10km cell is available. The ESDB only includes the European countries of the Mediterranean.
	FAO-UNESCO	The Digital Soil Map of the World is a compendium of information on the distribution of soils in the world. The scale of the original map (and the vector-formatted data) is 1:5,000,000. The cell size of the raster data is 5 x 5 arc-minute http://www.fao.org/ag/agl/agll/dsmw.htm).
Land Use – Land Cover	CORINE	EU programme to provide information on the status of and changes to the environment. This database was derived from visual interpretation of Landsat satellite imagery in combination with ancillary information. It does not cover the Former Republic of Yugoslavia and Albania but it includes Tunisia and Morocco.
	PELCOM	A 1 km spatial resolution Pan-European Land Cover database which contains 16 classes and extends to Turkey, and part of the Syrian coast. This dataset does not cover any of the North African Countries (http://www.geo-informatie.nl/projects/pelcom/).
	GLC2000	The GVM unit of the JRC has produced a new global landcover classification for the year 2000 (GLC2000), in collaboration with over 30 research teams from around the world. Access is provided through registration.
	FAO:	The purpose of the AFRICOVER project is to establish a digital geo-referenced database on land cover for the whole of Africa (http://www.africover.org/webmap.htm). The Multipurpose Africover Database for the Environmental Resources (MADE) is produced at a 1:200,000 scale (1:100,000 for small countries and specific areas). Of the African Countries that boarder the Mediterranean there are data currently only for Egypt.
Geomorphology		No consistent Mediterranean or European geomorphological map exists. However, detailed digital elevation models (DEMs) are available, which convey a high proportion of the information required, i.e. altitude and slope. These data act as surrogates for geomorphological information. The best dataset available is the United States Geological Survey (USGS) HYDRO1k global digital elevation model, with a resolution of 1 km^2 (http://edcdaac.usgs.gov/gtopo30/hydro/).
GIS Global Datasets Products	AGI - ESRI	A compilation of geologic, hydrologic, elevation, land cover and other thematic datasets organized by regions of the world. The dataset comprises relatively small scale data (1:1 million scale or 1 km resolution).

3. Landscape Character Assessment for Tunisia

3.1 The Tunisian coast – a historic overview

Tunisia's landscapes have been influenced by humankind for millennia. The first trace of human presence, within the land area that comprises the present-day Tunisia, dates back to about half a million years B.P. Peoples originating from the Sahara mingled with those originating from the northern and eastern regions long before this land, later to become known as Tunisia, was colonised by people of diverse origins, including Phoenician, Greek, Roman, Vandal, Byzantine, Arab, Norse, Spanish, Turkish and French.

Evidence exists of Phoenician trading posts along the Tunisian coast, as early as the 12th Century B.C. These trading outposts, which later developed into maritime fortified towns, and subsequently became important coastal urban areas, exerted pressures on coastal landscapes as their populations grew and their domestic and economic activities became more diverse. Various colonizers utilised the coast and its often bountiful resources. Kerkouane, a former Punic settlement, with the status of a city, on the Cap Bon Peninsula, was founded in the 5th-6th century B.C. Utique, some thirty kilometres north of Tunis had been one of the most important ports in Africa. It was founded around 300 years prior to Carthage.

Carthage, a world power of the time, was founded in 814 B.C., and needs no introduction. Vast tracts of terrain to the north, south and inland of the city served to fuel Carthage with the resources it required. In particular, immense plains, former wetlands and natural grasslands, were transformed into agricultural land for an ever-growing and prosperous civilization. Carthage was destined to be later destroyed by the Romans and subsequently redeveloped by Julius Caesar. Further tracts of land were transformed into arable farmland extending into the hills in the hinterland, where freshwater from mountainous regions, such as those of Djebel Zghouan, was conveyed via impressive aqueducts to coastal regions such as Carthage. Remnants of the 132 km long Roman aqueduct that ran across the Wadi Miliane to the Bardo still stand today.

Following inter-religious conflict during the 10th century, Mahdia was developed on a promontory north of the Gulf of Gabes as a capital of the fatimide caliphate. The 10th century Great Mosque which still stands in this coastal locality in the vicinity of Borj el-Kebir, together with a fairly dense surrounding conurbation made up of habitations of varying age, is testimony of how coastal areas that were deemed to have defensible attributes were developed over time and according to the social, political and economic needs of the time. Another classic example is the former Berber town known as Oppidum Tunicense, later to become known as Tunis, the present-day capital, which was developed on the rocky isthmus which stretches between the Sebkhet es-Sedjoumi (great salt lake) and the bay of Tunis, an immense lagoon-like embayment overlooking the Mediterranean.

In addition to being landscape features of considerable magnitude, the various lakes near the capital are immensely important from the hydrological point of view as also from the conservation standpoint. These include the Lac de Bizerte, covering some 11,000 hectares, which flows into the adjoining Lac Ichkeul (8,500 hectares) during the dry season. The latter, a declared UNESCO (natural) World Heritage Site, is considered to be an exceedingly important wetland site for wintering waterfowl and the largest fresh water body in the Maghreb. The Lac de Ghar el-Melh, which covers approximately 3,000 hectares, also forms part of the system and is fed by the Medjerda, the only perennial river system in Tunisia. In historic times, its delta served as a strategic anchorage for the galleys of Barbary corsairs, as has also the partially navigable Lac de Tunis. The Gulf of Tunis, in particular the area between the capital proper (Tunis) and the surrounding coastal suburbs, to the north including La Goulette, Carthage, Sidi Bou Said and La Marsa, and to the southeast Rades and Hammam-Lif, became exceedingly popular for

up-market housing. Coastal landscapes were, in some instances, dramatically altered to accommodate necessary changes, such as a marina at Sidi Bou Said together with beach nourishment adjacent to it and the modification of the terrain at La Marsa so as to ensure appropriate alignment for construction of housing units on the immediate coast.

The strategic importance of La Goulette, translated from the Arabic Halk al-Wad (river mouth), was recognised as early as the sixteenth century when various conflicts ensued for its control between Barbarossa's corsairs, the Spaniards and the Ottomans. Its location on a sandy isthmus between the Lac and the open sea made it militarily valuable. Economic prosperity and political stability of recent times transformed La Goulette into a coastal attraction and various infrastructural projects, over the years, aimed at embellishing this locality and at making it more accessible, contributed towards urban and infrastructural consolidation of this section of the coast and perhaps also to changes in the dynamics at large of the area. The Lac road which stretches across the shallow water to link La Goulette and Tunis is a case in point. The same can be said for the urban growth of coastal areas such as Hammam-Lif at the foot of Djebel Bou-Kornine and Soliman. In both locations, various alterations were made to the coastline, in particular, with regards to the construction of extensive wave-braking mechanisms immediately offshore. In the case of the latter, the coastal town is sandwiched directly between the shoreline and the coastal plain where wetlands occur.

Colossal changes in the terrain for strategic purposes are said to have occurred at Bizerte, often described as the Venice of Africa. For centuries Bizerte had been utilised as a trading post, port of call or strategic base, but, it is said, the military improvements that took place during recent colonisation drastically changed its thousand year old appearance.

The northern coast between Cap Roux to Cap Zebib is characterised by a diverse landscape and seascape, comprising largely an undulating coastline with numerous capes and large embayments or small gulfs. Some of the various coves served over the centuries as indispensable ports of call and as bases for various activities relating to the maritime industry, including the infamous corsair events of High and post-Medieval age that wreaked havoc within entire coastal regions throughout the Mediterranean Basin, as well as economic benefit through the direct exploitation of marine resources. In particular, Cap Negro was utilised as a base for commercial coral fishing by French companies as early as the sixteenth century.

Of note is the harbour at Tabarka, located between Cap Roux and Cap Serrat, where a former island (immediately offshore) that had been joined to the mainland, in antiquity, via an existing sandbar offers adequate shelter to the Tabarka fishing fleet. Again, in view of the commercial importance vis-à-vis coral fishing around the rocky barren coast of Tabarka, the Genoese, after having acquired the land from Charles V, constructed a large imposing fortress on the crest of the hilly isthmus (former island), with commanding views of the Tabarka port; little in terms of landscape change, other than the further construction of a lighthouse by the French naval command in 1881, took place until recent times.

In recent years numerous housing units have been constructed on the mainland promontory opposite the isthmus, while a "tourist village", essentially consisting of numerous beachside hotels, complexes, beach clubs, golf courses and large plantations on extensive stretch of coast east of Tabarka, was constructed towards the area of Oued Bouterfess. Thus, new developments during the last decades extended the urban footprint considerably on this part of the Tunisian coast, significantly altering the landscape fabric. This can also be said for other locations where golf courses have been constructed, such as along the eastern coast at Port El Kantaoui, where an entire tourist town was constructed from scratch, at Hammamet and as far south as Jerba (another former island that was linked via a thoroughfare to the mainland), not to mention golf courses beyond the coast in hyper-arid desert regions such as at Tozeur.

The northwest coast

The immediate hinterland of the north-western coast consists of a wooded range of hills and mountains, known locally as the Khroumiria, part of the Atlas range that extends westwards

throughout northern Algeria all the way to Morocco. The vegetation comprises vast Cork oak forests accompanied by Mediterranean Evergreen oak-dominated woodland together with maquis-type assemblages as well as extensive plantations. The understory carpeting these areas mostly comprises myrtle, heather and *cistus* species. This woodland-dominated landscape extends across political boundaries of Maghrebian states as well as to locations close to the northwest coast, imparting a true sense of wilderness. The area is considered a refuge for wildlife including large mammals, so much so that the last Atlas Lion within Tunisian territory was shot here in 1943.

The Tell, which extends from this region, consists of a series of hills and ridges that form an undulating landscape which characterises the northern aspect of the country. In particular the northern Tell is significantly hillier since this forms part of the foothills adjacent to the Atlas range. The north-eastern Tell and Cap Bon comprises lush plains, mostly used for cultivation. The Cap Bon promontory stretches out for ninety kilometres into the Mediterranean, bound by the Gulf of Tunis to the north and the Gulf of Hammamet in the south.

Cap Bon

The Cap Bon coast, which measures some 200 kilometres is largely rocky, ranging from low rocky coast to sheer cliffs, but also supports various sandy enclaves. The fertile soils of the hinterland are exploited to the full, through the establishment of orchards with numerous varieties of trees and cultivars, as well as large-scale garden-type farmland for the cultivation of cash crops. In some areas within the Cap Bon promontory, agricultural land-use occupies the terrain practically all the way to the sea. This part of the coast has also long been marketed for recreation purposes, primarily associated with sea-sports, bathing and relaxation, and, as a result, infrastructure and development have encroached upon the Cap Bon promontory coastline considerably.

The Sidi Raïs beach and coastal dunes, for example, have been, to a large extent, encroached upon by small-scale developments that have nonetheless had a significant impact on dune-field development, primarily interrupting beach nourishment through longshore drift, thus creating disequilibrium between beach-foredune sediment dynamics. In other localities along the Cap Bon coast various developments that often contrast with the rural character of the region may be encountered, but which nonetheless are exceedingly important from the socio-economic point of view. The constructed fishing port that protrudes seawards from the coastline and its associated tuna canneries at Sidi Daoud, south of El Haouaria, is a case in point.

A large-scale construction and development along the littoral has taken place at both Kelibia and Hammamet, as well as along significant stretches of coast between these two east-facing key conurbations, for example around Nabeul. In the case of Kelibia, urbanization spread from the nucleic 12th century A.D., borj that comprises a rocky spur on which a Punic citadel had originally been built in the 5th century B.C., (later to be reconstructed and reinforced during the Arabisation of the Maghreb; this fortress is considered the most important Moslem fortress in existence in Tunisia). The original fishing port was, in recent years, enlarged to cater not only for the needs of a modern fishing fleet but also for pleasure craft that sail the eastern coast of Cap Bon and beyond. The town grew both perpendicularly as well as parallel to the coast, with “Petit Paris” being constructed around the pocket El Mansourah beach, although most of the urban spread occurs in inland direction, across the plain.

Another large conurbation, Hammamet, lies at the foot of the Cap Bon promontory, and north of the Gulf of Hammamet, one finds a largely sandy environment that was quick to draw the crowds and compete for tourists, both international and domestic; Hammamet was launched as a resort town in 1920. Notwithstanding its present-day urban footprint, town planners have ensured that building height regulations, especially on the waterfront, remain within stipulated limits, while a large variety of trees (mainly eucalyptus and cypress) and other shrubbery has been introduced within the townscape in abundance. Like most coastal areas that have been inhabited for centuries, a fortified medina with accompanying Great Mosque, ramparts and fortress stand out, but while these may have characterized the coastal landscape at Hammamet up to a century or so ago,

it is the whitewashed resorts and villas interrupted by 'curtains' of shrubbery that now dominate the landscape-seascape. The early nineties saw the construction of a mega yachting harbour with full ancillary facilities that cater for the international tourist market. The integrated resort of Yasmine Hammamet spreads over more than two hundred and eighty hectares and is flanked by extensive sandy beaches. The immediate hinterland of Hammamet has been converted from a terrain once supporting semi-natural and natural habitats as well as parcels of land used for pasture and cultivation, to one that now boasts some of the more attractive golf courses in the Mediterranean. The natural aspect of the landscape was incorporated into the design, while wide-scale planting was integrated into a massive landscaping scheme that produced numerous copses of trees and shrubs across the vast terrain.

From the conservation standpoint Cap Bon, or more specifically El Haouaria and its environs, is exceedingly important for avian migration across the central Mediterranean. During the spring passage, the promontory attracts as many as forty thousand raptors (birds of prey) that converge on the Darchichou region at the base of the Cap Bon promontory, and then soar towards El Haouaria over Djebel Abiod (393m), which forms the tip of this stretch of land (known as Ras Addar), and out onto the Mediterranean towards Pantelleria and subsequently towards Monte Ciccia in Sicily. The stretch of open sea between Djebel Abiod and Sicily is of a distance of one hundred forty kilometres, with the island of Pantelleria lying just over 80 kilometres from the coast of Kelibia on the Cap Bon promontory.

Historically, the coastline of Cap Bon has always provided a bridgehead for military incursions, such as the Agothocles' expedition in 310 B.C., that of Regulus' in 255 B.C., Caesar's in 47-46 B.C., and others closer to date. For this reason the Cap Bon littoral boasts of various coastal fortifications such as the Ras ed-Drek Punic fortress and the Citadel at Kelibia, which, to a large extent, instigated large-scale modification of the coast so as to make these fortified areas strategically viable. Strategic considerations aside, the coastal areas of Cap Bon feature various other assets such as the hydropathic properties of natural spring-waters at Aïn Oktor and Korbus, where dedicated resorts have been constructed. Korbus had already been exploited as early as Roman times when wealthy inhabitants of the region visited the Aquæ Calidæ Carpitanæ.

The Sahel and the Gulf of Gabes

South of the city of Hammamet, commences the region known as the Sahel, which stretches south practically to the city of Sfax. In general, the coastline is relatively low-lying, dotted with a variety of towns and villages, many of which depend on fisheries, both domestic and commercial, as a way of life. The hinterland largely consists of open, flat steppic terrain that extends significantly inland. Coastal conurbations of significance comprise Sousse, Sfax, Monastir and Mahdia, while further inland one finds the city of Kairouan, an important holy centre for Islam. Indeed Kairouan, which is considered by many as the fourth Holy city of the Muslim world, has exerted its influence over time on surrounding landscapes. In particular, coastal defences were constructed around the port areas of Sousse, Sfax, Monastir and Mahdia with a view to afford a degree of protection to Kairouan.

One of the northern-most towns within the Sahel is that of Hergla, a relatively old town with a thriving community much dependent on fisheries and agriculture. A coastal thoroughfare dominates the shore region, as do the fishing port and cemetery. The lower regions are occupied by parcels of land that are cultivated while the slightly higher regions around the town support a vegetation assemblage that has been subjected to grazing pressures over the centuries. The town's 18th century mosque dominates the coastal town centre.

Much alike Yasmine Hammamet, Port el Kantaoui was constructed from scratch. It consists, essentially, of an immense coastal resort surrounded by an extensive hinterland of olive groves. In terms of landscape change, Port el Kantaoui altered the coastline considerably, with the establishment of a yachting harbour, various piers and jetties as well as breakwaters with acropods (to absorb the energy of onshore waves), extended beaches, large scale landscaping, including a 100 hectare golf course that extends from the hinterland to the sea, and a sprawl of holiday resorts.

The city of Sousse, one of the larger cities of the Sahel, has grown over the centuries both inland and along the littoral. Originally a walled coastal town with an 8th century ribat, the city was in recent times more associated with the tourism industry rather than coastal defence. When, in the seventies, Tunisia was identified as a potential tourist destination, Sousse was among the first coastal regions to be developed for this commercial endeavour. As a result, entire sandy tracts of beach were built upon to provide the newly founded industry at the time with space for commercial development. As in many other locations in the Mediterranean, little attention was paid towards environmental considerations, and the townscape ventured much too close to the shoreline.

Monastir is very much like Sousse in terms of intensive development of the coastal landscape, where 8th century ribats stand side-by-side with broad coastal thoroughfares, yachting harbours, artificially managed beaches, golf courses and holiday resorts. It is said that a chain of ribats, built by the aghlabites along the entire southern Mediterranean shoreline, communicated by means of light signals that enabled messages to travel between Sebta in Morocco and Alexandria in Egypt during the course of one night; such was the influence on the landscape by coastal defence structures along the Mediterranean during early Arab rule. Today, the leisure-oriented construction that takes place on the Monastir-Sousse-Port el Kantaoui coast as well as further north at Hammamet, is of such high calibre that, on the basis of design and amenity, it may compete with the some of the best resorts in the Mediterranean Basin. Significant alterations to the coastal landscape, particularly in Monastir, where extensive olive plantations occur, came about with the development and design of large golf courses on the immediate hinterland. The modification of the terrain, the intensive use of water resources, the radical land-use change and the planting of, often, alien vegetation for embellishment purposes may pose questions of an ethical nature where sustainability considerations are concerned. Another area along the eastern littoral within the Sahel that is being developed into a resort centre is that of Bekalta, where touristic zones have been declared and subsequently developed on former agricultural and saltwort plains.

Further south, towards the Gulf of Gabes, extensive salt crystallizing basins may be found. Apart from characterizing the coastal landscape, these huge salt pans are an important staging point for numerous waterfowl including the elegant flamingos, which abound in this region. Not far is the fishing town of Mahdia. Developed largely on a promontory, Mahdia has spread along the adjoining littoral, where modern harbour facilities have been constructed. Thus, while enhancing the socio-economic fabric of the town and its environs, the new promenades abutting the port area have significantly altered the natural shape of the coastline. The country's second largest city is that of Sfax. Located on the northern tip of the gulf, Sfax is often referred to as the door of the Levant. Largely a sprawling coastal city in present times, Sfax was developed as an important part of a system of coastal defence towns in the region as early as the 10th century. In view of the prevailing aridity, many of those who cultivate the surrounding barren landscapes are also skilled fishermen and craftsmen, as a result of which, the coastal landscapes around Sfax are subjected to a multitude of uses. The harbour is characterized by vast commercial facilities and ancillary services, together with numerous industries of which some are deemed obnoxious. The vast hinterland comprises kilometres upon kilometres of olive plantations.

The Gulf of Gabes is located south of Sfax, where the shores of the embayment stretch for over five hundred and seventy-five kilometres, from Cap Kaboudia to the Libyan border. The gulf, formerly known as *Syrtis minor*, harbours within it a series of shoals, mudflats, rocky outcrops, islets and the island of Djerba. In the distant past, seafarers ventured into the seas of the embayment with trepidation due to the numerous shoals that made navigation difficult. As a consequence to the relatively poor soils, locals depend essentially on fisheries within the region's natural basin, although cultivation is nonetheless still practiced.

The coastal landscape within the gulf is characterized by a significant tidal range, unlike other locations within the Mediterranean (with the exception of some parts of the Adriatic). The formation of numerous mudflats is, therefore, very much in evidence within the Gulf of Gabes.

3.2 The Cap Bon peninsula

Cap Bon lays on the north-north-east segment of the country, forming an appendage that projects onto the central Mediterranean into what is geomorphologically known as the Siculo-Tunisian sill. The extent of the promontory's land-area measures some 2822km^2, which is approximately 1.8% of the total land-area of Tunisia. According to the census of 2004, some 650,300 persons inhabit the Cap Bon region, a figure that amounts to around 6.6% of the total population, with the largest conurbations occurring on the eastern coast at Kelibia, Hammamet, Nabeul, Dar Chaabane, Korba and Menzel Temime. Other smaller but nonetheless significant population centres on or near the coast occur at Soliman, Takelsa and Maamoura.

A simplistic appraisal of the promontory in terms of its landform demonstrates an extended massif that lies dorsally across the central segment of Cap Bon; this is known as Jebel Abderrahmen (637 m amsl at its highest point), which extends from the region north of Hammamet, across the middle of the promontory, towards Azmou in the north. Generally, this massif occupies much of the central segment of the Cap Bon promontory and is bound by coastal plains and other low-lying landforms in at least three main regions. These are:

- the relatively broad plain around Soliman, which extends from near the inland Zaouiet Jdidi to the Sebkha de Soliman on the coast;
- the extensive eastern coastal plain that stretches from Hammamet on the southeast to Hammam Laghzaz, just north of Kelibia, on the northeast coast; and
- the wide Dar Allouch plain that occupies much of the northern segment of the promontory and extends, in-part, down the northwest coast to the region occupied by the Forêt de Oued Lâabid.

Other smaller but nonetheless significant massifs that occur within the Cap Bon promontory are Jebel de Korbous and Jebel El Haouaria. The former lies on the coast, generally between Forêt de Oued Lâabid and Sebkha de Soliman on the western littoral of the promontory; the latter is located on the northern-most point of the promontory, just beyond the town of El Haouaria. A point worthy of mention is the fact that Jebel El Haouaria is a particularly important locality during spring avifaunal migration, primarily for raptors.

Many thousands of birds of prey, including eagles, buzzards, harriers and falcons, soar over Jebel El Haouaria in considerable number as they converge on Cap Bon every year during spring passage, before they undertake the seaward crossing towards Pantelleria and onto Monte Ciccia in Sicily during their northward journey. Thus, this locality is of regional, perhaps international, importance given the numbers of raptors that utilise this area for migration and any drastic changes on the landscape through, for example, (i) accelerated urbanisation and increased urban footprint; (ii) large-scale open-pit mining; (iii) significant changes in the hydrology that may lead to changes in vegetation distribution patterns; or even (iv) considerable discernable disturbance (noise – vibration – emission) during peak migration, may have a dramatic negative influence on bird movement across this region.

As much as two thirds of Tunisia territory is cultivated and the same can be said for the Cap Bon peninsula, although it also harbours a great deal of tourism-related amenities, particularly on the coast. Indeed, the urban footprint is particularly dense in a number of locations along the littoral of the peninsula, in particular, in Hammamet, Nabeul, the coast between Beni Hkiar and Maamoura, as well as a number of other localities which were deemed conducive to tourism development. In general, the coastal landscape is quite varied, with extensive tracts of cultivated land together with considerable areas colonized by semi-natural assemblages and/or used for pasture. These, together with the cultural element that includes the contemporary urban footprint and the numerous historical monuments, form a mosaic that characterises the Cap Bon landscape.

Habitat-wise, a number of interesting elements occur throughout the peninsula as a result of a varied geomorphology and geology. Landforms at Cap Bon include an array of formations that range from sheer seacliffs and boulder scree formations to sloping rocky shores, shores comprising pebble and sandy formations, clay-dominated undulating hills and coastal plains, all of which provide habitat for a range of communities and assemblages. Some of the major biotopes that occur within the promontory include the various garrigues and low matorrals bearing various communities – noteworthy amongst which are the Thermo-Mediterranean and pre-desert scrub assemblages (in particular, Palmetto brush: *Chamaerops humilis*-dominated formations and *Sarcopoterium spinosum* phryganas), the *Tetraclinis articulata* biotope and the oak and juniper dominated woodlands, among others. Various other specialised coastal biotopes and geomorphological entities of both scientific interest and importance occur within the peninsula, which contribute towards the formation of the particular coastal landscape that occurs at Cap Bon. These include:

- coastal dune fields with accompanying pocket and linear beach formations (the latter formations function as "resting" zones for sand grains involved in aeolian processes, so crucial for foredune development and sustenance);
- perennial and seasonal *oued* systems, important not only as habitats in their own right, but as water run-off conduits and agents for sediment conveyance and deposition;
- offshore sandy/gravel formations such as sandbars, spits, tombolos and mudflats, some of which facilitate the creation of immense coastal lagoons;
- wetlands, including saline marshlands, transitional coastal wetlands and freshwater marshes.

Apart from the geology and the geomorphology, the formation of the landscape is also dependent on other factors, not least climate and hydrology. The climate of the Cap Bon region is, as expected, Mediterranean by its very nature, experiencing dry warm summers and mild wet winters. However, the promontory represents climatic variation that demonstrates substantial difference between different areas of the promontory. These micro-climatic regimes, which result from Cap Bon's geographic orientation as a peninsula surrounded largely by the sea and the presence of the massif Jebel Abderrahmen, have, over time, helped shape the landscape of present-day Cap Bon. At least three micro-climates, and variations thereof, have been identified, these being humid, sub-humid and semi-arid.

As outlined above, a number of physical factors play a significant role in shaping the micro-climatic regimes throughout the promontory. As a consequence, the distribution of land-uses and the patterns these create within the landscape matrix are testimony of this. These factors include relief, prevailing onshore winds, geology and soils, as well as hydrology, that latter of which is discussed below. The watershed patterns of the promontory are largely determined by the Jebel Abderrahmen massif and its associated relief. At least 15 distinct catchment zones can be identified, draining an immense volume of run-off towards the littoral via the numerous *oued* systems that bisect the region. The principal systems that drain the promontory are Oued Bézikh, Oued Laâbid, Oued El Magaïez and Oued Tabouda on the western coast of Cap Bon, and Oued Hajjar, Oued Tafekhsit, Oued Lebna, Oued Chiba and Oued Bouliedin on the eastern coast, where a substantial number of sandy beaches, chotts and sebkhas occur.

Some of the more important biotopes that are closely associated with coastal watersheds are sand dune systems and wetlands. A number of these exist throughout the Cap Bon promontory, with the majority occurring on the eastern coastal plain. From the conservation point of view, these important coastal habitats should not be protected and managed in isolation, since they form part of a broad system of coastal conservation areas. Not only are they often physically connected through the dynamics that govern such geomorphological entities, but are also linked on a biogeographical landscape scale as a result of the linkages they form across the vast terrain comprising not just Cap Bon and the immediate Tunisian coast, but the very important biotopes that stretch across the Maghreb, such as Lac Ichkeul, Lac Tonga (El Kala) and others. This is precisely why it is crucial that biotopes and

their immediate surroundings are not seen in isolation but rather as part of a landscape matrix that includes both natural and cultural dimensions, since people and their activities are very much part of the Mediterranean landscape and therefore part of the equation.

Some of the sites that were visited during the course of this present assignment exhibited characteristics typical of prime coastal habitats that require broad-scale conservation efforts rather than piecemeal protection largely due to the interconnectedness of these coastal biotopes. These wetlands and dunes provide a system of wildlife corridors at varying landscape scale for a wide suite of different faunal forms, which could use these habitats and the cover they provide as staging points during migration as also, depending on species, for foraging, hunting and movement across the terrain. The various habitats perform the function of wildlife corridors and other such linkages, so badly needed in numerous areas throughout coastal regions where the human footprint has grown considerably; in order to serve as a medium for connectivity between existing pockets of ecologically important habitats and biota.

In ensuring connectivity it would be further envisaged that ecological linkages meet the needs of different movements (e.g. foraging strategies, seeking shelter, etc.), spanning different scales, of the various organisms that colonize a particular coastal landscape. In essence, it is crucial that physical linkages within such landscapes (which have been modified as a result of human activity) provide sufficient space and material assets for individual species to move and obtain what resources are required at different stages of their life cycle. Clearly there is a need to develop a better understanding on the use of connectivity at different scales by different species as a result of the complexity of the natural world and its associated ecological processes that operate at different spatial and temporal scales.

Some of the habitats encountered include the saline sebkha of Maamoura that is interconnected with the marshland at Tazerka and Korba; the latter comprises an extensive system of wetlands that occur immediately behind an exceedingly wide sandy beach that is backed by a series of embryo coastal dunes as well as what appears to be a dunal remnant. Such dunal remnants may be the result of decreasing sediment discharges by fluvial systems in the vicinity. Dunal biotopes of varying dimension may be noted in a number of localities throughout the promontory, as indicated earlier, especially on the eastern coast, and very often, these are associated with wetland habitats ranging from freshwater marshes to saline sebkhas. At Plage Menzel Horr, where a sizeable beach exists, the dune formation only supports a foredune colonized by the binder *Ammophila arenaria* (at the time of survey), a species typical of foredune formations, but no other species normally associated with this biotope were noted. Minor dunal formation is also present adjacent to Sebkha Dar Rebii and Sebkha de Bit El Assa, where the shoreline is characterized by mudflats and lagoon formations. Particularly large coastal dune formations, demonstrating high dune ridge development, are present at Hammam Laghzaz, where the dunes co-exist with a series of extensive sebkhas. These dunes are largely colonized by *Ammophila arenaria* on the foredune region, *Pancratium maritimum* and *Eryngium maritimum* on the subsequent ridges including the fixed dune, and *Retama raetam* and *Juniperus phoenicea* mostly on the consolidated dune region.

Another exceedingly large foredune formation occurs at Rtiba. This dunal component is, in relation to other dunes, quite mobile and is solely colonized by *Ammophila arenaria*. Its consolidated region further inland comprises a mix of planted species of trees and species of a remnant of the assemblage that once colonized the region. Species present at the time of survey included *Pinus halepensis*, *Pinus pinea*, *Acacia cyanophylla*, *Retama raetam*, *Myrtus communis*, *Pistacia lentiscus* and *Quercus coccifera*. The issue of planting trees on the consolidated dune, so close to the mobile foredune, impedes spatial inland development of the dune system. One positive feature of this particular dune system was the extensive *Posidonia* (seagrass) banquettes that formed on the strandline. These formations of washed-ashore seagrass remains act as barriers against wave surges; they absorb the energy of the force of the sea, thus reducing erosion and, as a consequence, protect the beach from losing sediment and retreating inland. In comparison to

the Rtiba dunes, the Oued Lâabid dunes do not attain the same height but are far better vegetated with *Ammophila arenaria* as a result of less mobility of the foredune; these dunes extend quite a distance inland and, in places within dune slacks, support humid zones.

One other most significant factor that has determined the shaping of the landscape over time is the anthropic element. The anthropogenic environment is another facet that requires serious consideration since the numerous artificial habitats that were created as a result of human intervention over time within the Cap Bon littoral and, indeed, throughout the promontory, are of paramount importance landscape-wise.

3.3 Developing a Typology for Tunisia and Cap Bon

The availability and accessibility of various datasets was evaluated during a meeting with the local management authority (APAL). In the absence of national widely digital datasets, the analysis has employed "freely" available spatial information using the methodology described in Section 3 to develop a typology. For geology, therefore, land-cover the GIS Africa product of AGI-ESRI are used while elevation data were derived from the SRTM-USGS (see Table 2). Data on climate at the national level was taken from the European Environmental Stratification (Metzger *et al*. 2005). The framework divides Europe into 84 classes based on topographic and climatic variables at 1 km^2 resolution. Finally the issue of scale remains an important challenge. Therefore, it is necessary that the developed framework is hierarchical. This will allow studies to be undertaken and comparisons to be made at different spatial scales in a way that for example local field data can be placed in the Mediterranean context. The system described herein is developed in a way that can be scaled up or down according to need.

Table B2: Attributes employed for Coastal Landscape Mapping in Tunisia and Cap Bon

	Climate[1,5]	**Landform**[2]	**Geology**[3]	**Land Cover**[4]
Tunisia	Medit. South 6	Lowlands	Quaternary recent deposits	Urban Areas
	Medit. South 7	Undulating (hilly) terrain	Pleistocene	Cropland
	Medit. South 8	Montane terrain	Tertiary (Oligocene-Miocene)	Pastureland
	Medit. South 9			Semi-Natural Areas
				Desert
Cap Bon	Semi-Arid	Lowlands	Pleistocene	Agricultural areas
	Sub-Humid	Undulating (hilly) terrain	Quaternary	Semi-natural areas
	Humid inferior	Montane terrain	Upper Miocene	Coastal wetlands
			Lower Miocene	Mosaic
			Calcareous deposits	

[1]According to Metzger et al 2005; In ascending order the numbers indicate higher July mean maximum temperature, [2]From USGS-SRTM [3,4] From the AGI-ESRI © Dataset [5] According to MedWetCoast (UNDP/GEF 2004)

Based on the attributes described in Table 2 a series of maps were produced for the Tunisian Coastal Zone (Figure 5) According to these maps the Tunisian coastal zone can be characterized as follows:

1. Urban coastal landscapes on quaternary deposits as, for example, in the region of Tunis.
2. Lowland coastal arable landscapes on Tertiary deposits as in the regions of Bizerte and Ariana.

3. Undulating coastal landscapes on Tertiary deposits as in the regions of Jendouba and Beja.
4. Mosaic coastal landscapes on Quaternary deposits as for example in the area of Cap Bon.
5. Lowland pastoral landscapes on Tertiary deposits in more arid areas such as Sfax and Medenine.

A more detailed characterisation and mapping took place for the Cap Bon peninsula. For this purpose the climate, geological and land-cover data were based on the Geological Map of Tunisia (1:500,000 scale), the Bioclimatic Map of Tunisia and the MEDGEOBASE respectively as provided in the MedWetCoast project report (UNDP/GEF 2004). These maps were geo-referenced and digitised with ArcGIS. For landform the study relied on the STRM data. As a result the following Landscape Types were identified (see also Table 3):

1. Undulating semi-natural landscapes: Found on rolling hills of Miocene geology these landscapes are dominated by semi-natural vegetation.
2. Undulating mosaic landscape: These units are found on rolling hills, calcareous substrate characterised by patchy semi-natural vegetation and agriculture.
3. Montane mosaic landscapes: Found on montane terrain these landscapes, which occur on calcareous and Lower Miocene geology, characterised by patchy semi-natural vegetation and agriculture.
4. Montane semi-natural landscapes: These units are found on montane terrain, on Miocene rocks, dominated by semi-natural vegetation.
5. Undulating agricultural landscapes: These units are on rolling hills over upper-Miocene rocks where agricultural practices are predominant.
6. Lowland agricultural coastal landscapes: Lowland pleistocene deposits where intensive agriculture dominates.

6a. Lowland semi-arid agricultural coastal landscapes Lowland pleistocene deposits where intensive agriculture dominates and where the climate is semi-arid rather than sub-humid as in Type 6.

7. Lowland semi-natural landscapes: Lowland pleistocene deposits where semi-natural vegetation is dominant.
8. Lowland agricultural coastal landscapes on Miocene rocks: Dominated by agriculture these units are found on upper Miocene rocks.
9. Coastal wetlands: Lowland landscapes on pleistocene deposits dominated by wetlands.
10. Semi-mobile coastal landscapes: Lowland landscapes on pleistocene deposits dominated by sand dunes.

Table B3: Main Coastal Landscape Types in Cap Bon, their main components and patterns

	Landscape Type	Location	Components & Patterns
1	Undulating semi-natural landscapes	Jebel El Haouaria, Korbous	Sclerophyllous and other semi-natural vegetation dominant, some agriculture
2	Undulating mosaic landscapes	West of Soliman	Mosaic with agriculture and sclerophyllous vegetation, discontinuous urban fabric
3	Montane mosaic landscapes	West of Grombalia	Mosaic with agriculture, sclerophyllous vegetation and forests
4	Montane semi-natural landscapes	The plateau of Sidi Abderrahmane	Predominantly forested landscapes
5	Undulating agricultural landscapes	Takelsa	Hilly landscapes dominated by agriculture, discontinuous urban fabric
6	Lowland agricultural coastal landscapes	Kelibia, Dar Allouch	Agriculture dominated, Discontinuous urban fabric, wetlands
6a	Lowland semi-arid agricultural coastal landscapes	Grombalia, Korba, Tazarka, Maamoura	Agriculture dominated, Discontinuous urban fabric, wetlands
7	Lowland semi-natural landscapes	Oued Laabid	Forests and coastal sand dunes
8	Lowland agricultural coastal landscapes on Miocene rocks	Douar Ez Zedine	Agriculture dominated, Discontinuous urban fabric
9	Coastal wetlands	Extended from Maamoura to Kelibia	Includes marshes, transitional coastal wetlands, freshwater marsh and sebkhas
10	Semi-mobile coastal landscapes	Oued Laabid, Dar Chichou	Extensive dune fields

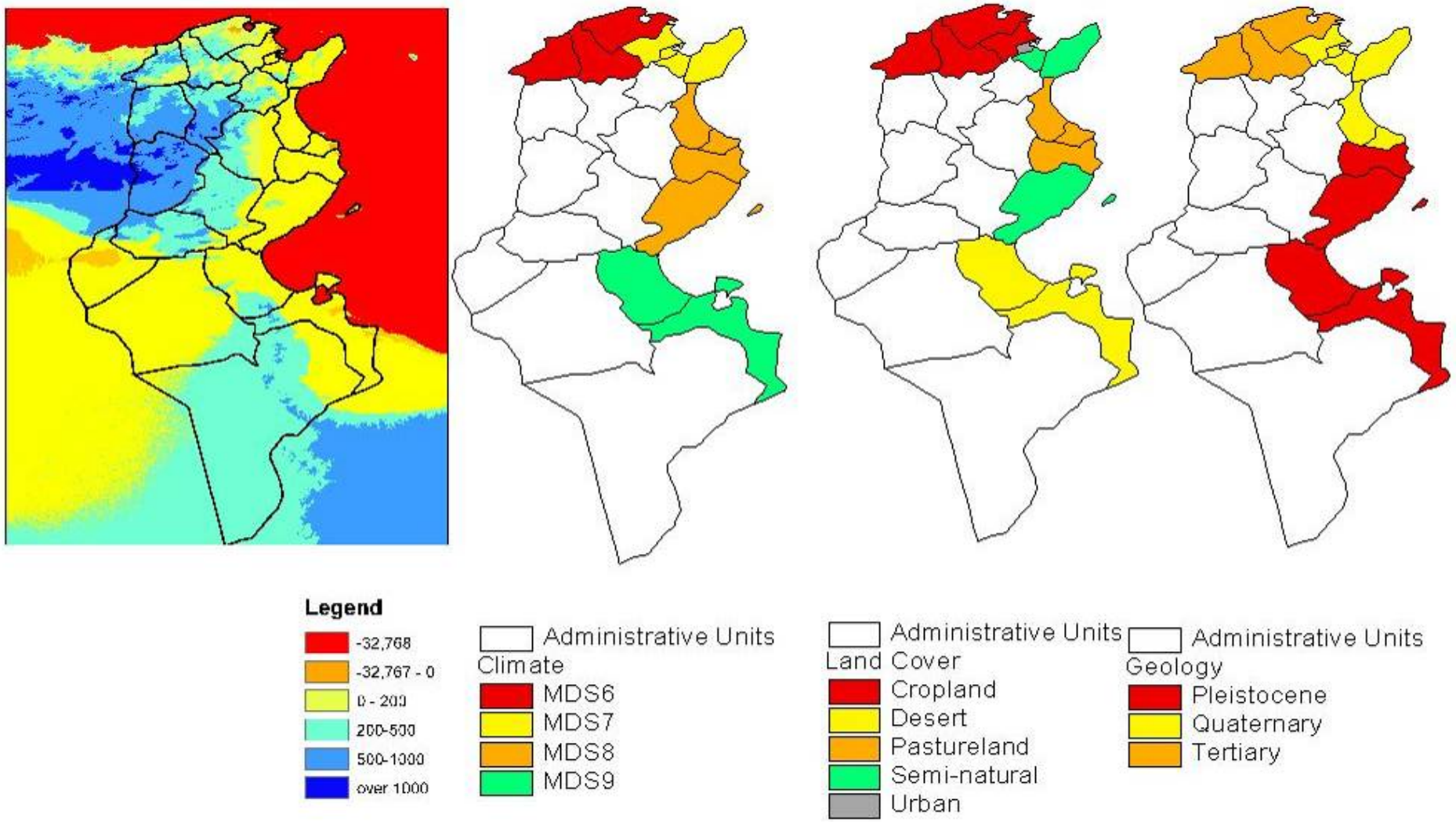

Figure B4: The character of the administrative units bordering the coast in terms of landform, climate, geology and land-use. These maps of variables can be used for developing a landscape Typology (see Table 2)

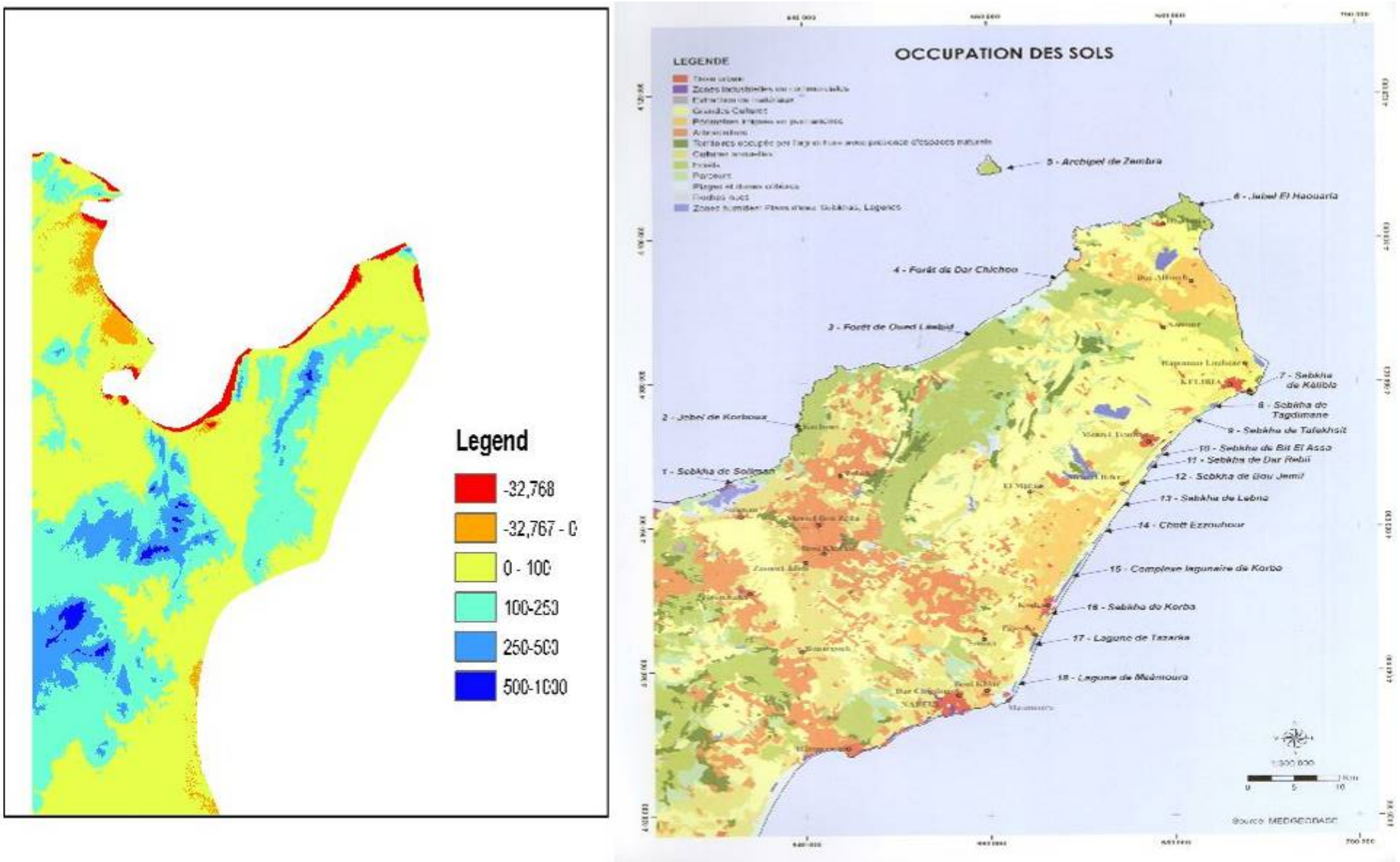

Figure B5: Landform and Land-cover units in the Cap Bon peninsula. Land-cover source MedWetCoast (UNDP/GEF 2004)

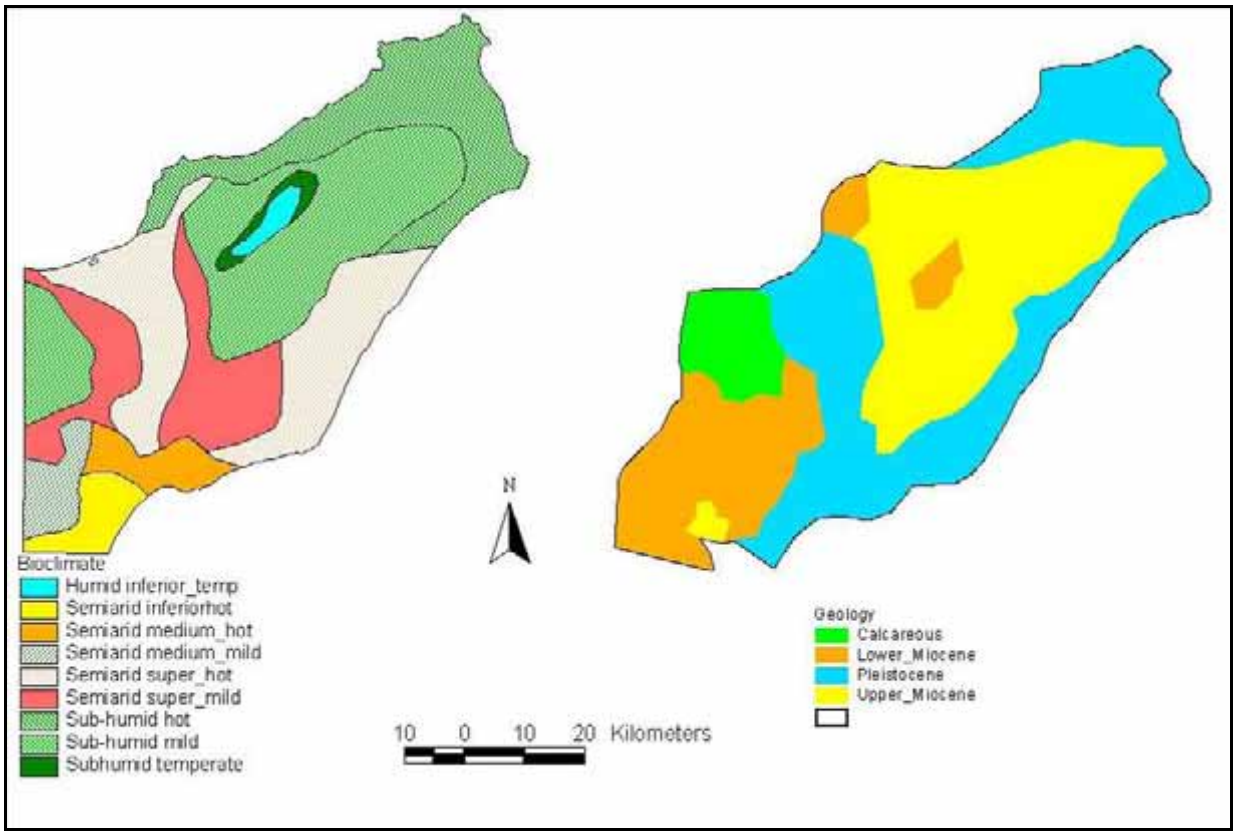

Figure B6: Bioclimate and Geology units in the Cap Bon peninsula. Modified from MedWetCoast (UNDP/GEF 2004)

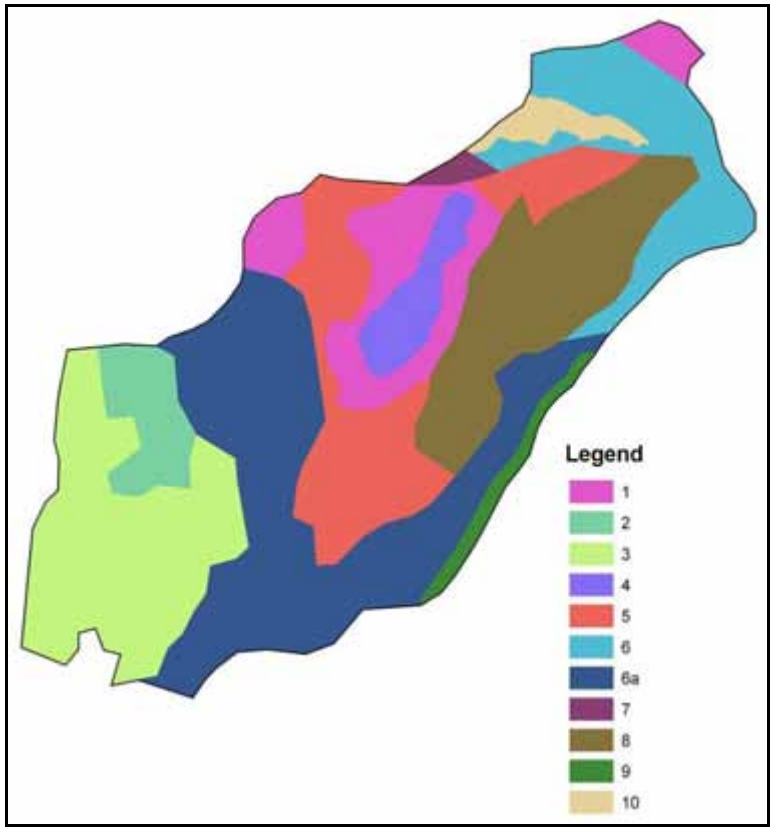

Figure B7: Landscape Types in the Cap Bon peninsula. Legend numbers follow Table 3

3.4 Pressures, impacts and risk

One of the more significant aspects of human actions, in terms of induced landscape modification, is dam construction. The construction of dams across perennial *oued* systems not only alters the hydrology and drainage configuration of an entire region, but also the pattern of water infiltration and the distribution of vegetation, as also changes in sediment conveyance and deposition. The latter will, more often than not, result in a dramatic decrease in sediment loads, which will subsequently negatively influence aeolian process on the strandline.

The fact that sediment gets entrapped behind dam constructions essentially equates with less material reaching the coast via *oued* systems that act as water run-off conduits. Thus, the offshore zone, where sand material gathers before longshore drift conveys suspended sand grains to the strandline, will become depleted of sand over the short-term. As less sand accumulates on the strandline the beach sediment budget will experience a prolonged phase of attenuation, which will consequently influence the rate of foredune build-up that is expected to decrease over time.

Long-term negative beach and dunal budgets will hence result in sediment loss and an overall sustained deficit, which will trigger off a variety of processes that will lead to accelerated erosion of coastal sands. Every beach and dunal component will experience sediment losses demonstrated by a severe loss of mass, blow-out formation and dune ridge deflation. As dunal sand is eroded away, stenotopic vegetation that thrives on this specialised environment will find survival difficult as a result of exposed root systems and will therefore begin to decline spatially along the dune lines. As floral cover decreases, more sand is blown away by the wind as stolons and other rooting systems, known for their sand stabilizing properties, wither away. Dunal vegetation is of vital importance in coastal dune formation, as plants that are adapted to thrive in these austere maritime conditions not only function to stabilize sand grains within the formation with their elaborate rooting system, but also act as an interception medium for *saltating* grains as well as those grains moving across the dune surface by *surface creep*. As this vicious circle of events comes about, more and more sand is lost consequent to accelerated erosion.

A sustained absence of terrestrial material, which would have been subsequently re-worked by marine processes and conveyed to the strandline via longshore drift, will eventually lead to beach-line retreat and dune-field attenuation. The coastal landscape will thus experience considerable physical change due to an overall collapse of morphological processes as the system becomes less dynamic; a continued lack of sand will lead to deflation of dune ridges, a change in the micro-hydrology of individual dune ridges, and, subsequently, to the consolidation of the sand, which will induce a suite of ruderal flora to colonize entire tracts in place of dunal vegetation. As this takes place, essentially two processes, independent of one another, are expected to get underway: one is that of accelerated erosion, and the other is that of rapid degradation of ecological assemblages. As indicated above, such drastic change in the dynamics of aeolian processes will bring about not only changes in the coastal landscape but also issues of a socio-economic nature as, for example, enhanced erosion of the coastline causes the abandonment of housing units constructed on sandy substrate (see below).

In addition to induced landscape change brought about by processes outlined above, dam construction itself generates two most significant changes in the landscape with which a number of pressures are associated. The first is the visual aspect through the large-scale use of reinforced concrete across perennial *oued* systems. The dam *per se* together with its ancillary facilities and infrastructure, including the introduction of shrubbery (often using fast-growing alien species or indigenous species that are planted outside their ecological context) for landscaping and embellishment purposes, creates an immense impact upon the vista. Whereas the landscape, prior construction of the dam, would have consisted of a rural/semi-natural mosaic, the abrupt presence of a massive concrete structure

jars somewhat with the surroundings. Although the dam would have been constructed for the common good of local communities, in order to provide water for domestic and agricultural uses, people living in close proximity to where the dam had been installed would have developed, over generations, a sense of belonging with which they have close, often emotional, association. Therefore, any sudden drastic modification of the terrain would, indeed, have a negative socio-cultural impact on those who have developed 'ethnic' ties with the landscape surrounding their homes.

The second major change to the landscape is the creation of an artificial body of water following completion of the dam, which, more often than not, inundates huge tracts of land, converting it into a freshwater reservoir not unlike a lake. The impact of such an undertaking is colossal and comprises an overall influence that has bearing on socio-economic aspects (due to the loss of land and sometimes housing); on the hydrology (as a result of seepage); on ecological resources (through the total obliteration of habitats and biota as a result of inundation); and, on the landscape matrix *per se* (due to a change in land-cover and land-uses). A number of such dams occur on the Cap Bon promontory.

Other major alterations and modifications to the coastal landscape occur that one can ill-afford to ignore. In particular, these include the construction of saltpans and salinas; excavation of water canals across the terrain to convey waste or excess waters to the sea as at Sebkha de Bit El Assa where a water conduit carries freshwater in addition to waste water from village to the sea; and, the formation of temporary ponds and wetlands following excavations of the land, as a result of which, ponding occurs due to the accumulation of water run-off or inundations consequent to storm surges. Of course, one should not fail to mention the immense transformation of the landscape following large-scale conversion of vast tracts into cultivated land during historical times. Perhaps the biggest land-cover change of all times was brought about by the practice of agriculture, a revolution, so to speak, that commenced some ten to twelve millennia ago and that, to some extent, is still on-going, either in terms of cultivation or pasture. As rural Third World populations grew, so did the human footprint as people sought to increase levels of production in order to feed more mouths.

In the case of Cap Bon, agriculture is predominant even if the tourism sector has grown enormously during the last decades (see below) along the littoral of the promontory. Much of the interior of Cap Bon is either agricultural (where the terrain permits such practice) or natural/semi-natural, primarily where the topography is rugged. However, some of the rolling terrain around El Haouaria is, in places, stepped (not terraced). The coast, on the other hand, comprises a mosaic of land-uses together with a number of biotopes typical of coastal regions. Depending on the topography, a substantial portion has been converted to cultivated land or developed; largish areas that are not appropriate for cultivation are utilized for pasture. Large, flat plains are mostly cultivated for cereal or extensive olive plantations; more manageable parcels of land are utilized for kitchen crops and orchards. A case in point is the coastal stretch between Nabeul and Beni Hkiar, which is quite rural in character and mainly cultivated with olives and kitchen crops. In the region between Chaabeni and Menzel Horr, where the terrain comprises a mix of terra and loamy soils, and the landscape is mostly undulating, grazing appears to be common. Evidence of grazing pressures by sheep and cattle is manifested in the manner by which the numerous fig trees (*Ficus carica*) present are cropped at the base of the trunk and by the presence of a suite of ruderal species, notably *Diplotaxis erucoides*, among other species, which form carpets across vast tracts of trampled and grazed terrain. Areas nearby where these pressures tend to abate include the halophytic Chatt Ezzouhour, a seaward plain colonized by *Arthrocnemum macrostachyum.*

An apparent pressure on the coastal areas of the promontory is development, which manifests itself both in privately owned dwellings and extensive complexes for recreation and leisure; the latter industry is well established in Tunisia. Evidence of high density tourism development as well as closely packed domestic development close to the strandline occurs at various localities along the Cap Bon littoral. At Yasmine Hammamet, for example, an entire 'city' was

erected along the sea-front. This up-market development caters mainly for the discerning European market and not only comprises 5-star arrangements for accommodation but also boasts artificial beaches and yacht marina. The sand required for nourishing the beaches was acquired from the seabed when excavation works were being carried out during the construction phase of the marine. During fieldwork related to this present assignment, it was noted that the sand had experienced consolidation (owing to the fact that its presence in the locality was only due to the intervention of human agency), as a result of a lack of aeolian dynamics, and *Cynodon dactylon* was colonizing areas were sand had eroded away and formed shallow depressions, where ponding was evident.

In Hammamet proper, where culture, fishing, habitation (both ancient and recent), tourism and embellishment-related landscaping brush shoulders, certain safe-guards are adopted, although some domestic housing units along the seafront have been constructed rather close to the shoreline. Planning considerations and policies impose minimum distance requirements of 25 metres in urban areas and 100 metres in rural regions. However, given the lie of the land in some parts of the coast, for example, where low-lying sandy pockets predominate, such policy is rendered ineffective and construction on sandy substrate will interfere with the dynamics of deposition (not to mention problems of structural instability). Such circumstances are not limited to one town or another, but are relatively quite widespread. The coast between Hammamet and Nabeul, for instance, is somewhat homogenous where coastal tourism development is concerned, as is the coastal region between Beni Hkiar and Maamoura.

Other implications, with far-reaching consequences, include the influence of climatic change that is expected to manifest itself in sea level rise, among other. According to the latest IPCC (Intergovernmental Panel on Climate Change) report, the sea level is estimated to rise between 28 centimetres and 43 centimetres (even if previous estimates anticipated a rise of up to a metre). Sea level rise will in actual fact threaten low-lying areas of the Mediterranean and all those regions within Cap Bon that have, over the last decades, experienced construction close to shore, primarily on sandy areas and wetlands (as is evidenced in Soliman and its surroundings), will be among the first to be subjected to the influence of accelerated erosion by the sea.

Another human activity which exerts a negative impact upon the landscape, both visually and for physical reasons outlined below, is the disposal of domestic waste and building debris. Undoubtedly, the footprint of a specific site used for waste disposal encroaches upon coastal habitats, replacing ecological communities and geomorphological entities with homogenised and generally unstable substrate that does little to sustain complex ecological assemblages. As the waste footprint increases, further obliteration and/or degradation and displacement of species occurs as it promotes the replacement of equilibrium communities dominated by K-strategists by transient, labile and relatively less diverse floral assemblages dominated by r-strategists. The pre-existing coastal landscape thus becomes a mosaic of remnant patches and fringes interspersed with mounds of debris colonized by weedy species. Hence, the ecotones at the boundary between mounds of domestic waste and other debris and remaining surrounding biotopes become superimposed by an opportunistic flora largely associated with disturbance and biotope degradation. Such areas and mounds of debris and waste may function as sources for colonization by invasive species, as degraded areas promote the establishment of propagule banks; adjacent relatively stable areas that harbour remnant communities of the original biotope may thus function as a relative sink.

Unconsolidated substrates and waste materials are known to generate fugitive emissions, including fine particulates that are subject to wind and water assisted transport. Although particulate emissions are expected to contribute little to landscape change, their indirect impact on adjacent habitats and agricultural land may play a role in changing the patterns of natural vegetation and land-use. As particulates enter adjacent habitats, this may induce alterations of soil *p*H levels, which in turn may influence the solubility of various nutrients and the rate at which these are absorbed by vegetation. Increased fallout of particulates may coat the

photosynthetic organs of plants leading to reduced incidence of light on plant surfaces, with subsequent reductions in photosynthetic efficiency. Moreover, the inherent instability of unconsolidated material promotes high sediment loads in surface water runoff following heavy precipitation. The terminal sinks for redistributed particulates by surface runoff include the surrounding biotopes, agricultural land and the marine environment. Likewise, leaching of soluble materials contained within domestic waste sites would be expected to disperse various chemicals throughout adjacent environments, including the marine environment. As outlined above, such emissions may contribute towards changing patterns of natural and semi-natural vegetation as well as potentially lead to agricultural land abandonment, all of which will result in landscape change of one form or other.

Another form of human activity, often related to the disposal of waste, which has the potential of inducing changes in the landscape matrix, is fire. Apart from the generation of various pollutants arising from combustion and the generation of particulate and gaseous emissions that would lead to the deterioration of air quality downstream, torching of extensive tracts of terrain will destroy vegetation as well as any immobile or slow-moving fauna. Fires would also displace mobile fauna due to localised increase in temperature and decrease in oxygen concentrations, as well as generate ash deposits that may influence soil quality.

Associated with waste, but generated from ships, is the issue of flotsam. Ship-generated garbage, consisting mostly of plastics and other synthetic materials (including bits of nylon rope and polystyrene) in addition to naphtha, is another element that requires careful consideration both in terms of visual impact and direct harm to fauna at sea and on the coast. Marine turtles in particular are frequent victims (through entanglement with fishing lines and nylon ropes or by swallowing polythene bags that are mistaken for food sources), while numerous species of vertebrates and invertebrates foraging on beaches and coastal dunes are known to become entrapped in plastic containers washed ashore. Although the presence of flotsam was not observed to be acute along the Cap Bon coastal region during the time of survey, other locations in Tunisia, such as Zouaraa and Berkoukech, on the north-eastern coast, are extensively affected. These sites are subject to on-going beach-dune erosion research and have been visited on a regular basis for the last seven years, where it was noted that ship-generated waste, regrettably, forms part of the coastal landscape of these areas in view of the vast quantity of plastics washed ashore and carried considerable distances inland by storm surges.

Another human activity that has led to a change in the landscape is afforestation, that is, the establishment of plantations of varying dimension across tracts of terrain throughout the country. The Cap Bon promontory has not been spared in this regard and much of the area known as Dar Chichou has been planted extensively mainly with eucalyptus trees, pines and cypress trees. As indicated above, Dar Chichou is rather important as a staging point during the annual spring avian passage, as raptors among other groups converge on the promontory prior to cross the Siculo-Tunisian Channel towards Monte Ciccia in Sicily. From that point of view, therefore, there is no doubt that the planted woodland is of little importance. However, in view of the fact that many of the species used are either not indigenous or have not been planted in ecological context, the presence of such species of trees is expected to have an impact on the terrain, both on the micro-scale and on the landscape scale. In particular, as these trees shed their resinous leaves, the chemical properties of the surrounding top soil are expected to alter, consequently inhibiting the growth of any native understory vegetation and the natural development and regeneration of appropriate local biotopes that would have colonized the landscapes in the region.

3.5 Recommendations

This section provides with recommendations for the protection and development of the specific landscape types as identified in this report and summarised in Table 3. It is important to recognise that these recommendations deal with landscape components that are inter-linked and inter-related. Recommendations relating to one landscape component may have impacts on other landscape elements. Thus, for instance, allowing the abandonment of agricultural land in order to provide areas for re-colonisation by indigenous species and habitat restoration, may have impacts in terms of displaced rural populations and hence, urbanisation due to resettlement in urban areas. The recommendations below should therefore be holistically addressed and implemented through strategic planning at a regional or national level, with subsequent plans at the local scale.

3.5.1 Grazing (Landscape Types 1, 7, 8, 10)

- Grazing is an integral part of the Mediterranean landscape, and has been a key element in the formation of cultural landscapes over time. It is also of considerable socio-economic significance in certain areas, even today. Any restrictions on grazing should therefore be accompanied by adequate measures at the strategic level to ensure minimal social, economic and cultural impacts, notwithstanding that such initiatives would be difficult to implement. Such measures could include the provision of alternative economic incentives or the provision of alternate sources of income and resources.
- Designate appropriate areas where grazing may be permitted through specific zoning plans coupled with a two-pronged effort that focuses on environmental education and surveillance/enforcement. Such zoning plan would delineate areas of ecological/cultural importance where grazing activity should be restricted and other areas of lesser importance where grazing may be permitted but its effects monitored.

3.5.2 Urbanisation (Landscape Types 2, 6)

- Conduct a baseline study to identify ecologically important biotopes as well as any areas that may harbour assets of cultural significance and determine how best such resources may be protected and conserved through the setting up of appropriate policies that ensure long-term adherence of conservation measures.
- Control excessive construction and restrict such activity to those areas designated for development according to existing coastal management/local plan policies to ensure the conservation of coastal biotopes such as wetlands and sand dunes, as well as their adjoining landscapes which, more often than not, harbour cultural assets that include ancient fishing ports, coastal fortifications, walled cities including medinas and other coastal settlements, marabouts, amongst others.
- Develop a conservation-friendly culture through environmental education, which would promote a view of land as more than an economic resource to be developed, but as a holistic entity, the Mediterranean landscape, which is also important for a variety of non-economic purposes, not least a better quality of life for local inhabitants and an attraction typical of the region for visitors.
- Where constructions in undeveloped areas cannot be avoided for social and infrastructural reasons, all efforts should be made to ensure that such development has as restricted a footprint as possible and a contained negative influence on its surrounding landscapes is constructed in a sensitive manner and seeks to mitigate all negative impacts.
- Efforts should be made to safeguard against the development of shanty towns and other slum settlements, given that due to inadequate infrastructure including waste disposal facilities, these have a disproportionate negative impact on the natural and cultural landscape, as well as

considerable negative social and cultural impacts. Shanty towns may also have significant spill-over effects on surrounding areas.

3.5.3 Agriculture (Landscape Types 6, 7, 8, 10)

- Agriculture in the Mediterranean region is characterised by two contrasting trends: intensification of agricultural production, particularly in areas of population growth, and land abandonment in more marginal areas. The former is often accompanied by increased use of agricultural chemicals, including herbicides, pesticides and fertilisers. These have extensive and proven impacts on a variety of ecological components (to the detriment of some species and to the advantage of others), on hydrological systems (both freshwater and marine), and on human health. Wherever possible, the increased use of chemicals should be discouraged and more organic forms of agriculture promoted, if necessary through strategic incentives and disincentives.
- Agricultural intensification may also lead to freshwater pollution through over-abstraction of water for irrigation. In coastal areas this may lead to intrusion of saline water into freshwater aquifers, leading to an often irreversible decline in water quality. Water abstraction should therefore be strictly controlled and monitored while all necessary measures to ensure efficient use of water should be implemented. In particular, losses through evaporation and runoff should be minimised. Water quality in freshwater aquifers should also be regularly monitored.
- Land abandonment in more marginal areas may be seen as having both positive and negative impacts. On the one hand, it leads to degradation of distinctive cultural landscapes with aesthetic, social and cultural impacts, often accompanied by environmental impacts including soil erosion, rilling and gullying. On the other hand, the abandonment of cultivation allows regeneration and secondary succession to take place, providing valuable areas of semi-natural habitats. A strategy to address land abandonment must therefore be based on a holistic assessment aimed at identifying areas where abandonment should be discouraged (through a suite of incentives) in order to ensure the preservation of cultural landscapes and livelihoods, and other areas, particularly those close to adjoining natural habitats, where abandoned land can be colonised by a variety of species and assemblages. In the latter case, initiatives may also include the promotion of habitat restoration and re-creation through the use of indigenous species planted in ecological context. Species utilised should include those that form a canopy as well as those that form an accompanying understorey floral stratum.

3.5.4 Landfill (Landscape Types 6a, 9)

- The impacts of landfills are several and include: i) land-take and visual impacts, ii) contamination of environmental components, including soil, air, and water resources (notably perched aquifers, wetlands and seas as well as leachates into aquifers and contaminated runoff). Landfills are generally also unsustainable in terms of resource use and may lead to the proliferation of invasive weedy flora and vermin. It is therefore recommended that a general strategy be developed to encourage waste reduction, reuse and recycling, and to ensure that waste disposal facilities have minimal impacts on landscape and the environment in general. Where landfills cannot be avoided, these should be stringently managed and engineered to ensure that contaminants are contained and that impacts are hence restricted to the landfill site. The visual aspects of landfills can be addressed, to some degree, through sensitive landscaping and screening. The use of indigenous vegetation is therefore recommended to ensure blending with the environmental context.

3.5.5 Tourism (Landscape Type 6a)

- Whilst it is recognised that tourism is vital to the economy of many Mediterranean nations, the industry also has several conspicuous impacts on landscape. The construction of facilities and infrastructure in particular, has been a key component of coastal urbanisation, and recent trends towards addressing specific tourism niches (such as golf-related tourism), have resulted in

considerable negative impacts on the cultural Mediterranean landscape (together with a suite of negative environmental impacts). Achieving a balance between the economic necessity of tourism for many countries, and the safeguarding of resources which attract tourists in the first place, is no mean feat and necessitates strategic planning at the national level. This should be based on a philosophy that sees the safeguarding of resources and the growth of tourism as complementary rather than contradictory. Any tourism development that is not based on a sustainable view of resource use will inevitably have a limited life-time and will not be financially viable in the long term. This is particularly the case given shifts in tourism flows at an international level and the opening up of markets in other areas of the world which are now competing with the traditional "sun, sea and sand" tourism of the Mediterranean region. If the tourism product in the Mediterranean is degraded due to unsustainable resource use, the tourist now has alternative markets which can accommodate one's demands. Mediterranean countries must therefore seek to diversify their tourism product and to market elements which are specifically related to the Mediterranean, such as the considerable and unique natural and cultural heritage of the region. Moves towards eco-tourism, nature tourism and cultural tourism are therefore important in this regard and should be actively encouraged. The development of a master plan at a national level is therefore recommended. Furthermore, such a master plan should be part of a regionally coordinated strategy across the Mediterranean basin.

- All tourism-related infrastructure and activities should be developed in a manner that is sensitive to the cultural and natural context. The proliferation of tourism-related constructions that have no link with a country's identity (and that could effectively be located anywhere in the world) is of great concern, and in the long run, serves to undermine the viability of the tourism product. Similarly, the promulgation of activities which result in degradation of natural resources, or which are insensitive to the cultural context, will inevitably be short-lived, either due to the degradation of the product being marketed, or due to antagonistic relations with local inhabitants. Any tourism developments should therefore be rigorously assessed and subject to environmental impact assessments (EIAs) and social impact assessments (SIAs), which should, amongst other things, identify exhaustive mitigation measures for any negative impacts identified. The refusal of permission for tourism developments (zero-option) should also be actively considered in particularly cases, particularly where such developments will impact more pristine areas or where they may lead to sprawl and the growth of resorts that would lead to the further degradation of coastal landscapes. It should also be borne in mind that some categories of tourists actively seek out more remote areas of a country and that the development of resorts and tourist complexes, whilst possibly attracting some groups of tourists, will also result in the loss of other groups. The growth of such resort areas should also be contained due to the variety of negative impacts that these have on landscapes and the environment in general.

3.5.6 Recreational activities (Landscape Type 9)

- Some recreational activities, particularly those based around natural resources, can have considerable impacts on coastal landscapes. In the Cap Bon area, these include bathing and sea-sports, with associated facilities and infrastructure, as is common in most Mediterranean coastal regions. The recommendations made above with regard to tourism facilities and infrastructure are also relevant to other recreational facilities. Furthermore, specific coastal areas of particular value (such as wetlands) should be safeguarded from recreational activities. Alternatively, limited recreational activities may be allowed provided that these are not accompanied by the widespread development of facilities and infrastructure. Any facilities developed in protected areas should be limited in footprint and impact, and should as far as possible be completely reversible.

3.5.7 Fire (Landscape Type 10)

- Fire has a long history in Mediterranean landscapes and may be considered to be an integral process in the evolution of cultural landscapes. Fires occur naturally in the Mediterranean climate. Aside from naturally occurring fires, however, fire may also result from a variety of anthropogenic activities/processes, such as landfills, burning of vegetation for agricultural purposes, and deliberate actions such as arson. Particularly given climate change and predictions that the Mediterranean region will become drier, fire is increasingly a threat and deliberately set fires may easily spread out of control and result in the destruction of expanses of natural vegetation. Recommendations therefore include the strict control of activities that may lead to fire, primarily during drier months in areas where seasonal vegetation (e.g. grasses) is dry and prone to fire. This should also be accompanied by widespread educational campaigns and strict monitoring and surveillance.

3.5.8 Planting of/displacement by alien species (Landscape Type 9)

- The concept of "Mediterraneanism" has for centuries been conceptually linked to an identity based on particular floral species such as the olive (*Olea europaea*) and the lentisk (*Pistacia lentiscus*). Whilst such species are still widespread in the Mediterranean (e.g. *Olea europaea* in the Sahel region of Tunisia), a number of alien species are increasingly becoming dominant elements in the landscape. Some of these were deliberately introduced/are deliberately planted due to specific properties they harbour, whilst others were accidentally introduced or were introduced as ornamental species which subsequently escaped into the wild. An example of the former is the use of *Acacia* species in much of Tunisia; its properties as a relatively fast-growing species have resulted in its use in kilns for the generation of charcoal, and thus to the widespread planting of *Acacia* in several rural areas. Such plantations inevitably occupy a footprint that would otherwise be utilised by native indigenous species. At the same time, however, *Acacia* cannot be easily replaced by indigenous species, and it serves an important social and economic function. It is therefore recommended that areas of such plantations are contained, particularly in ecologically sensitive areas. Plantations can also be surrounded by a band of indigenous species, to ensure better blending with the ecological and landscape context.

3.5.9 Dune destruction (Landscape Types 9, 10)

- Coastal dunes represent one of the most threatened habitats in the Mediterranean. Sand dune systems in the region also form an integral part of the Mediterranean coastal landscape. They are severely limited in extent and harbour species, many of which are threatened, which are not found in other ecosystems in view of their specialist nature. Dune dynamics are also dependent on sediment systems across large watersheds, and the health of dunal ecosystems is therefore linked to activities occurring in areas much larger than the limits of the dunal habitat. This latter fact has been the prime cause of dunal degradation, as activities in the hinterland have increasingly limited water and sediment flows from inland to marine areas, resulting in less sediment being available for dunal processes and thus to negative sediment budgets and ultimately to beach erosion. Damming of river systems, in particular, has had a significant impact on dunal systems, as sediment is trapped behind dams and processes of siltation occur; not only is less sediment available for dunal systems, but water with a lower sediment load is also generally more erosive. The mitigation of such impacts is difficult, particularly where dams are large scale and of great importance for water harvesting and storage. Wherever it is possible to develop engineering measures to allow for the flow of sediments through dams, these should be implemented. Furthermore, the importance and vulnerability of dunal ecosystems should be recognised and these should be protected; protection should extend beyond the immediate boundaries of the dunal area to incorporate the watershed influencing dunal dynamics.

4. The need for a Coastal Landscape Conservation Strategy

4.1 Developing a policy framework – the notion of protected landscapes

There is a widespread recognition regarding the necessity to extend the reserve-based approach to enhance conservation through the management of the whole landscape, since the maintenance of ecological processes does not depend solely on tracts of land dedicated to conservation, but also on surrounding areas. An integrated landscape approach is appropriate in situations where protected areas are spatially sparse or relatively small and therefore inadequate in guaranteeing effective long-term conservation. This is particularly relevant where human population density is high, where land-use is dominated by urbanisation and agriculture, and where the pressures on already dwindling natural habitats are intense. In such a scenario, conservation will essentially depend on the capacity to afford protection to species within cultural environments. The challenge, therefore, is to integrate biodiversity conservation with the sustainable management of land and its resources. Planning at broad spatial scales for conservation is an essential aspect of an integrated landscape approach since the principle goal is to achieve conservation aims within the context of a mosaic of land-uses. The imposition of a planning regime will bring about a strategic, forward-looking approach to conservation, as opposed to the reactive response to managing land-use. A broad landscape-scale perspective is fundamental for the planning process to take into account the wider ecological and cultural processes that shape and alter the environment in a given area such as Cap Bon and other similar location in the Mediterranean.

In order to deal with the various constraints that arise from the loss and fragmentation of landscapes and habitats, a number of actions may be considered, essentially as a response to restore connectivity (linkages through aspects of wildlife corridors) and enhance nature conservation, principally through the notion of protected landscapes. The issue pertaining to the role of connectivity in conservation planning and strategy is central to the concept of protected landscapes and needs to be addressed at policy framework level. The recommended responses below primarily aim to improve the conservation potential of individual habitats without, however, straying from the significance of utilising linkages within a concept of protected landscapes. These are:

- Enlarge the extent and range of protected areas and declare and/or restore other adjoining or nearby tracts with existing potential. Substantially larger tracts of habitat are more likely to support self-sustaining populations of flora and fauna (Bennett 1999). Increased habitat extent also enables an area to maintain greater species richness, support fuller assemblages and communities, and sustain ecological processes (Forman 1995). Protected areas should not be isolated from their surrounding landscapes, nor from surrounding land-uses. Indeed, one should be promoting protected landscapes that form an integral part of a wider matrix that includes nature, a semi-natural topography and a significant cultural dimension, which harbours activities that are both conducive to conservation, like some aspects of agricultural activities, e.g., retaining terraces and rubble walls, planting of archaeophytes, organic farming, etc., and some undeniably quite harmful, such as activities and development which lead to fragmentation, quarrying, uncontrolled use of pesticides, hunting and trapping, grazing, etc.

  Sites that are declared conservation areas are subject to a suite of pressures and impacts from their surroundings because of the spill-over effects of human activities. Moreover, protected areas rarely provide a balanced representation of ecological assets within a region. It is often argued that such areas were only set aside because, in the past, these were found or perceived to be least productive agriculturally or for some reason inaccessible for other economic or domestic activities. Hence, it is crucial to designate or design linkages that permit connectivity that is physical and as direct as possible between

different important habitats and adjacent areas that serve as buffers, and, where this is not viable, restore or create habitat that would, as a minimum, provide a stepping stone effect within the landscape matrix.

- Enhance the quality of existing habitats by allowing natural processes to go on, concurrently ensuring adequate protection measures accompanied by satisfactory enforcement. It is an accepted reality within the Mediterranean Basin that semi-natural landscapes are, more often than not, subjected to multiple uses, where nature conservation objectives need to be weighed against other, often conflicting, land-use intentions. Controls on land-uses to minimize environmental degradation are a necessity, especially where anthropic activities threaten to irreversibly alter a landscape or reduce its sustainability. In such cases, consideration of trade-offs may sometimes be necessary.
- *Contain anthropogenic impacts from surrounding areas and land-uses.* Anthropic activities are a source of major impact on ecological assets, especially where landscapes are heavily fragmented. A range of actions such as **micro-scale zoning** to control certain activities and land-uses near important habitats and communities as well as the setting up of **buffer zones** to minimize impacts and pressures from external factors, coupled by **management and monitoring programmes**, would help counter some of the effects caused by external disturbances.
- *Promote and maintain connectivity to counter the influence of habitat isolation.* The benefits of linkages are numerous since these assist movement and dispersal *(a)* during migration and for everyday life cycle requirements; *(b)* between fragments across inhospitable environments; and *(c)* that create opportunities for re-colonization following local extinction. Connectivity also assists in the maintenance of biological processes, in particular those that depend on animal vectors such as seed dispersal, pollination and predation. The concept of a linked system of habitats and landscapes should be seen in the context of an integrated approach to nature protection since multiple tracts of habitat that function as an interacting system are a more effective means of conservation than a similar but isolated set of habitat tracts (Bennett 1999).

In summary, the conventional approach to conservation has, for years, been based on the selection and management of sites as protected areas of one form or other. These areas normally fall within categories in which the conservation of nature is given high priority or in which conservation aims need to be balanced with various forms of land-use, on occasion even incompatible with conservation. Typically, the pattern of such protected areas is that of stand-alone, very often scattered, land parcels that represent a range of different communities and ecosystems. There has been a growing concern among conservation biologists that, on its own, protected area-based strategy will not suffice to ensure long-term conservation needs of biota and their habitats. The way forward, therefore, should be three-pronged:

- to increase the number and spatial extent of protected areas;
- to recognise the urgency to extend conservation boundaries with a view to include entire landscapes, embracing both natural/ semi-natural and cultural elements; and
- to ensure connectivity through a system of linked habitats and, where this is impractical due to distance or fragmentation, then restoration and/or habitat creation may need to be considered so as to secure some form of linkage.

Such strategy applies wherever human pressures have negatively impacted landscapes and the environment in general. Finally, it is augured that the concept of protected landscapes emerges as an ideal management framework; this is due to the fact that this management approach includes the human dimension as an essential part of an integrated system, with socio-economic and cultural concerns placed on a level footing with biodiversity conservation. The notion of protected landscapes brings conservation into the social arena because it specifically allows for human uses. In line with changes in the paradigm of protected areas, protected landscapes aim to protect 'for' and 'with' people. As a result, the concept offers a middle ground between conservation and development, providing a means for protecting biodiversity elements within a setting which also provides for sustainable livelihoods.

5. Annex: Photos

Section A: Landscapes

(i) Examples of coastal Tunisian landscapes

Photo B1: Dunal landscape at Berkoukech.

Photo B2: General view of the dune field at Berkoukech on the north-west coast of Tunisia, illustrating dunal re-orientation as a result of changes in sediment fluxes.

Photo B3: Coastal mosaic on the north-west coast of Tunisia at Bouterfess, illustrating perennial fluvial source, consolidated dune, estuary and pasture.

(ii) Coastal landscapes at Cap Bon

Photo B4: Coastal landscape north of El Haouaria.

Photo B5: Rural landscape at El Haouaria comprising fallow agricultural land used for pasture, with palmetto brush community dominated by Chamaerops humilis on the outcrop in the background.

Photo B6: The coastal medina at Hammamet, a locality of cultural value constructed in historic times.

Photo B7: General view of Yasmin Hammamet an upmarket large-scale development on the coast.

Photo B8: One of the numerous ecologically important wetland areas on the Cap Bon promontory. Such wetlands are important for avifauna, such as this wintering flock of flamingoes.

Photo B9: Agricultural landscape north of Nabeul, extending virtually to the shoreline.

Photo B10: Coastal mosaic: a landscape comprising sandy beach and dunes, semi-natural maquis, and planted pines, with pasture in the foreground.

Photo B11: Cultural heritage - ancient rural units alongside a culturally important grove of Olea europaea oleaster.

Photo B12: General landscape view of the coastal area at Korbus.

Photo B13: Extensive coastal dune landscape at Rtiba. A large plantation occurs on the consolidated region of this dune, which makes dunal development inland improbable.

Photo B14: Rural landscapes with high technology: wind farms installed on agricultural land at Cap Bon.

Photo B15: A view of the foredune at Hammam Laghzaz, where large dune formations occur, along with a series of extensive sebkhas.

Section B: Pressures, Impacts and Risks

(i) General Examples

Photo B16: Using brushwood to stabilize sand. The practice increases the risk of fire and also changes the microclimate on dune crests, apart from impeding the natural movement of sand.

Photo B17: Loss of agricultural land as a result of an artificial floodplain created following the construction of a dam at Zouaraa.

Photo B18: Acacia plantation on the consolidated dunes at Zouraa (north-west Tunisia).

Photo B19: Ship-generated waste: flotsam beached at Berkoukech (left) and Zouaraa (right).

Photo B20: Carpobrotus edulis, a prolific alien that is known to displace indigenous dunal vegetation on this important biotope.

Photo B21: The effects of accelerated beach erosion at Zouaraa, leading to strandline retreat and loss of sand material throughout the system, including beach and dunes.

(ii) Pressures, impacts and risk at Cap Bon

Photo B22: Upmarket tourist destination at Yasmin Hammamet. Note the promenade abutting the beach, and the close proximity of urban development immediately adjacent. The impacts on beach dynamics are evident.

Photo B23: Housing units constructed on the dunes. Not an uncommon sight throughout the coastal region between Hammamet and Korba. Apart from structural instability, this practice impedes dunal development.

Photo B24: Urbanisation encroaching upon the beach zone. This is a relatively common occurrence throughout the Cap Bon promontory. The use of the invasive Agave in this locality is evident.

Photo B25: Threat to wetlands. Urban dwellings encroaching upon the immediate banks of coastal wetlands on the Cap Bon promontory.

Photo B26: Expanding urban footprint around the coastal citadel of Kelibia, steadily encroaching upon agricultural land.

Photo B27: Hard landscaping, housing and infrastructure encroaching upon much of the coastal region at Kelibia.

Photo B28: Urban footprint encroaching on the shoreline and practically surrounding the coastal marsh at Kelibia. No doubt the ever-growing urban footprint will have a negative impact on the watershed of the wetland.

Photo B29: Urban belt around the foot of the Citadel of Kelibia. The urban footprint is increasingly spreading laterally along the coast, particularly given that the land area between the citadel and the shore is limited.

Photo B30: Hard landscaping on sandy substrates, a common occurrence in and around the coastal town of Soliman.

Photo B31: What future? Erosion collapse and instability of sandy substrates, where housing units were constructed on beaches at Soliman.

Photo B32: As the urban footprint expands at Soliman, dunal and wetland features decline. Much of the town that stands immediately adjacent to the strandline has been constructed on marshes and sandy beaches.

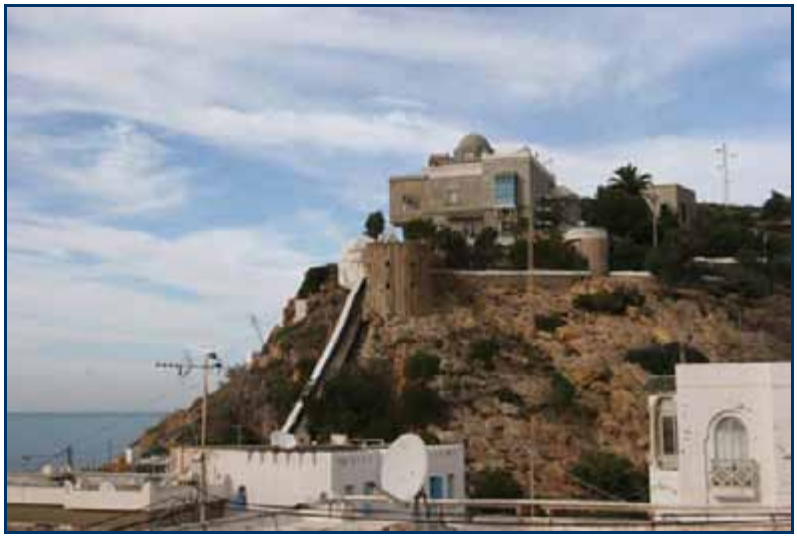

Photo B33: Extensive use of concrete in coastal localities near Korbus.

Photo B34: The effect of beach erosion: housing units practically on the water's edge as a result of accelerated erosion.

Photo B35: Land take: competition between coastal urban development and agriculture.

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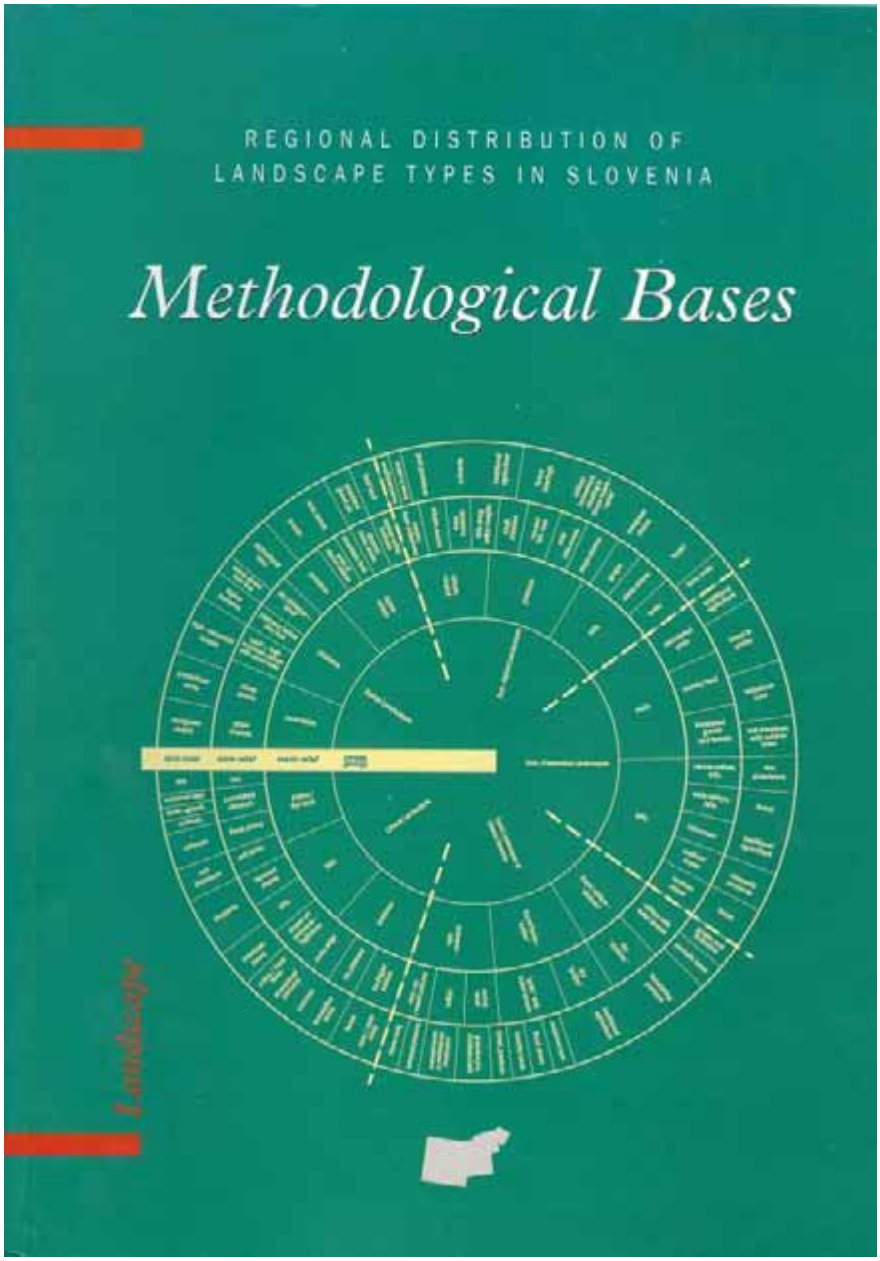

Regional Distribution of Landscape Types in Slovenia

Thematic Study **C**

REGIONAL DISTRIBUTION OF LANDSCAPE TYPES IN SLOVENIA

1998

Ministry of the Environment and Physical Planning
National Office for Physical Planning
and
Department for Landscape Architecture
Biotechnical Faculty
University of Ljubljana

Authors: **MARUŠIČ, Janez, Ph.D**., Associates: Blanka Bartol, Stanka Dešnik, Jelka Habjan, Jelka Hudoklin, M.Sc., Marjeta Jug, Alenka Kolšek, M.Sc., Dr. Nikolaja Kravanja, Saša Piano, Marsela Podboj, Marko Prem, M.Sc., Mitja Simič, Etbin Tavčar, Jelena Hladnik, Igor Zakotnik

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1. Summary

The study “Regional Distribution of Landscape Types in Slovenia” was made upon the order of the National Office for Physical Planning of the Ministry for the Environment and Physical Planning in Slovenia. The study was carried out by the Biotechnical Faculty, Department of Landscape Architecture of the University of Ljubljana. The study was prepared by Prof. Dr. Janez Marušič and Prof. Dušan Ogrin with numerous colleagues – landscape architects. It took several years to prepare the study, since there was a great deal of field and project work. It was concluded in 1998 and published in 6 thematic publications. The area dealt with was the entire Slovenia and thus all Slovene landscapes are typologically defined in the study.

The Slovene landscapes are divided into several typological groups at four different levels. Considering the basic typological classification of landscapes, the study deals with five main landscape areas in Slovenia, which are predominantly determined by climate. The climate varies with the distance from the sea and thus from the Mediterranean climatic influences, with the contact with continental Europe, and with altitude. The latter determines the Alpine climate region. The intermingling of these three main climate influences creates in the south the costal- sub-Mediterranean, in fact – landscapes, Alpine landscapes in the northwest, in the east sub-Pannonian, and in the central Slovenia sub-Alpine and Karst landscapes of the interior Slovenia. (Marušič, 1996)

The study “Regional Distribution of Landscape Types in Slovenia” has got special recognition in the framework of the European Landscape Convention that it was recognised the exemplary value of the work on the first selection of the Landscape award of the Council of Europe. On 23 September 2009, on 1066th Meeting of the Committee of Ministers’ Deputies of the Council of Europe conferred the Council of Europe the first Landscape Award, under the European Landscape Convention and gave special mention and recognition to some projects.

Six publications of the study “Regional Distribution of Landscape Types in Slovenia” include:

- **Methodological bases**: describes the project, the reasons for its creation, and the purpose and objectives of the project and presents the method of work, the results, and the useful value of the study;
- **Landscapes of the Alpine Region**: presents a typological definition and evaluation of landscapes and guidelines for them in the Alpine region;
- **Landscapes of the Sub-Alpine Region**: presents a typological definition and evaluation of landscapes and guidelines for them in the Sub-Alpine region;
- **Landscapes of the Sub-Pannonian Region**: presents a typological definition and evaluation of landscapes and guidelines for them in the Sub-Pannonian region;
- **Karst Landscapes of the Interior Slovenia:** presents a typological definition and evaluation of landscapes and guidelines for them in the region of the Karst of the inner Slovenia;
- **Landscapes of the Littoral Region**: presents a typological definition and evaluation of landscapes and guidelines for them in the Littoral region.

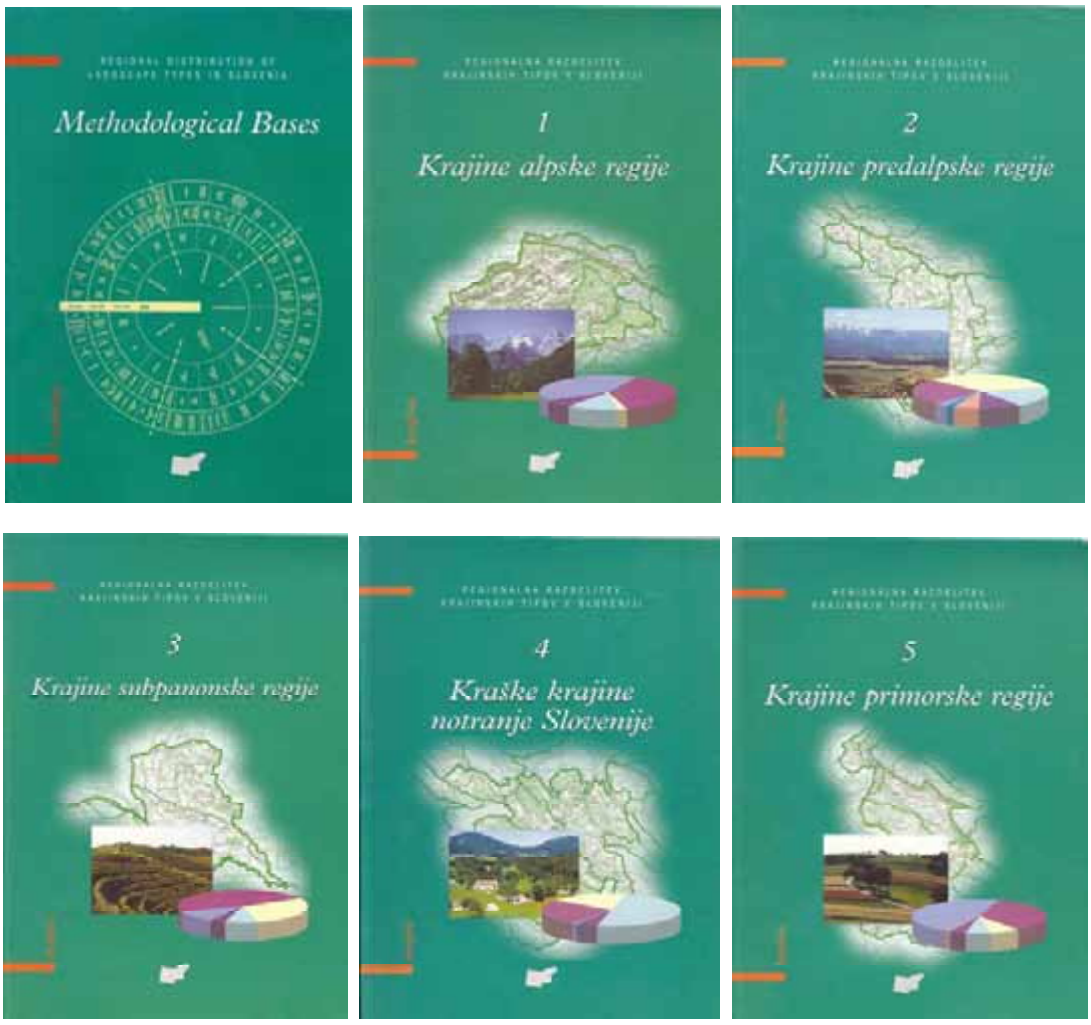

Figure C1: Covers of six publications (notebooks) of the study "Regional distribution of landscape types in Slovenia"

2. Introduction

2.1 Project Description

The project *Regional Distribution of Landscape Types* was carried out at the Department of Landscape Architecture at the Biotechnical University of the University of Ljubljana with the ongoing participation of representatives from the commissioning agent, the National Office for Physical Planning of the Ministry of the Environment and Spatial Planning of the Republic of Slovenia.

The project was inspired by the realisation that Slovenia is an extraordinarily varied and rich country in terms of its landscape types and yet, despite numerous monographs and special projects that deal with specific aspects of the Slovenian landscape, there has never been a complete picture of the landscapes of the contemporary Slovenia. In addition, the Slovenian landscape has changed considerably during the last ten years since the beginning of this project and it can be expected that as Slovenia continues to open to external markets, these changes will only increase. Anxiety over how to preserve the country's rich variety of landscapes is therefore understandable and was present prior to Slovenia's membership in the European Landscape Convention.

The project *Regional Distribution of Landscape Types* fulfils some of the goals of the European Landscape Convention: specifically Article 6 (*Specific Measures*), and Article 6.c (*Identification and Assessment of Landscape)*. One of the main tasks of the project was the creation of an extensive inventory of landscapes throughout the entire territory of Slovenia, an analysis of their characteristics, and the forces and limitations that have been impacting them.

This process sets the foundation for the continued monitoring of such changes while at the same time providing a professional evaluation of specific landscapes. The project has also partially contributed to the fulfilment of another sub-article of the Convention: specifically Article 6.a (*Raising Awareness* of the value of landscapes, their role, and the changes impacting them), and Article 6.d (*Landscape Quality Objectives)*, which in the framework of the project was carried out by experts on recognition and evaluation of various landscapes.

The aims of the project were as follows:

- to acquire as complete as possible knowledge of the characteristics and conditions of Slovenian landscapes;
- to acquire knowledge about development trends effecting various Slovenian landscapes;
- to categorise Slovenian cultural landscapes according to visual appearance;
- to prepare the basis for establishing direct protection of outstanding Slovenian landscapes;
- to prepare guidelines for landscape development and conservation.

The aims of the commissioning agent were wider and more detailed recognition of the variety and characteristics of Slovenian landscapes, the introduction of suitable forms of protection, and, where necessary, improvements of landscapes that have been degraded in the past. In addition to inventorying and categorising Slovenian landscape areas, an additional goal was the definition of development policies that would enhance these areas and prevent degradation. The underlying aim of the project, therefore, is the protection of the wealth and diversity of Slovenian landscapes and the introduction of methods of protection to the process of spatial and environmental planning.

The project also had several concrete objectives:

- to provide material for the national spatial development plan that was being prepared at that time (Spatial Development Strategy of Slovenia, adopted and in force since 2004);
- to facilitate landscape conservation policies through the specific definition of outstanding landscape areas;
- to encourage landscape conservation policies by increasing the level of knowledge about

landscape characteristics and evaluating the impact of various development activities;

- to provide practical instructions to those involved in land development activities or charged with issuing approvals for spatial development activities;
- to define general guidelines on appropriate conduct within specific landscape areas.

2.2 Working Procedure

The primary working method was field work. This comprised observing, recording, taking photographs of landscape patterns, and verifying previous definitions, e.g. definitions of regions and boundaries, classification hierarchies, etc. A format for these observations was established in advance and was later amended as needed. An attempt was made to standardise writing methods in order to create a uniform project report.

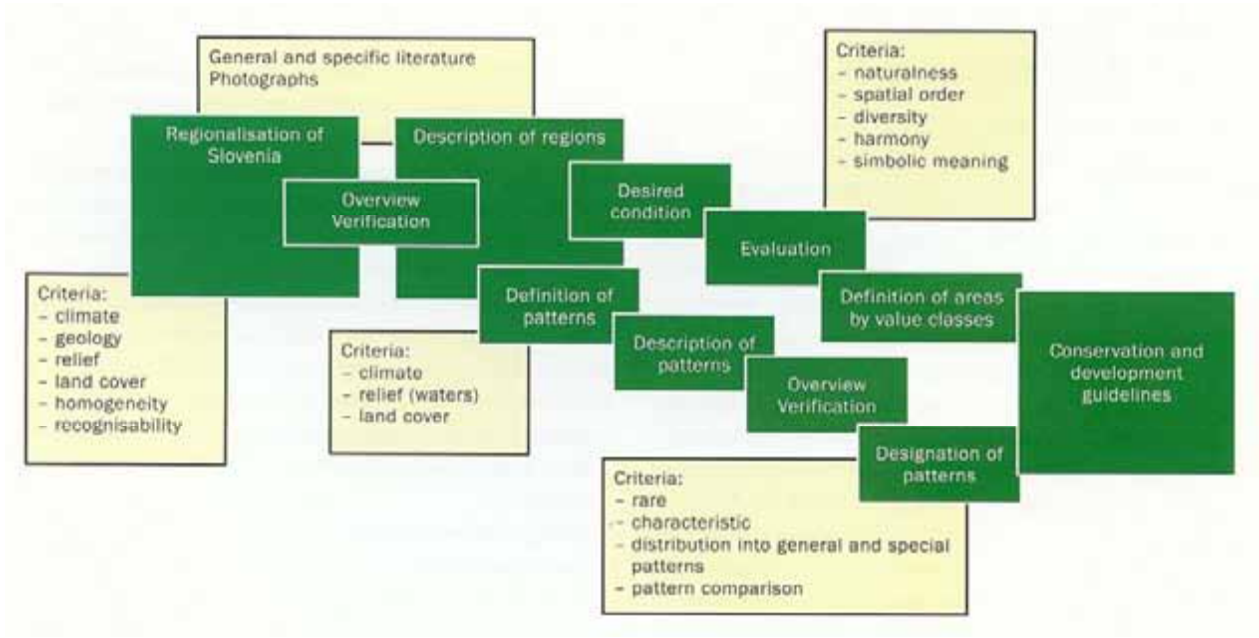

Figure C2: Working procedure

3. Landscape Regionalisation of Slovenia

The first step in the work process was the categorisation of Slovenian regions into broad landscape units. The foundation of this categorisation was the regionalisation proposed by the well-known Slovenian geographer, S. Ilešič. In general, Ilešič's categorisation complies with the proposals of other Slovenian experts, mainly geographers. In an effort to arrive at relatively smaller but more clearly defined units, we added an additional level to Ilešič's classification method. This was viewed as necessary because of the use of field work as the project's primary working method.

Though based on subjective assessments, the regionalisation process took into account the objective natural characteristics of Slovenia's various landscape areas. The first level of classification was based primarily on climatic and geological properties. The second level included the macro-relief criteria in addition to climatic and geological properties. The most important criterion of the last two levels was the landscape appearance or image. We required that the units at the lowest level share mostly uniform landscape characteristics, or at least less diverse basic typological patterns.

The landscape image of particular units was defined by landscape patterns. The landscape image – representing a certain spatial unit by being frequent, typical, or characteristic in identifying that unit – is described by a pattern with particular features. It was often not possible to identify only one pattern within a particular unit. Even a small and transparent landscape unit can be further divided into smaller sub-units. At some point, we often encountered difficulties in determining the concrete physical boundaries of the patterns.

Thus, a perfect fit between patterns and spatial units could never be fully achieved.

Nevertheless, regionalisation should generally express the image of spatial homogeneity within units. However, given the variety of patterns within a particular unit (each pattern being representative of the unit either because it is frequent, typical, or characteristic in identifying that unit), homogeneity becomes a somewhat relative term. Not surprisingly, it was not possible to have only one pattern associated with each individual unit. Within the framework of the project, therefore, homogeneity was defined as a joint domain belonging to a specific area that was perceived as being common to the unit, though it might consist of separate geographical areas. Thus if we were capable of making suitable generalisations or abstractions of particularities, we were able to perceive what was common and unified within a particular landscape. Within the framework of our subjective approach, such abstractions or generalisations allowed us to include a number of factors and landscape characteristics (or physical data) that otherwise might have been very difficult to collect and include in the formalised processing. Generalisation is expressed by the landscape unit characteristic.

The definition of a landscape unit is a unit with common landscape characteristics enabling the unit to become a potential conveyer of a large amount of information important to the planning tasks:

- describable characteristics;
- value designations and recognised potentials;
- proposals for protection and conservation of the unit;
- proposals for land management and development targets, activities, measures, and standards;
- typological designations.

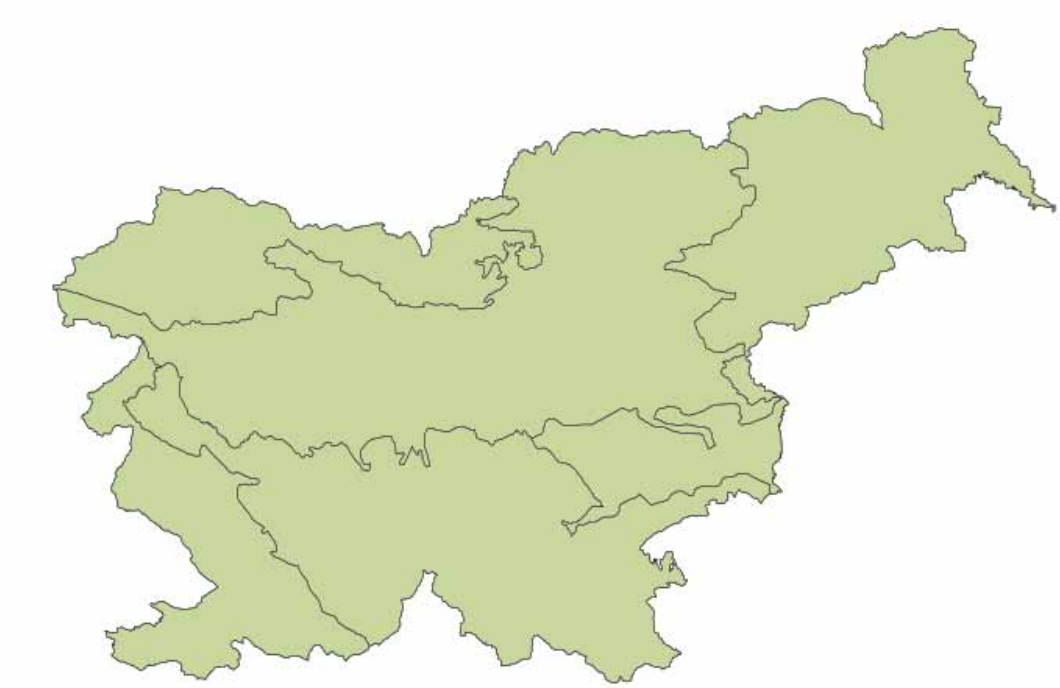

Figure C3: Landscape Regionalisation of Slovenia –level 1

Figure C4: Landscape Regionalisation of Slovenia – level 2

Figure C5: Landscape Regionalisation of Slovenia- level 3

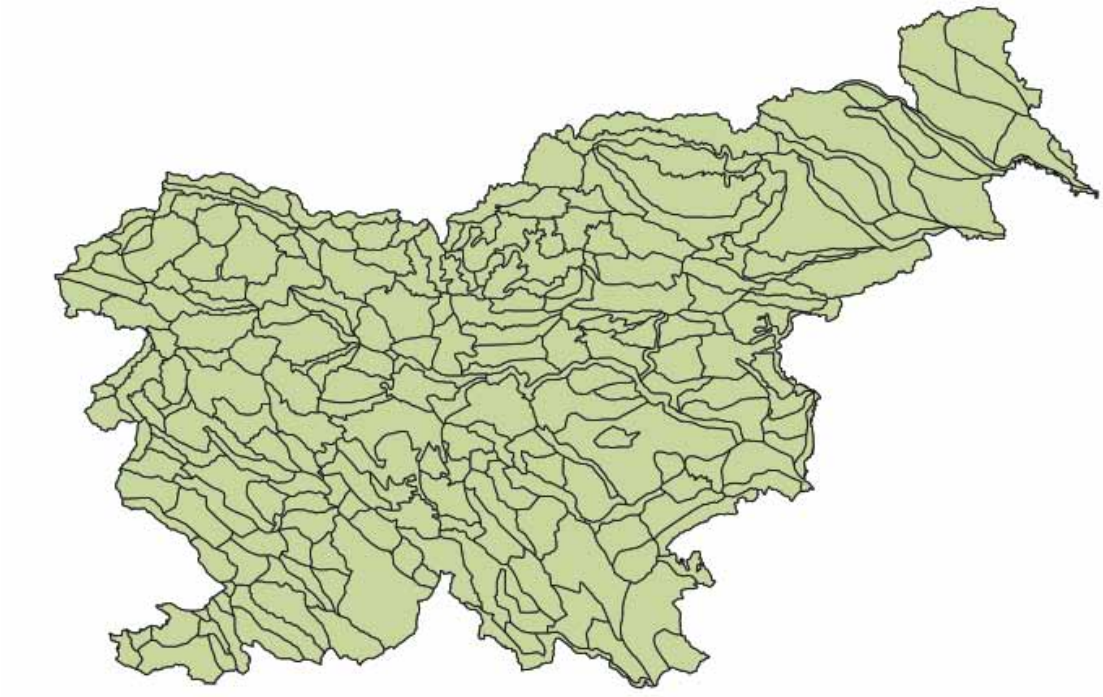

Figure C6: Landscape Regionalisation of Slovenia – level 4

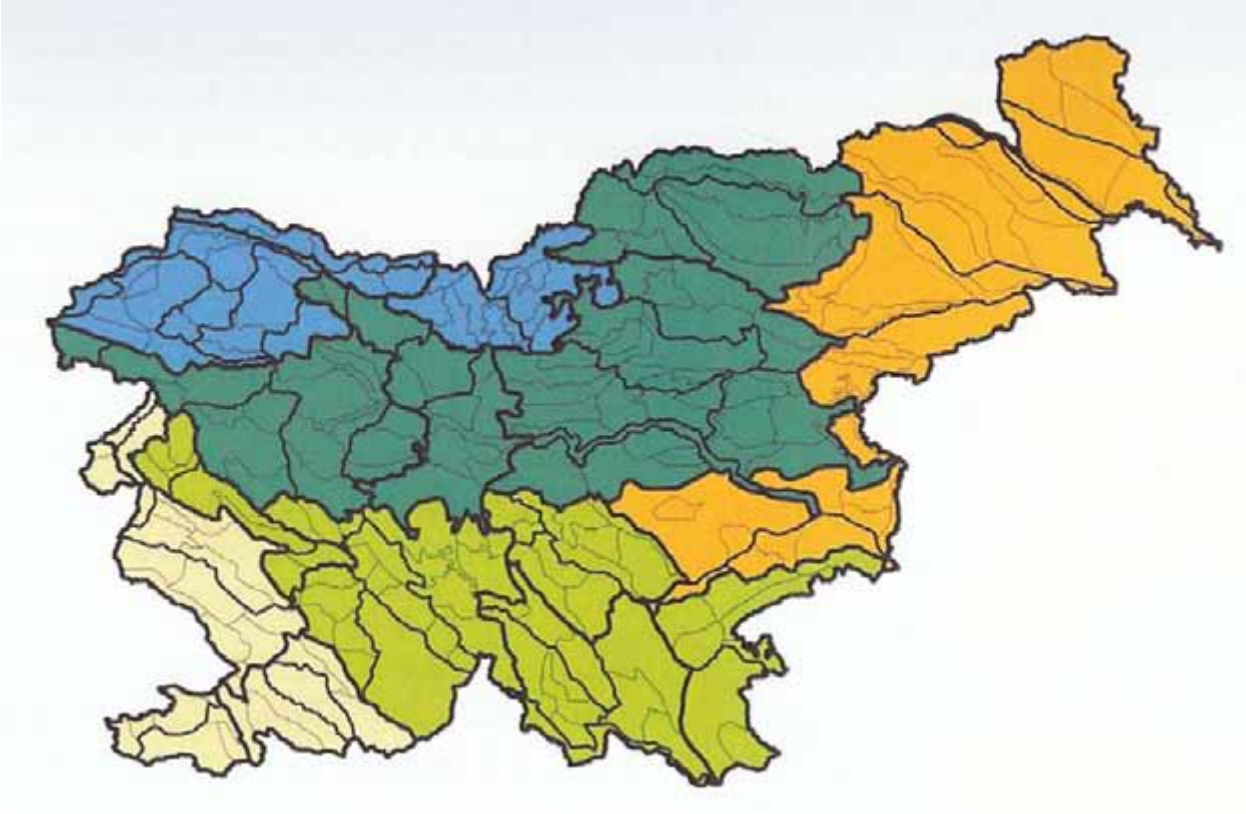

Figure C7: Landscape regionalisation of Slovenia – together four levels

4. Typological Classification of Slovenian Landscapes

In principle, the regionalisation of landscapes should coincide with typological definitions. Although the definition of common landscape characteristics has the primary aim of establishing homogeneous spatial units, it can also lead to typological definitions if the final homogeneity of the units is also expressed by morphologic characteristics. At the same time, a particular landscape type will inevitably express a certain landscape character as well. This reflects the conceptual blending of the two activities which, as mentioned earlier, was the initial premise of the whole work.

An important constituent of the description of individual landscape units was the presentation of its patterns. The patterns were defined as the basic criteria that should also be revealed by the orphological characteristics of the landscape.

Approximately twenty-five experts – mostly landscape architects – performed the extensive inventory based on their field work. They provided an integrated picture of the landscape patterns that are encountered in various parts of Slovenia. The work was also characterized by seasonality, repetition, and confirmation of each researcher's individual steps. The researchers also had many conversations among themselves. The final definitions of measures and landscape patterns emerged only after great deliberation.

This extensive categorisation took place at the outset. The next step was connecting patterns at the lowest level of regionalisation, the smallest linked units. The patterns themselves were defined on the basis of standards that were gradually refined. An analogous process of regionalisation involved the typological definitions that were simultaneously being collected on the basis of the definition of the smallest patterns. This, of course, involved a different conceptual system.

The pattern revealed in a particular photo always becomes a concrete *subject* of a certain landscape type regardless of the specific level it represented. The landscape type is therefore an abstraction, a generalised model for several landscape patterns.

The typological system was built by the gradual inclusion of the most important elements of a landscape pattern. These elements were:

- climate, which determines the basic features of a specific landscape and can be 'read' both by land use and plant cover;
- relief, which along with water, forms the basic morphologic foundation of a landscape structure;
- land use or surface cover, which is a synthesis of climate and relief, and reflects the degradation of traditional landscape patterns in areas of the most intensive spatial development.

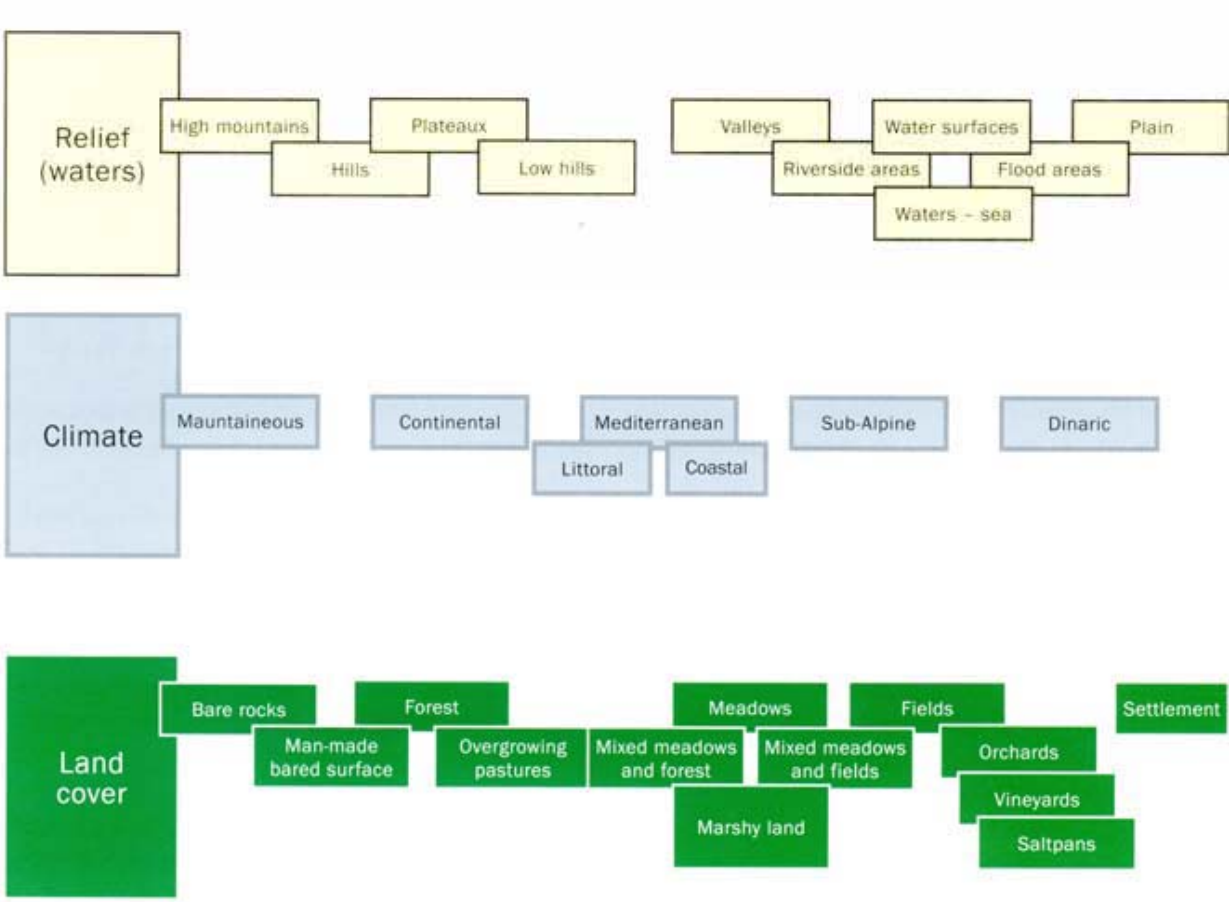

Figure C8: Criteria for classification of landscape patterns

The result of the typological categorisation was a typological system with basic division of Slovenian territory into five broad landscape regions determined mostly by climate. This was followed by the division of these broad landscape regions into lower typological classifications defined by other measures.

Several categories of landscape patterns were defined during the course of the project:

- basic patterns for the five prevailing landscape areas of Slovenia which also form the most common typological groups (e.g. mountains, plateaus, plains). If they are the most frequent or if they characterise a certain landscape thus giving it its specific identity, a basic landscape patterns can also function as a representative pattern.
- particular or specific landscape patterns, which are identified within landscape units in the ongoing categorisation work.
- general or widespread patterns, which are patterns of intensive human activity where natural characteristics have been lost completely or where their morphology – external visual appearance – can be classified by the typological criteria of settlement patterns.

These are the landscape patterns of urban fringes, industrial areas, and all forms of contiguous settlements in general. Development guidelines were also defined for landscapes in general. More detailed guidelines were defined for individual basic landscape patterns.

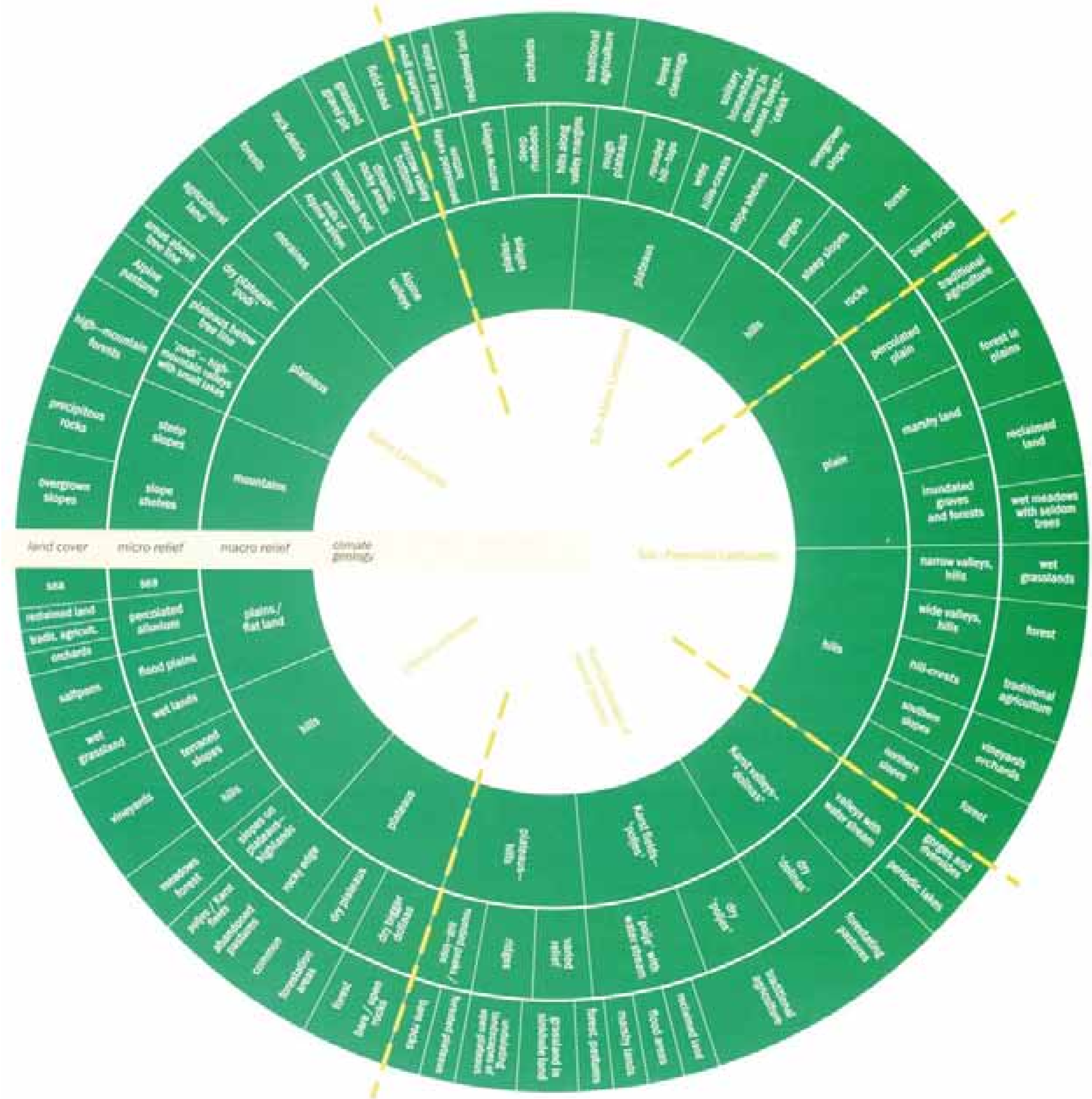

Figure C9: Typological classification system: a circle with five segments (five broad regions) and four circles (particular criteria)

5. Landscape Evaluation

Landscape evaluation took place during the process of evaluating the lowest level of

landscape units. This process took place in the context of preparing evaluative definitions of individual parts of Slovenia for the spatial plan of Slovenia being drawn up at that time. This information was also used for the creation of guidelines for landscape development and for protection and conservation. The landscape unit was the primary unit of evaluation.

The purpose of the evaluation process was to rank each landscape in terms of its vitality

(natural and economic), its potential to provide enjoyment (amenity), and it stability (health/healthiness). These factors were evaluated and then placed on a scale that ranged from the most desirable status to a status denoting degradation and reduction of the area's potentials.

Four basic criteria were selected:

a) **Natural Preservation**: this denotes the level of preserved natural elements or the primary (i.e. pristine) quality of the area. It also can denote the perceived natural quality of an area that may be of a secondary nature (i.e. no longer primary or completely pristine).

b) **Diversity**: this denotes the phenomena of diversity and takes into account variations of forms and diversity of elements. The presence of forests is a very important factor in the experience of landscape diversity because of their high growth (vertical structure) and their volume. Forests appear in many different and varied forms (large or small patches of forest, tongues of forest in ravines, forest in plains). The diversity of landscape also increases when there is relief, i.e. the association of forest and relief, or water and relief.

c) **Spatial order**: this only takes into account patterns of order. Complexity is the highest degree of order. Other criteria, such as congruity, balance, and harmony, were considered elsewhere. In order to evaluate this criterion, we looked at structural order (the orientation and course of ridges and valleys, for example). We also looked at the individual components of spatial order: recurrence, rhythm, direction, gradation.

d) **Harmony**: this is a composite criterion consisting of diversity (number of elements and phenomena, forms of elements and phenomena) and order. In addition to the harmony between the existing natural conditions and subsequent development and transformation of the natural condition, this criterion also considers aesthetic value: the pleasantness of landscape image. The landscape patterns with diverse yet regular structure were given the highest score for harmony. The score was lowered in the case of increased diversity accompanied by reduced order. Logical land use with respect to existing natural conditions and degree of transformation (e.g. paths along the foothills of slopes) was a significant factor in the assessment of harmony. We also looked at pattern transparency and recognisability.

Two criteria of symbolic meaning for elements of landscape parts were added that are already attributed with specific associative meanings either at the local community level, at a wider regional level, or at the national level:

e) **Symbolic meaning of natural elements** (mountains, lakes, rivers, plant life): that is if the recognisability (national, regional, or local) of a certain area is determined on the basis of such natural characteristics, and the historical and cultural significance of such elements could be identified in the landscape.

f) **Symbolic meaning of cultural elements**: that is if the recognisability (national, regional, or local) of an area was based on the landscape characteristics of cultural elements. Using the basic criteria, landscape units were ranked on an evaluation scale from 1 to 5 (score 1 = the highest score; score 5 = the lowest). A ladder was used for the additional criteria: national, regional, or local significance.

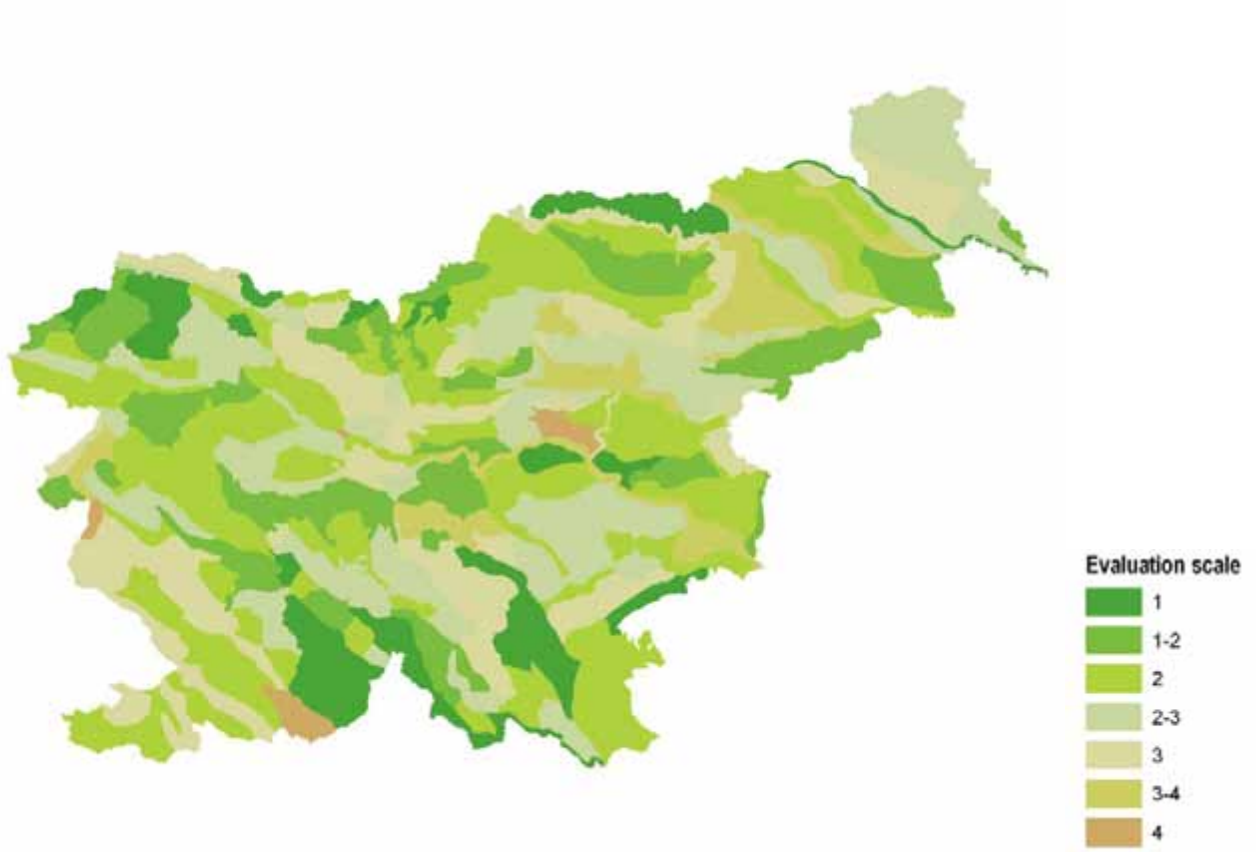

Figure C10: Value classification map of Slovenia

6. Publication about the Project

The results of the research project were presented in six notebooks that were published in 1998 by the Ministry of the Environment and Spatial Planning of the Republic of Slovenia, Office for Physical Planning.

The following five Slovenian landscape regions were presented in five notebooks:

1. **Alpine landscapes**
2. **Sub-Alpine landscapes**
3. **Sub-Pannonian landscapes**
4. **Karst landscapes of interior Slovenia**
5. **Littoral landscapes**

Each notebook was made up of:

- introductory section with a list of landscape units,
- regionalisation map with various levels of categorisation,
- list of landscape patterns,
- evaluation of landscape sub-units.

The sixth notebook, entitled **Methodological Basis,** was printed in both Slovenian and English and provides an introduction to the theoretical underpinning of the projects, international experience, and a description of the work process. The approach to landscape regionalisation is explained in detail along with typological classifications, evaluations, and discussions of difficulties and shortcomings in the methodology. The landscape patterns of the main Slovenian regions are presented as well as guidelines for the Management of cultural landscapes. Descriptions of the various levels of landscape regionalisation are presented with examples. The publication includes a glossary of terms. The appendix features an overview of landscape regionalisation by region with lists of landscape units and an overview of all landscape patterns by landscape units.

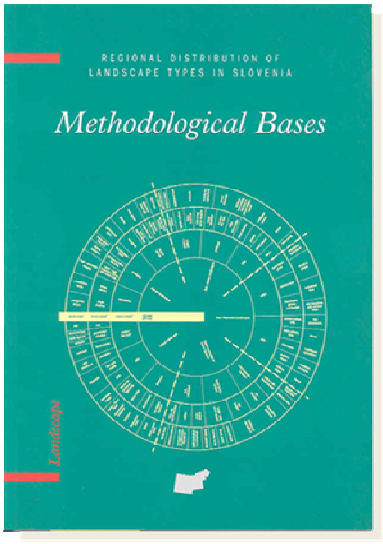

Figure C11: Notebook Methodological Bases

7. Contribution of the Project to Establishing Landscapes Quality Objectives

The Regional Distribution of Landscape Types meant the completion of an extremely extensive task: the creation of the first comprehensive picture of the wealth of Slovenian regions. In addition, it established basic evaluative definitions for individual Slovenian landscape regions, their optimal condition, and policies that would encourage that optimal condition or at least cause the least negative impact. The project also fulfils several of the fundamental goals of the European Landscape Convention (specifically Article 6 – *Specific Measures* and Article 6.c – *Identification and Assessment of Landscapes*), and it contributes to the realisation of Article 6.d – *Landscape Quality Objectives*.

The results of the project provide an expert foundation for landscape, environmental, and spatial planning on various levels, and thus make an important contribution to encouraging spatial development that will be in accordance with the specific characteristics of Slovenian regions, to preventing and correcting degradation of the landscape, and improving and enriching landscapes and their specific characteristics:

- The project results also create a professional foundation for the definition of the most valuable landscape regions in Slovenia, the so-called **outstanding landscapes** (presented in the publication *Outstanding Landscapes of Slovenia,* published in 1999 by the Ministry of the Environment and Spatial Planning of the Republic of Slovenia). The current list of outstanding landscapes includes almost one hundred small landscape areas which:
  - represent traditional forms of dwelling and land use adapted to natural landscape structures,
  - have visually distinctive patterns of settlements and expressive architectural elements,
  - have symbolic, cultural and associative values,
  - make a strong impression (in terms of natural structures and cultural values),
  - are unique in the regional, national, and sometimes even wider context,
  - have special values of natural landscape structures,
  - have a consistent landscape structure that enables their spatial limitation,
  - have great importance for the national identity.

  For each type of outstanding landscapes, current problems, desired state and guidelines for the preservation or maintenance of these landscapes are defined.

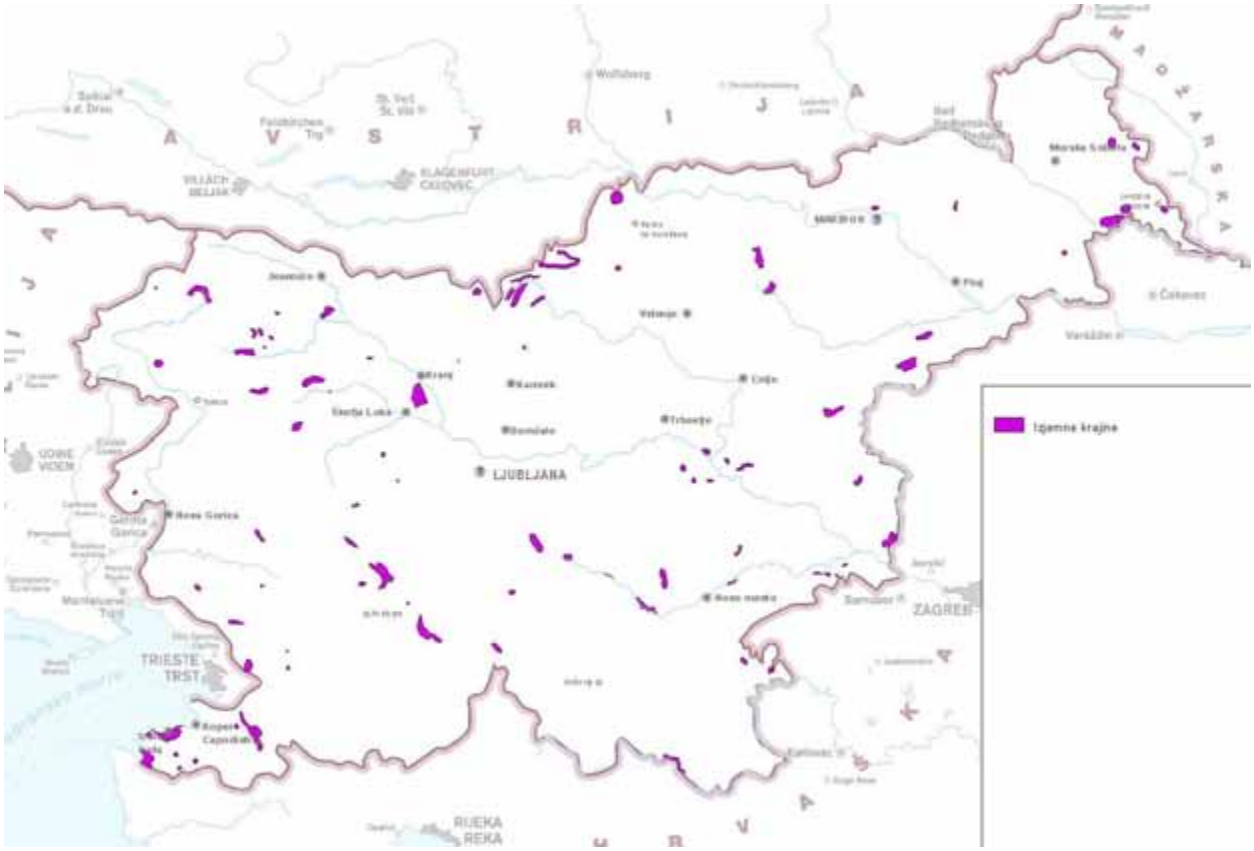

Figure C12: Outstanding landscapes in Slovenia

- The project results provided an expert foundation for the establishment of ***Areas and Elements of Landscape Identity*** which were designated in national planning acts, specifically in the Spatial Development Strategy of Slovenia and Spatial Order of Slovenia, both of which were adopted in 2004. The primary purpose of these designated areas and elements of landscape identity in planning acts is the conservation of landscape, symbolic and other spatial characteristics in relatively large areas that are important to the landscape identity of Slovenia and its regions. The establishment of areas of national identity also provides a basis for the local planning policies.

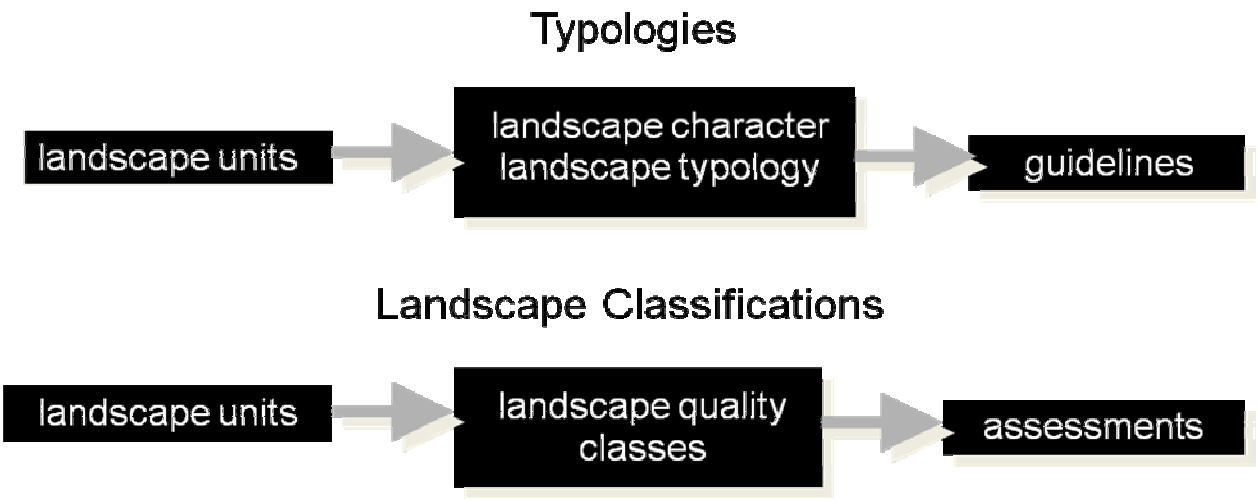

Figure C13: Methodology

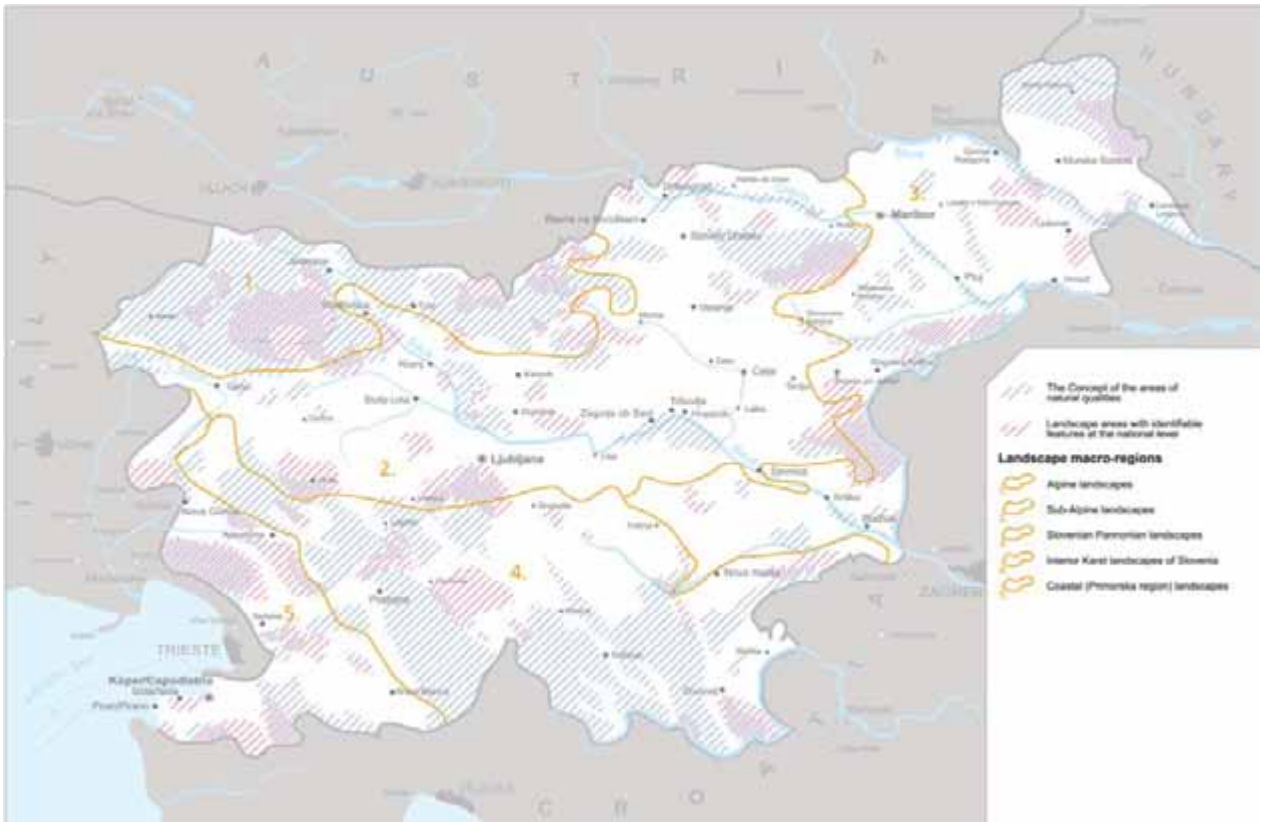

Figure C14: Areas of landscape identity in the Spatial Development Strategy of Slovenia

The project results also provide an expert foundation for the drafting of the whole

Spatial Development Strategy of Slovenia (SPRS, 2004), and in particular for the landscape section which, in addition to settlements and infrastructure, comprised two of the three main chapters in the plan. (http://www.mop.gov.si/fileadmin/mop.gov.si/pageuploads/publikacije/drugo/en/sprs_eng.pdf).

Fiure C15: Spatial Development Strategy of Slovenia

- The results of the project will continue to provide the main expert foundation for thepreparation of spatial plans, detailed spatial planning, and environmental protection policies, mainly as:
  - the data and evaluation of the current conditions of landscapes,
  - the data about the desired state of landscapes and basic guidelines for further spatial development,
  - a methodological instrument for the evaluation of landscapes in spatial planning processes,
  - an expert foundation for spatial and detailed spatial planning,
  - an expert foundation for landscape impact assessment in the environmental reports that are a part of Strategic Environmental Impact Assessment. Slovenian environmental protection laws dictate that impact on landscapes must be considered as one of the environmental aspects of the process.
- At the same time, the project provides valuable information for any continued research into the types of landscape areas. A number of projects involving a more detailed research into the typological classification of Slovenian landscapes have already used the project results as a starting point.
- Project results can be used in the development of tourism, the marketing of Slovenia as a tourist destination, and the use of tourist trade marks based on the landscape diversity and the many ways to make use of natural sources.
- Project results can also be used in the creation of polices for the development of agriculture in areas with limited development potentials, for the protection of Slovenian natural and cultural heritage. The results can be used as data about the current condition and tendencies of Slovenian regions and as an evaluation of aspects and elements that fall under the competence of various sectors.

Thus the results of the project have become an integral part of the sustainable development policy planning of Slovenia.

The published project notebooks have also significantly contributed to the **awareness-raising** of civil society, private organisations, and public institutes about the evaluation of the landscape regions, their roles, and the change they are undergoing, which is also dictated in the European Landscape Convention, Article 6 – Specific measures and Article 6.a – Awareness Raising.

8. Popularisation of the Project results

The published notebooks of the project results were given to most Slovenian public libraries and organisations that work in the area of spatial planning and environmental protection. Today, it is possible to borrow the notebooks at more than 80 public libraries in Slovenia (National University Library, university and professional school libraries, a number of specialised libraries, general and school libraries). They can also be ordered directly from the Ministry of the Environment and Spatial Planning of the Republic of Slovenia.

The project notebooks are presented on the webpage of the Ministry of the Environment and Spatial Planning of the Republic of Slovenia.

(http://www.mop.gov.si/si/publikacije/drugo/#c16299).

The project was presented on a number of occasions at various domestic and international conferences. In terms of domestic conferences, these were mostly held under the auspices of the Ministry of the Environment and Spatial Planning of the Republic of Slovenia and the Slovenian Association of Landscape Architects. In terms of international conferences, the most noteworthy were the 2004 IFLA Conference in Prague and the fourth international meeting of the European Landscape Convention with the thematic title *Landscape and Society* which took place in May 2006 in Slovenia. The material from the meeting in which the project *The Regional Distribution of Landscape Types* was also featured, were distributed to all conference participants, ministries and appropriate institutions (faculties, spatial planning organizations), municipalities, business groups and the Slovenian Parliament. It is also available on the webpage of the Ministry of the Environment and Spatial Planning of the Republic of Slovenia:

http://www.mop.gov.si/fileadmin/mop.gov.si/pageuploads/publikacije/drugo/krajina_druzba.pdf)

The project is one of the efforts made in the area of landscape protection, management and planning in Slovenia that were carried out already before the introduction of the European Landscape Convention. *Regional Distribution of Landscape Types* is the first complete inventory and evaluation of Slovenian landscapes performed on the national level using new and fresh methodology. As such it sets an excellent example for other similar works done later in other European countries.

9. Literature and References

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OUTSTANDING LANDSCAPES

Thematic Study **D**

OUTSTANDING LANDSCAPES IN THE MEDITERRANEAN

April 2010

Author: **Nataša Bratina Jurkovič,** M.Sc., Landscape architect

allinea PLUS
service, consulting, landscape
planning, landscape architecture

Allinea plus d.o.o.
Einspielerjeva ulica 6
1000 Ljubljana
Slovenia

M +386 051 44 55 44
T +386 01 437 93 30
F +386 01 437 93 31
E info@allinea.si
I www.allinea.si

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1. Summary

Landscape is a sort of a “common denominator” which is of social interest in the fields of ecology, economy and culture with a focus on the protection and development of its recognisable natural and cultural characteristics.

Defining of outstanding landscapes as the highest value landscapes in the territory of a country or a region (such as the Mediterranean itself) is an activity establishing a hierarchy among individual parts of the national territory. The activity underlines the most impressive landscape areas which provide the greatest amount of information, express the culture and history of a nation in the best way and are, in view of the protection of landscape identity, of the utmost importance for a country or a region.

Regarding the landscape structure, the Mediterranean area is extremely colourful and diverse. Also, despite numerous negative spatial changes occurred in the recent decades as a consequence of many technological and social changes, the Mediterranean preserved a relatively quality landscape.

Landscapes, which are given a special value and are classified among the outstanding landscapes, are thus defined according to their uniqueness, characteristics, symbolism and level of experience value. Apart from that visual exposure, i.e. their presence in the human activity, landscapes are important for their classification among the outstanding landscapes. Last but not least, these areas must also meet other criteria: they should above all achieve a high-value rating of actual conditions in relation to the desired state.

Classification of landscapes into the category of outstanding landscapes is expected to provide different guidelines, such as the guidelines for the development towards specifically defined desired states; the establishment of the modes of maintenance of the state; limitations, in some places, of spatial development; organisational and legal measures; establishment of systems of financial incentives; professional consultation; etc. For this purpose, different systemic solutions, the inter-sectoral harmonisation, preparation of the spatial planning documentation and technological plans, financial resources, and last but not least, the systems for monitoring of the state of these areas will have to be provided; all these will also require financial resources, the inclusion of relevant experts and at the same time a sufficiently extensive time-span.

The landscape areas which will be selected as outstanding landscapes of the Mediterranean require the definition and preparation of the basic professional background, namely:

- detailed analyses (evaluations, identification of historical and cultural characteristics and the natural structure, and ascertaining whether the traditional land use corresponds to the natural structure and natural processes in individual areas);
- guidelines for the development (limitations and conditions for individual specific areas and within their framework for individual expected activities, i.e. agriculture, tourism, shipping, coastal arrangements, water management, forestry, construction of roads and other infrastructure and expansion of building and settlement);
- proposals of legal arrangements for the incorporation into spatial and sectoral legislation;
- proposals of financial assistance and incentives and other systemic solutions.

2. Importance of the landscape

Landscape is mainly simply perceived as a beautiful scenery and attractive natural environment. It is our everyday space, a commonplace. Therefore, every type of the landscape bears significance, regardless of the extent of its attractiveness, exceptionality and identifiable character, and the rate of its natural preservation. We have to recognise its diverse character and strive to maintain its qualities, regardless of diverse circumstances defining it. Landscape is a multilayer concept.

We could treat landscape as:

1. **Potential of the Mediterranean**

Numerous landscape images of the Mediterranean are a sort of a personal identity card of this region and its fundamental potential. These very characteristics are important for the formation and protection of interesting tourist coastal areas in all Mediterranean countries.

2. **Quality of life**

Landscape plays a specific role in the quality of life of an individual or the whole society and is a key element of the landscape heritage.

3. **Identity and recognisable features**

Outstanding landscapes present and strengthen above all the recognisability and identity of landscapes. The very quality and diverse coastal outstanding landscapes of the Mediterranean present the Mediterranean identity and trademark. The state of landscapes in the Mediterranean reflects the level of development and living standard of Mediterranean countries and broader of the countries in Europe and world-wide.

4. **Cultural heritage**

The outstanding cultural landscapes present together with settlement characteristics a cultural heritage of local, regional, national and international importance.

5. **Limited natural resource and value**

One should be aware of the fact that the landscape is a limited natural resource. It presents a value which is important for the economic growth and a great potential for tourism and creation of jobs.

6. **Dynamic system**

Landscape reflects a common activity of natural processes and human activities. It is a permanent dynamic system which is constantly changing because of different influences. Landscape reacts to changes in settlement, social and economic conditions, changes in the cultivation procedures and all matters falling within the living and activity of humans in the environment.

7. **Wholeness of the landscape**

Landscape is a comprehensive concept, since it comprises several functions - protective and development. Thus, the implementation of spatial planning as a planning instrument for the reconciliation of wider social interests is necessary.

8. Landscape and society

We all contribute to the creation of landscapes - residents, experts, sectors and politicians. The treatment of landscape is also subject to the perception of landscape by a society.

3. Introduction

The knowledge, recognition and awareness of landscapes as a value have become very distinctive and topical in the last two decades. The definition of the landscape as a heritage - the cultural and natural heritage, is the earliest form of the protection attitude towards the landscapes.

But what is landscape? Landscape is a space where we live and which we can change, take care of or maintain by our activity. Landscape reflects a common activity of natural processes and human activities. The main distinction is made between the natural and cultural landscapes.

Changes which are a consequence of realisation of social needs in the form of new constructions due to the expansion of settlement, shrinking of forests, reformation of relief due to agriculture, building of infrastructure, industry, arrangement of sport devices, expansion of tourism, etc. constantly take place in the landscape. All these changes, which have recently been growing extremely rapidly, had a strong influence on the changes of landscapes and thus on their image. The pressure of intensive development and changes of landscapes are also explicitly visible in the Mediterranean region and in particular in its coastal areas.

In the developed countries, especially those with a very rapid and intensive development of various economic activities, people became increasingly aware of the fact that the landscape is a limited natural resource whose potential can be essential for the economic growth – above all for tourism.

Landscape of harmonious and consistent relations is an essential competitive advantage between the human activity and preserved nature. A recognisable outstanding landscape presents above all the identity of a certain area at different levels (regional, national, European, international or global). The treatment of the landscape is also subject to the perception of it by a society thus influencing the state and image of landscapes and quality of our life.

Photo D10: Žrnovo settlement – Korčula island, Croatia

Photo D11: Coast of Corsica, France

4. The Concept of Outstanding Landscapes

The Mediterranean landscape heritage is typologically diverse and the influence of different cultures on it can be seen through the history. Despite the rapid development and numerous pressures, some landscapes have preserved their unchanged structure for centuries. In some places, the connection between the design of original settlements and patterns of agricultural cultivation developed together with them is still preserved and visible. Usually, these are landscape patterns of articulated small holdings and the type of contiguous settlement.

These very landscapes represent a small group of landscapes which occupy a very special place among landscapes and are in technical terms referred to as outstanding landscapes. Since their structural characteristics are considerably outstanding, they have to be dealt with separately.

This is also a group of landscapes with the smallest possibility of survival and existence due to irrepressible modernisation of agriculture, rapid development of settlement and expansion of tourist areas in the very coastal zone of the Mediterranean.

Taking into account their historical and cultural value, special attention must be paid to outstanding landscapes in the framework of the national and international concern for natural and cultural landscapes. One of important steps in this direction is the definition of a selection of outstanding landscapes and informing the expert and general public about the importance of the landscape heritage

.

4.1 Definition of concepts

Outstanding landscapes:

The outstanding landscapes are the highest-value category comprising the most outstanding natural or cultural landscapes and presenting the identity and landscape heritage of an individual country, either at the Mediterranean, European or global level. As such, they must be defined, evaluated and acknowledged accordingly.

Photo D82: Delta of the Neretva river

Photo D83: The Mediterranean landscape pattern

Outstanding landscapes are the selection of landscapes which are outstanding owing to one or more valuable characteristics, such as a unique pattern of land use, an appropriate share of natural elements, a special settlement pattern, etc. as a reflection of a unique structure of landscape. They comprise natural and cultural landscapes. The results of human use and activities can be seen in cultural landscapes. The natural landscape is an area where its development takes place according to natural laws without human activity.

An individual landscape can be outstanding due to one or several aspects of value, whereas due to only one aspect, it can have a higher value than others characterised by several outstanding characteristics.

The definition of the value of outstanding landscape can thus be built on the combination of several or on only one characteristic which has to be highly developed, very special and even unique in a certain area.

In defining the outstanding landscapes, the understanding of visual attractiveness of the landscape, which is an important element in dealing with and evaluating the outstanding landscapes, is significant. The characteristics of the landscape, such as the composition of individual elements (rises, hills, plains, vegetation, and water elements), patterns of agricultural structures (fields, orchards, and plantations), patterns of settlement and other man-made factors, make the landscape visually attractive and pleasant. The diversity of structures, textures and colours in the landscape contribute to a greater visual attractiveness. However, it is important to note in which mutual relation these elements are in the space and landscape.

The definition of outstanding landscapes varies depending on the importance and selection of outstanding landscapes at the level of an individual country, region or globally. However, each country aims at defining its outstanding landscapes contributing in that way to the protection of recognised landscapes which present the identity of a certain area – in this case, the Mediterranean coastal area.

Owing to their special structure, the outstanding landscapes create a unique character of a space giving it a special meaning and thus contributing to the recognisability of a particular area. This is of particular importance for the protection of the national identity of an individual country, as well as for the protection of the common Mediterranean identity.

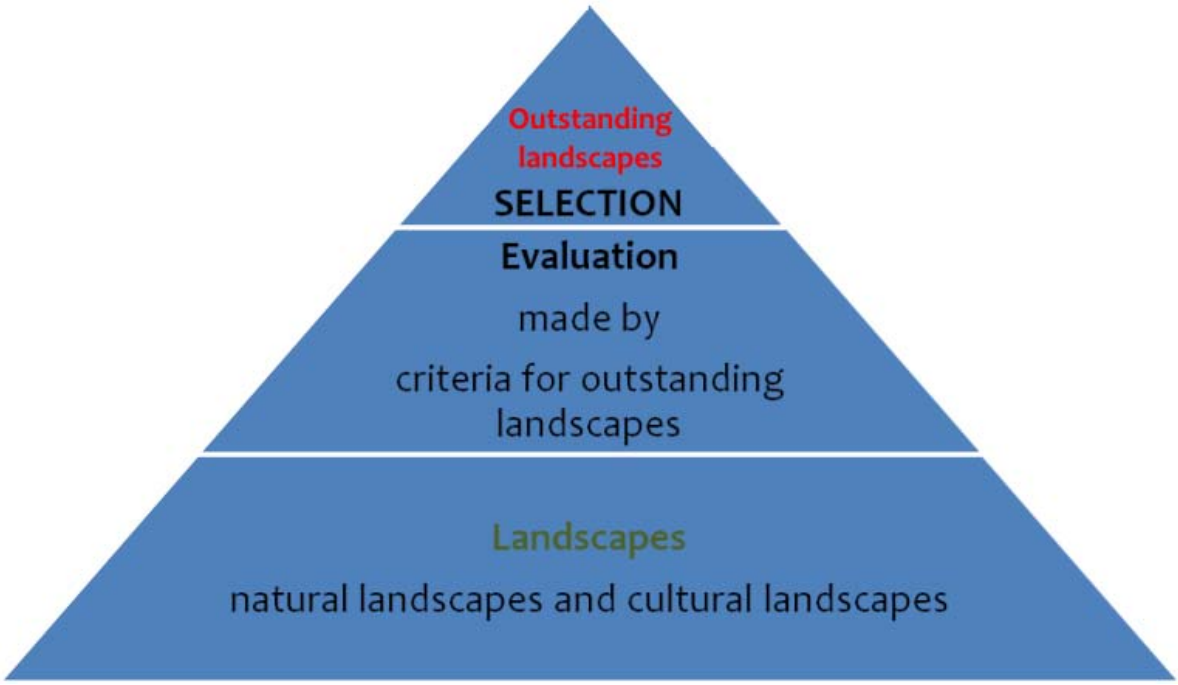


Figure D2: Selection of landscapes

For a better understanding of the whole contents of the study, we would like to explain in the continuation a few more terms which are often used in the typological definition and classification of landscapes and their evaluation.

The explanation of the concepts and some terms are summarised according to the study *Regional Distribution of Landscape Types in Slovenia* (RDLTS, 1998) and the *Spatial Planning Strategy of Slovenia* (SPSS, 2004).

Land use means the subdivision of physical space across the entire territory of a municipality as laid down in the Municipal / Local Spatial Plans or Local Master Plans, determining the purpose for which the land and built structures may be used. (SPSS, 2004)

Landscape characteristics are a recognisable characteristic which defines a certain landscape appearance or character; for example: surface shape, land use growth.

(RDLTS, 1998)

Landscape unit is an area with defined boundaries which is uniform with respect to one or more landscape characteristics. (RDLTS, 1998)

Landscape identity is landscape characteristics which are determinant for a certain area or landscape pattern and which make the area or a landscape pattern recognisable – giving identity to the area of a pattern. (RDLTS, 1998)

Landscape type is a generalised model for several landscape patterns. (RDLTS, 1998)

Landscape pattern means typological or morphological landscape characteristics which are the result of: a climate, which defines the basic landscape characteristics and is recognised in both land use and vegetative cover; a relief, which together with waters shapes the basic morphological foundation for landscape structure; and a land use or a vegetative cover, which is the synthesis of climate and relief and also reveals the designation of traditional landscape patterns. Characteristic of landscape patterns is their spatial continuity, because of which they are not spatially defined by boundaries.

(SPSS, 2004)

Characteristic landscape pattern gives identity to a wider landscape area. The landscape pattern is characteristic when it prevails in a certain area. (RDLTS, 1998)

4.2 Purpose of defining the outstanding landscapes

The outstanding landscapes have a protection connotation, since with their definition we want to enable the protection of the original, unique landscape patterns of the Mediterranean coastal areas which can be of great spatial value also at the broadest international level.

The outstanding landscapes are also often a result of a sustainable agricultural cultivation and thus an educational example of sustainable use. Some can be as special for a certain area as to also present the trademark of the area and are thus very interesting for the economic development, particularly tourism.

The definition of the outstanding landscape and ensuring its protection can also mean providing assistance to local communities in counteracting the external pressure of development and the greed of investors for building settlements and new large tourist areas with a negative aspect of globalisation.

By defining the outstanding landscapes, the following can be achieved or enabled:

- protection or even conservation of the most valuable parts of the coastal Mediterranean region;
- protection of landscapes contributing to the definition of the regional, national or even international identity;
- preservation of traditional patterns and landscape structure in agricultural areas;
- protection of special valuable landscape patterns characteristic of the Mediterranean;

- establishment of the network of Mediterranean outstanding landscapes and thus ensuring the preservation of the most characteristic image of the coastal Mediterranean region;
- completion of the protection system in the field of cultural and natural heritage;
- provision of guidelines for spatial planning in areas comprising the outstanding landscapes;
- refusal of undesired activities and changes that might cause degradation of the coastal zone;
- preservation of sustainable land use in the field of agriculture, since numerous outstanding landscapes are an example of environmentally friendly use and method of agricultural cultivation;
- sustainable development of economic activities – particularly tourism, rather than mass tourism causing degradation of the coastal zone;
- public education and awareness-raising;
- education of politicians and experts from other disciplines – fields;
- realisation of the goals of the European Landscape Convention;
- realisation of the goals of the Barcelona Convention – the ICZM Protocol.

The goal of defining the outstanding landscapes is the protection and management of these landscapes and their maintenance and thus the preservation of outstanding landscape characteristics as the most valuable and typical Mediterranean areas.

4.3 Legislation

4.3.1 European Landscape Convention

The European Landscape Convention was prepared due to intensive social and economic processes and globalisation as well as concern for the disappearance of landscape values and qualities which are important for an individual and the entire society. It was formed at the initiative of the Committee of Ministers of the Council of Europe and signed and adopted in 2000 in Florence, Italy. The Convention entered into force in March 2004. As many as 36 countries have signed the Convention so far, 30 of which have already ratified it and thus the implementation of provisions of the Convention already takes place in the broader part of Europe.

The purpose of the Convention is to form a basic framework for a complex dealing with landscapes and the protection of landscape heritage in the entire Europe. The Convention provides basic orientations which must be observed by Signatory States in the planning of landscape sustainable development within the framework of developmental policies, strategies and programmes, in sectoral and spatial planning and in international co-operation.

Key emphases of the European Landscape Convention

The aim of the Council of Europe is to achieve among its members as great as possible unity for the protection of landscapes, which are their common heritage. With this Convention, the Council wants to achieve the awareness of the quality and diversity of European landscapes as a common resource and of the need for a joints action towards their protection, management and planning. For this purpose, Article 5.b of this Convention introduces a new instrument intended exclusively for the protection, management and planning of all European landscapes, i.e. the landscape policy. The Council wants to encourage the Member States to undertake activities in the field of landscapes and establish the co-operation at the European level in addressing the landscape-related issues.

This Convention emphasizes “that the landscape is an important part of the quality of life for people everywhere: in urban areas and in the countryside, in degraded areas as well as in areas of high quality, in areas recognised as being of outstanding beauty as well as everyday areas”.

Basic aims of the European Landscape Convention are as follows:

- to encourage and promote the protection, management and planning of landscapes;
- to recognise and evaluate landscapes and provide guidelines for their protection and development;
- to specify a common definition of terminology such as landscape, landscape policy, landscape planning;
- to inform the public and increase awareness of the meaning and values of landscapes;
- to provide education in the field of policy, protection, management and planning of landscapes; and
- to establish the European co-operation in addressing landscape-related issues.

Definition of some terms contained in the European Landscape Convention (Florence, 2000):

Landscape

"Landscape" means an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors;

Landscape protection

"Landscape protection" means actions to conserve and maintain the significant or characteristic features of a landscape, justified by its heritage value derived from its natural configuration and/or from human activity;

Landscape management

"Landscape management" means action, from a perspective of sustainable development, to ensure the regular upkeep of a landscape, so as to guide and harmonise changes which are brought about by social, economic and environmental processes.

European Landscape Convention associated with outstanding landscapes

The Preamble of the Convention, paragraph five, stresses "that the landscape is an important part of the quality of life for people everywhere: in urban areas and in the countryside, in degraded areas as well as in areas of high quality, in areas recognised as being of **outstanding beauty** as well as everyday areas".

The Convention Preamble, paragraph seven, particularly underlines that outstanding landscapes within the framework of all landscapes are important thus wishing to achieve that all residents and visitors could enjoy high-quality landscapes, since the landscape is the crucial component of the human and social welfare, i.e. *"wishing to respond to the public's wish to enjoy high quality landscapes and to play an active part in the development of landscapes."*

Article 2 of the Convention specifies the field of use of the Convention explicitly stating that it refers to landscapes which can be classified as "**outstanding landscapes**" and also all other landscapes such as "everyday and degraded landscapes".

Apart from that, the Convention promotes "that the quality and diversity of European landscapes constitute a common resource, and that it is important to co-operate towards its protection, management and planning;" (ELC, Preamble, paragraph 10).

Some important parts of the European Landscape Convention (2000)

Article 2 – Scope

Subject to the provisions contained in Article 15, this Convention applies to the entire territory of the Parties and covers natural, rural, urban and peri-urban areas. It includes land, inland water and marine areas. It concerns landscapes that might be considered **outstanding** as well as everyday or degraded **landscapes**.

Article 3 – Aims

The aims of this Convention are to promote landscape protection, management and planning, and to organise European cooperation on landscape issues.

CHAPTER II – NATIONAL MEASURES

Article 5 – General measures

Each Party undertakes:

a to recognise landscapes in law as an essential component of people's surroundings, an expression of the diversity of their shared cultural and natural heritage, and a foundation of their identity;

b to establish and implement landscape policies aimed at landscape protection, management and planning through the adoption of the specific measures set out in Article 6;

c to establish procedures for the participation of the general public, local and regional authorities, and other parties with an interest in the definition and implementation of the landscape policies mentioned in paragraph *b* above;

d to integrate landscape into its regional and town planning policies and in its cultural, environmental, agricultural, social and economic policies, as well as in any other policies with possible direct or indirect impact on landscape.

Article 6 – Specific measures

A Awareness-raising

Each Party undertakes to increase awareness among the civil society, private organisations, and public authorities of the value of landscapes, their role and changes to them.

B Training and education

Each Party undertakes to promote:

a training for specialists in landscape appraisal and operations;

b multidisciplinary training programmes in landscape policy, protection, management and planning, for professionals in the private and public sectors and for associations concerned;

c school and university courses which, in the relevant subject areas, address the values attaching to landscapes and the issues raised by their protection, management and planning.

C Identification and assessment

1 With the active participation of the interested parties, as stipulated in Article 5.*c,* and with a view to improving knowledge of its landscapes, each Party undertakes:

a i to identify its own landscapes throughout its territory;

ii to analyse their characteristics and the forces and pressures transforming them;

iii to take note of changes;

b to assess the landscapes thus identified, taking into account the particular values assigned to them by the interested parties and the population concerned.

2 These identification and assessment procedures shall be guided by the exchanges of experience and methodology, organised between the Parties at European level pursuant to Article 8.

D Landscape quality objectives

Each Party undertakes to define landscape quality objectives for the landscapes identified and assessed, after public consultation in accordance with Article 5.*c.*

E Implementation

To put landscape policies into effect, each Party undertakes to introduce instruments aimed at protecting, managing and/or planning the landscape.

4.3.2 Barcelona Convention

In 1976, the Parties adopted the *Convention for the Protection of the Mediterranean Sea against Pollution* (*Barcelona Convention*) addressing specific aspects of Mediterranean environmental conservation to complete the MAP legal framework. In 1995, the Convention was renamed to the *Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean* and ICZM became one of the priorities of MAP. Today, the Convention, together with its seven Protocols, constitutes what is referred to as "the Barcelona system".

The signatories to the Barcelona Convention are bound to encourage integrated management of coastal regions by considering the protection of areas which are important as to the ecology and landscape and the use of natural resources.

The Convention's main objectives are:

- to assess and control marine pollution;
- to ensure sustainable management of natural marine and coastal resources;
- to integrate the environment in social and economic development;
- to protect the marine environment and coastal zones through prevention and reduction of pollution, and as far as possible, elimination of pollution, whether land or sea-based;
- to protect the natural and cultural heritage;
- to strengthen solidarity among Mediterranean coastal States; and
- to contribute to improvement of the quality of life.

4.3.3 Protocol on Integrated Coastal Zone Management in the Mediterranean – ICZM Protocol

The Protocol on Integrated Coastal Zone Management is the new and the latest legal instrument in the framework of the Barcelona Convention. At the Conference of the Plenipotentiaries on the ICZM Protocol that took place on 21 January 2008 in Madrid, the ICZM Protocol was signed.

All the Parties are convinced that this Protocol is a crucial milestone in the history of MAP. It will allow the countries to better manage their coastal zones, as well as to deal with the emerging coastal environmental challenges, such as the climate change.

The Contracting Parties to the ICZM Protocol are convinced that:

- the Mediterranean area is an irreplaceable ecological, economic and social resource;
- the planning and management of coastal zones with a view to their preservation and sustainable development requires a specific integrated approach at the level of the Mediterranean Basin as a whole and of its coastal States;
- the Parties wished to establish a common framework for the integrated management of the Mediterranean coastal zone and shall take the necessary measures to strengthen regional cooperation for this purpose.

Objectives of integrated management

In implementing the ICZM Protocol, the Parties shall or would like to achieve:

- a **common framework for integrated management** of the Mediterranean coastal zone;
- **equal measures for regional co-operation**;
- **effective management plans** of the Mediterranean coastal zone;
- an **appropriate sustainable spatial planning and sustainable development**, by ensuring the protection of the quality of coastal zone;
- **preservation of the integrity of coastal ecosystems, landscapes and geomorphology;**
- **sustainable use of natural resources**, particularly with regard to water use,
- **preservation of coastal zones** for the current and future generation.

ICZM Protocol, 2008 – some sections with direct connection to landscape

Preamble (section):

Considering that the coastal zones of the Mediterranean Sea are the common natural and cultural heritage of the people of the Mediterranean and that they should be preserved and used judiciously for the benefit of present and future generations,

Concerned about the increase in anthropic pressure on the coastal zones of the Mediterranean Sea which is threatening their fragile nature and *desirous* of halting and reversing the process of coastal zone degradation and of significantly reducing the loss of biodiversity of coastal ecosystems,

Convinced that, as an irreplaceable ecological, economic and social resource, the planning and management of coastal zones with a view to their preservation and sustainable development requires a specific integrated approach at the level of the Mediterranean basin as a whole and of its coastal States, taking into account their diversity and in particular the specific needs of islands,

ICZM Protocol, 2008

Article 11: Coastal landscapes

1. The States Parties, recognizing the specific aesthetic, natural and cultural value of coastal landscapes, irrespective of their classification as protected areas, shall adopt measures to ensure the protection of coastal landscapes through legislation, planning and management.
2. The States Parties undertake to promote regional and international co-operation in the field of landscape protection, and in particular, the implementation, where appropriate, of joint actions for transboundary coastal landscapes.

In the ICZM Protocol, the coastal landscapes are dealt with separately and the need for the protection of coastal regions and stopping their decaying, the strengthening of striving of coastal countries for ensuring integrated management of coastal areas and the

conservation of coastal regions of the Mediterranean Sea as a common natural and cultural heritage of Mediterranean nations is underlined. The statements from the Preamble and particularly from Article 11 of the ICZM Protocol require the protection of landscapes through various means such as legislation, planning and management. In this regard, it is closely linked with the European Landscape Convention of the Council of Europe.

4.4 Definition of particularly recognised landscapes and their protection by other actors at the European and global level

The attempt at and the need for defining landscapes, which have special values and are very recognised in a certain area, region or country, and thus stand out among other landscapes, appeared together with identification and evaluation of landscapes and an attempt at protection of the most valuable landscapes. Particularly in the field of protection of natural and cultural heritage at the European and global level, the organisations UNESCO (the field of cultural heritage) and IUCN (the field of natural heritage) have established approaches on the protection and insurance of special landscapes by defining the term which is quite close to the term “outstanding landscapes” as early as in the 90s.

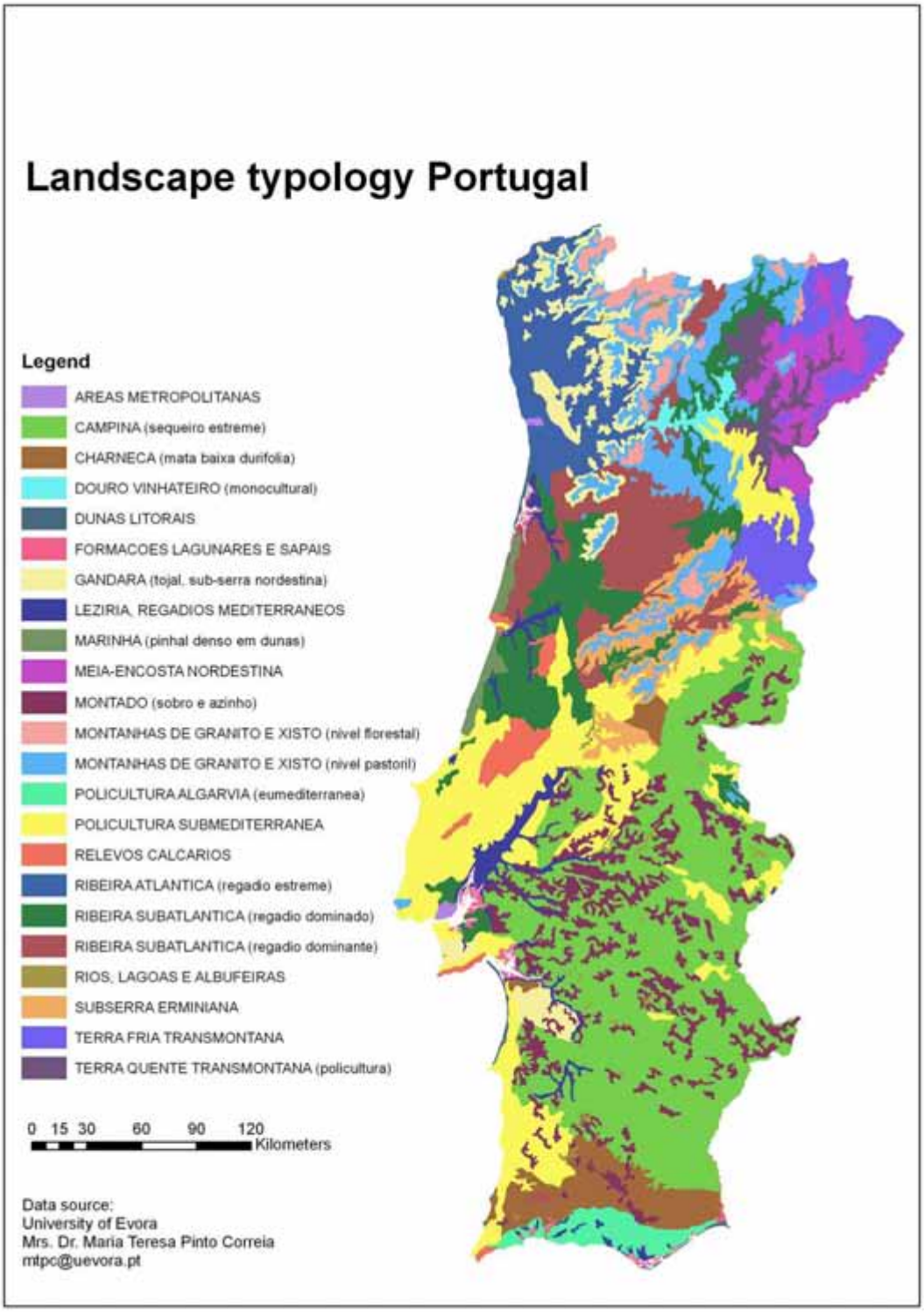
In the last decade, the European Landscape Convention was also introduced as an international legislative warning and an urgent intent to protect, manage and plan landscapes.

Table D1: Four international approaches to landscape

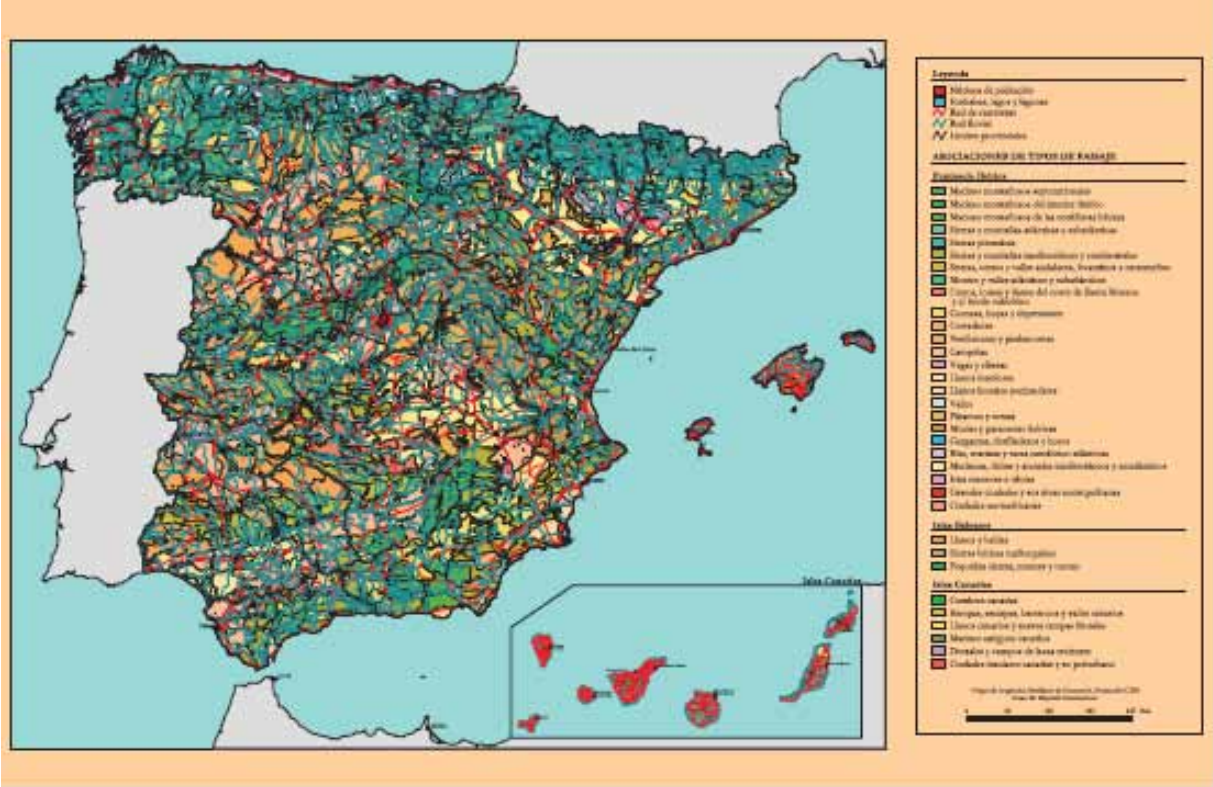
Initiative	Geographical scope of application	Character of landscape affected	Areas covered by the initiative	Main aims
Category V protected areas: Protected Landscapes/seascapes	National and sub-national	Landscapes/seascapes that deserve protection	Rural and coastal areas only	Integrate activities and enhance natural and cultural values
World Heritage Convention - Cultural Landscapes	Global	Outstanding universal value	Any appropriate area	Protect heritage values
European Landscape Convention	Europe	All landscapes	Town and Country and nature	Protect, manage and plan landscape
Barcelona Convention – ICZM Protocol	Mediterranean region	Coastal areas	Any appropriate area	Protect, manage and plan landscape

The need for defining landscapes, identification of the state of landscapes and their typological definition and evaluation appeared due to the increasing pressure of development (urbanisation, industry, intensive agriculture, tourism) on the environment and thus numerous degradations, above all landscape degradations, took place. Landscape began changing rapidly and the typical cultural and natural landscape started disappearing as well the most valuable, special – outstanding landscapes.

Many countries in Europe have already began and carried out the identification, evaluation and assessment of all landscapes of their country. The identification and typology of landscapes has so far been prepared by the following European countries: Austria, Belgium, France, Germany, Great Britain, Holland, Hungary, Ireland, and Italy – some regions (such as Sardinia), Norway, Portugal, Slovenia, the Slovak Republic, Spain, and Switzerland. (European Landscape Convention – website)



Map D1: Landscape typology of Portugal



Map D2: Landscape typology of Spain (Landscape Observatory of Catalonia)

Definition of protected landscapes according to IUCN Guidelines (Guidelines IUCN Category V: Protected Landscapes, 2002):

4.4.1 IUCN – The World Conservation Union

Founded in 1948, The World Conservation Union brings together States, government agencies and a diverse range of non-governmental organisations in a unique world partnership: over 900 members in all spread across some 138 countries.

The International Union for Conservation of nature and Natural Resources (IUCN) provided in its Guidelines the following definition for the selection of protected landscapes:

The area has to comprise the landscape of a high scenic value with different habitats, flora and fauna, together with expressions of unique or traditional patterns of use of land and social organisation demonstrated in human settlements, local practices and method of surviving or religions.

The area must also enable public use in form of tourism or recreation within the framework of its normal way of life and economic activities. (IUCN, online)

Selection of Category V Protected Areas

Usually, legislation will be enabling, and the act of selecting individual areas that are suitable for Category V status should follow. The IUCN 1994 Guidelines on the

protected area management categories (see Annex 1) give only a limited advice on the criteria to be used at this stage. However, it is possible to identify some essential and desirable qualities that should be looked for at the selection stage (see Box 4).

Guidelines **on the criteria for the selection of Category V Protected Areas**

Essential *characteristics in the selection of Category V protected areas, which should be of national or international significance:*

- Landscape and/or coastal and island seascape of high and/or distinct scenic quality;
- Significant associated habitats, and flora and fauna;
- Evidence that a harmonious interaction between people and nature has endured over time, and still has integrity;
- Unique or traditional land-use patterns, e.g. as evidenced in human settlements;
- Valued for the provision of environmental services (e.g. watershed protection);
- Valued for the sustainable use of natural resources;
- Unique or traditional social organisations, as evidenced in local customs, livelihoods and beliefs; and
- Opportunities for public enjoyment through recreation and tourism consistent with lifestyle and economic activities.

Desirable *characteristics in the selection of Category V protected areas:*

- Suitability for scientific research;
- Important for education;
- Recognition by artists of all kinds and in cultural traditions (now and in the past);
- Important for agri-biodiversity (domesticated livestock and crops); and
- Potential for ecological and /or landscape restoration.

Selection should be systematic, not *ad hoc*. In other words, the best approach is a thorough, country-wide analysis of areas that are most suitable for Category V status rather than individual, random site selection exercises. Ideally, such country-wide analyses should form part of the response to the requirements of Article 8a of the CBD, which requires each State Party to establish "a system of protected areas, or areas where special measures need to be taken, to conserve biological diversity". The analyses of sites for World Heritage Cultural Landscapes (see below) may also help to identify suitable sites for Category V protected areas.

IUCN has published a general advice on the development of national system plans for protected areas – systems, that is, that include Category V areas (Davey, 1998).

However, the specific characteristics of Category V protected areas require a particular emphasis upon some aspects of the lived-in, working landscape that will not usually be covered by a normal biodiversity assessment, since these tend to focus on the remaining natural or near-natural habitats. Some countries, notably in Europe, have undertaken landscape analyses to help them develop landscape-related policies, including the identification of areas suitable for Category V protected areas (Wascher, 2000). This is a promising area, but it is too early to recommend a standard approach, given the wide range of differing circumstances between different countries. However it is clear that the selection of Category V protected areas will require data from a variety of sources.

Management Guidelines for IUCN Category V Protected Areas **(IUCN, online)**

Guidelines **on the information required to select Category V protected areas**

Note that this advice ***supplements*** *general principles for selection of sites for a national system of protected areas.*

In selecting sites at the national level for designation as possible Category V protected areas, information will be needed on the following:

Scenic quality: areas with exceptional or dramatic scenery, deriving as much from the contrast and/or interaction between the works of nature and humanity as from the intrinsic quality of the natural characteristics themselves;

Recreational importance: areas where the landscape and the cultural associations are both important attractions for tourists or for outdoor leisure activities;

Traditions of stewardship: areas where the people have long and living traditions of care for the land and its natural resources, based upon the principles of sustainability, and in particular those that reflect excellent examples of sustainable land use by:

- respecting the productive capability of land,
- conserving the quality and quantity of soil,
- managing and safeguarding water quality,
- managing the marine environment responsibly,
- managing streams and rivers so as to reduce damaging floods and run-off,
- maintaining plant cover, and
- restoring vegetation, soils and sources of water;

Biodiversity conservation: areas where the landscape represents an outstanding example of how traditional land use patterns can:

- contribute to the protection of natural ecosystems (e.g. by providing for the protection
- of watershed forests),
- help protect wild species of fauna or flora,
- help protect genetic diversity within wild species,
- create semi-natural habitats of great importance to biodiversity, i.e. manipulated ecosystems with well-structured and functional interactions between its living components;

Agri-biodiversity: Areas where traditional farm systems have:

- developed and/or conserved a wide range of varieties of domesticated livestock, and
- developed and/or conserved a wide range of varieties of cultivated crops, such as cereals, fruit or root vegetables;

Cultural heritage: landscapes that retain built characteristics from the past, testifying to the occurrence of important events and/or a history of human occupation over many years; and

Cultural associations*:* areas whose landscape embodies strong cultural values, and/or artistic associations.

4.4.2 UNESCO - Definition for cultural landscapes as World Heritage

UNESCO (United Nations Educational, Scientific and Cultural Organisation) was established in 1945 as a specialised organisation of the United Nations for the field of education, science, culture and communications whose aims and tasks are defined in the Constitution of the Organisation.

The list of world heritage was introduced with the purpose of identification of areas of heritage deserving a special global attention and protection. It was established as a reflection of the situation in the world and awareness of the threat to the heritage in view of the changes and the transitory nature of identities. The world heritage itself is a heritage which is not important only for the identity of the group, but has an outstanding universal value for the entire

humanity. The Convention on Conservation of the World Cultural and Natural Heritage adopted at the General Conference of UNESCO in 1972 in Paris is the main document for the definition of it and the procedures for its inscription on the list.

The Convention on Conservation of the World Cultural and Natural Heritage was adopted by the General Conference of UNESCO on 16th November 1972 in Paris and entered into force in 1976. The aim of the Convention is to ascertain, protect, present and transfer the cultural and natural heritage of global significance for future generations.

Since cultural landscape is extremely spread but subject to different influences among which are also inappropriate maintenance or changes in the past or decaying and disappearance of function in the present, a selection of cultural landscapes, which apart from the criteria of universal value also meets the other criteria for their inscription, had to be prepared. Additional criteria can also be defined for the selection which should represent heritage as fully as possible and in all its value. This also comprises the diversity of types of architecture, geographical diversity, diversity and values of cultural landscape in which it can be found, the location and visual effects, etc.

Cultural landscapes as World Heritage (UNESCO cultural landscapes - online)

There exists a great variety of Landscapes that are representative of the different regions of the world. Combined with works of nature and humankind, they express a long and intimate relationship between people and their natural environment.

Certain sites reflect specific techniques of land use that guarantee and sustain biological diversity. Others, associated in the minds of the communities with powerful beliefs and artistic and traditional customs, embody an exceptional spiritual relationship of people with nature.

To reveal and sustain the great diversity of the interactions between humans and their environment, to protect living traditional cultures and preserve the traces of those which have disappeared, these sites, called cultural landscapes, have been inscribed on the World Heritage List.

Cultural landscapes -- cultivated terraces on lofty mountains, gardens, sacred places ... -- testify to the creative genius, social development and the imaginative and spiritual vitality of humanity. They are part of our collective identity.

To date, 66 properties on the World Heritage List have been included as cultural landscapes.

History and Terminology

In 1992 the World Heritage Convention became the first international legal instrument to recognize and protect cultural landscapes. The Committee at its 16th session adopted guidelines concerning their inclusion in the World Heritage List.

The Committee acknowledged that cultural landscapes represent the "combined works of nature and of man" designated in Article 1 of the Convention. They are illustrative of the evolution of human society and settlement over time, under the influence of the physical constraints and/or opportunities presented by their natural environment and of successive social, economic and cultural forces, both external and internal.

The term "cultural landscape" embraces a diversity of manifestations of the interaction between humankind and its natural environment. Cultural landscapes often reflect specific techniques of sustainable land-use, considering the characteristics and limits of the natural environment they are established in, and a specific spiritual relation to nature. Protection of cultural landscapes can contribute to modern techniques of sustainable land-use and can maintain or enhance natural values in the landscape. The continued existence of traditional forms of land-use supports biological diversity in many regions of the world. The protection of traditional cultural landscapes is therefore helpful in maintaining biological diversity.

Categories and Subcategories

Cultural landscapes fall into **three main categories** *(***Operational Guidelines 2008, Annex 3***), namely:*

The most easily identifiable is the **clearly defined landscape designed and created intentionally by man.** *This embraces garden and parkland landscapes constructed for aesthetic reasons which are often (but not always) associated with religious or other monumental buildings and ensembles.*

The second category is the **organically evolved landscape.** *This results from an initial social, economic, administrative, and/or religious imperative and has developed its present form by association with and in response to its natural environment. Such landscapes reflect that process of evolution in their form and component characteristics.*
They fall into two sub-categories:

- *a relict (or fossil) landscape is one in which an evolutionary process came to an end at some time in the past, either abruptly or over a period. Its significant distinguishing characteristics are, however, still visible in material form.*
- *continuing landscape is one which retains an active social role in contemporary society closely associated with the traditional way of life, and in which the evolutionary process is still in progress. At the same time it exhibits significant material evidence of its evolution over time.*

The final category is the **associative cultural landscape.** *The inclusion of such landscapes on the World Heritage List is justifiable by virtue of the powerful religious, artistic or cultural associations of the natural element rather than material cultural evidence, which may be insignificant or even absent.*

Example of designated cultural landscape as UNESCO World Cultural Heritage
(UNESCO, online)

Last selection of UNESCO cultural landscape – Stari Grad, Island of Hvar, Croatia:

Date of Inscription: 2008
Criteria: (ii)(iii)(v)
Property : 1376.5300 ha
Buffer zone: 6403.1300 ha
Split - Dalmatia County
N43 10 54 E16 38 19
Ref: 1240

Photo D84: UNESCO-cultural landscape heritage, Stari grad, Hvar island– Croatia

Photo D85: Area of Stari Grad town, Hvar Island, Croatia

Photo D86: Aero-shot – UNESCO cultural landscape heritage area of Stari Grad

Brief description

The Stari Grad Plain on the Adriatic island of Hvar is a cultural landscape that has remained practically intact since it was first colonised by Ionian Greeks from Paros in the 4th century BC. The original agricultural activity of this fertile plain, mainly centring on grapes and olives, has been maintained since the Greek times to the present. The site is also a natural reserve. The landscape features ancient stone walls and trims, or small stone shelters, and bears testimony to the ancient geometrical system of land division used by the ancient Greeks, the chora which has remained virtually intact over 24 centuries.

Outstanding Universal Value

The Stari Grad Plain represents a comprehensive system of land use and agricultural colonisation by the Greeks, in the 4th century BC. Its land organisation system, based on geometrical parcels with dry stone wall boundaries (chora), is exemplary. This system was completed from the very first by a rainwater recovery system involving the use of tanks and gutters. This testimony is of Outstanding Universal Value.

The land parcel system set up by the Greek colonisers has been respected over later periods. Agricultural activity in the chora has been uninterrupted for 24 centuries up to the present day, and is mainly based on grapes and olives.

The ensemble today constitutes the cultural landscape of a fertile cultivated plain whose territorial organisation is that of the Greek colonisation.

Criterion (ii): The land parcel system, dating from the 4th century BC, of Stari Grad Plain bears witness to the dissemination of the Greek geometrical model for the dividing up of agricultural land in the Mediterranean world.

Criterion (iii): The agricultural plain of Stari Grad has remained in continuous use, with the same initial crops being produced, for 2400 years. This bears witness to its permanency and sustainability down the centuries.

Criterion (v): The agricultural plain of Stari Grad and its environment are an example of the ancient traditional human settlement, which is today under threat from modern economic development, particularly from rural depopulation and the abandonment of traditional farming practices.

The Greek cadastral system has been fully respected during the continuous agricultural use of the plain, based on the same crops. This system is today perfectly identifiable, and has changed very little. The Stari Grad Plain forms an agricultural and land use ensemble of great integrity. The authenticity of the Greek land division system known as chora is clearly in evidence throughout the plain. The built structures of the stone walls are authentic, with the same basic dry stone wall materials being

used and reused since the foundation by the Greeks.

The setting up of the management plan and of the authority in charge of its application should enable the carrying out of a thorough programme of archaeological excavations, the fostering of sustainable agricultural development in the chora and the control of urban and tourism development in the vicinity of the property, with all due care being taken to ensure that its Outstanding Universal Value is respected. (UNESCO cultural landscapes - web-page)

4.4.3 Conclusion

In defining landscape according to the IUCN system Category V "Protected areas", mainly the protection due to outstanding natural qualities of a landscape, in fact nature reserves of different types and less landscapes characterised by cultural values and visual attractiveness, are concerned. Thus, according to the IUCN system, landscapes are mostly defined only unilaterally and mainly from the aspect of conservation of biodiversity and natural heritage.

UNESCO's cultural landscapes are areas related to outstanding landscapes as particularly selected landscapes with a high value. However, their definition and criteria for selection are significantly different and mainly apply to cultural heritage and its protection. Outstanding landscapes are also selected at the global level meaning a completely different level of evaluation.

The selection of UNESCO's cultural landscapes covers only universal values at the highest level (world heritage). The Mediterranean outstanding landscapes (OLM) would, however, cover the regional level of great significance (the Mediterranean as a region) which has so far not been particularly emphasised and dealt with. In the Mediterranean, we would like to ensure that by means of evaluation of landscapes of high value these are dealt with at the intermediate level between the national and higher – European and global levels. Thus, we will also encourage the implementation of the contents at the national level of Mediterranean countries, since with OLM, we would like to encourage the individual Mediterranean countries to evaluate their landscapes and define them as OLM due to the significance of outstanding landscape at the national level. Some OLMs will be of great importance at the regional – Mediterranean level, whereas others have a potential to become outstanding landscapes at the highest level or of universal importance.

The legal basis for defining outstanding landscapes is also specified in the European Landscape Convention as an international legislation from the field of landscape. Defining the outstanding Mediterranean landscapes, therefore, also presents the implementation of provisions and aims of the European Landscape Convention and thus also ensures the identity and the European landscape heritages of the highest value.

The coastal landscapes are especially emphasised in the ICZM Protocol within the framework of the Barcelona Convention. It is legally defined that the coastal landscapes must be defined and protected in order to ensure their full protection, spatial planning and management.

By defining and protecting the outstanding Mediterranean landscapes, the obligations of the international legislation would thus be met and the efficient implementation of the ICZM Protocol within the framework of the Barcelona Convention and the European Landscape Convention ensured.

4.5 National experience

Some countries have for quite some time been working on the contents of the definition of landscapes of high value which can present an identity and recognisability of the country. These contents were first dealt with by Great Britain as early as in the 60s of the previous century. They began defining areas of high value as "Areas of Outstanding Natural Beauty". Later, some other European countries, such as Switzerland, Germany, Austria and Slovenia, also followed this example.

Here, the English and Slovene experience in the field of defining outstanding landscapes will be presented.

4.5.1 Areas of Outstanding Natural Beauty – Great Britain:

The Countryside Commission *(Landscape Assessment,* 1991) with a long tradition in Great Britain in the field of evaluating and protecting landscapes provides the following criteria for defining protected landscapes (*AONB - Areas of Outstanding Natural Beauty*):

- landscape as natural resource;
- landscape of scenic quality;
- landscape occupying a high priority place in opinions of professional and laic public;
- landscape comprising specific values (natural protection, cultural associations and specific fields of heritage protection).

The Countryside Commission states that landscapes characteristic of a certain landscape are worthy of being classified among protected landscapes at the national level. It particularly underlines the importance of including the public in defining landscapes of high value which is understandable considering the purpose of defining these landscapes: these should be areas with a high experience value, natural protection and possibilities for tourism and recreation.

The National Association for Areas of Outstanding Natural Beauty was also established for an efficient activity and inclusion of the public in the field of outstanding landscapes. The National Association for Areas of Outstanding Natural Beauty (NAAONB) was formed in 1998 as an independent organisation to act on behalf of Areas of Outstanding Natural Beauty (AONBs) in England and Wales.

Its membership is largely composed of representatives from local authorities whose boundaries include AONBs and who are concerned to improve their management and funding arrangements. The Association is administered by a Management Board and holds an Annual Conference, which provides an opportunity for those working in AONBs to join together and address issues of current concern.

The Association also works through Joint Accords with the Association of National Park Authorities and other major organisations to establish agreements over issues which directly affect the work of AONBs.

Map D3: Areas of Outstanding Natural Beauty, Great Britain

4.5.1 Outstanding landscapes of Slovenia

A multi-annual project of typological definition and evaluation of all Slovene landscapes - Regional Distribution of Landscape Types in Slovenia (1998) commissioned by the Ministry of Environment and Spatial Planning and prepared by the Institute of Landscape Architecture, Biotechnical Faculty, University of Ljubljana, was launched very early in the beginning of the 90s prior to the formation of the European Landscape Convention. The project describes different landscapes, landscape types and patterns also preparing guidelines for planners according to individual landscape regions or typological units.

The typological system of landscapes was built on gradual inclusion of the most important elements that create the landscape structure and thus consequently the landscape pattern. The key elements considered were the climate, relief and the surface cover or land use. The evaluation of landscapes was performed by evaluating the basic landscape units with the purpose of defining value designations of individual landscapes and consequently preparing the guidelines for the development or protection of the landscape in the process of spatial planning at the national, regional and local level.

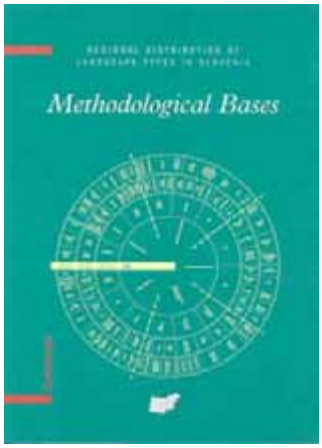


Figure D3: Regional Distribution of Landscape Types in Slovenia, 1998

Criteria for the Typological classification procedure

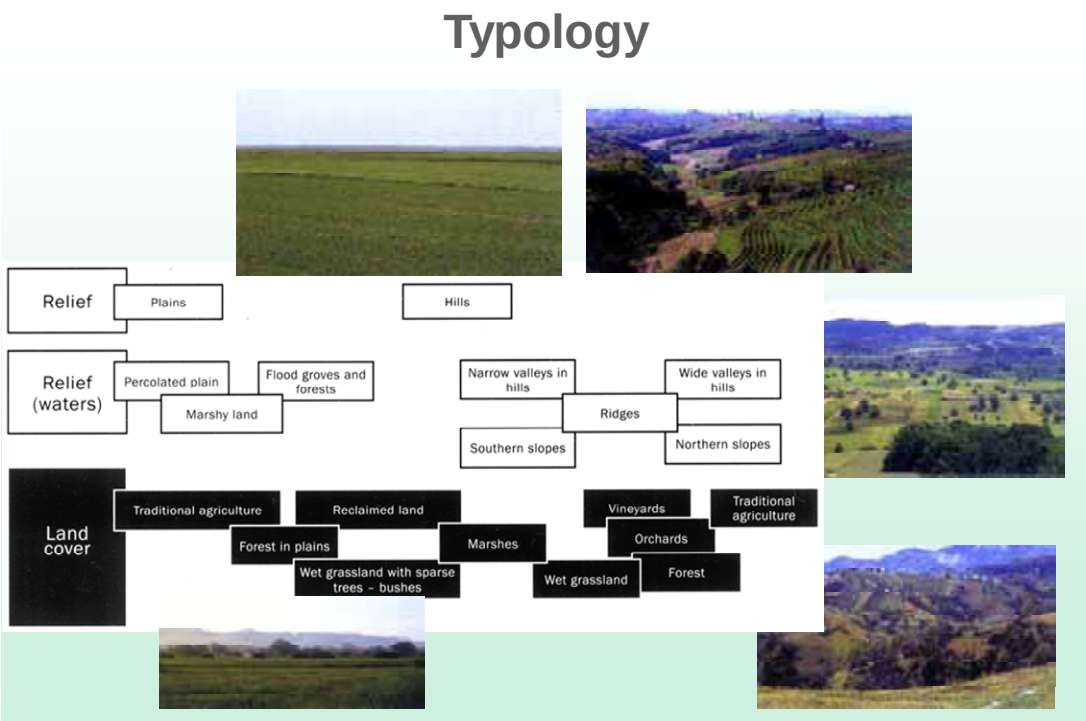
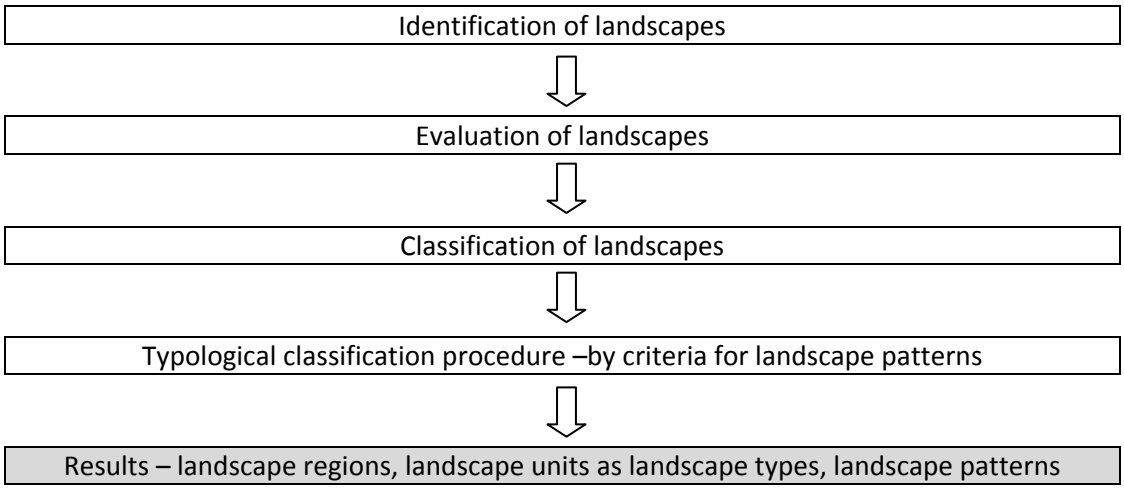


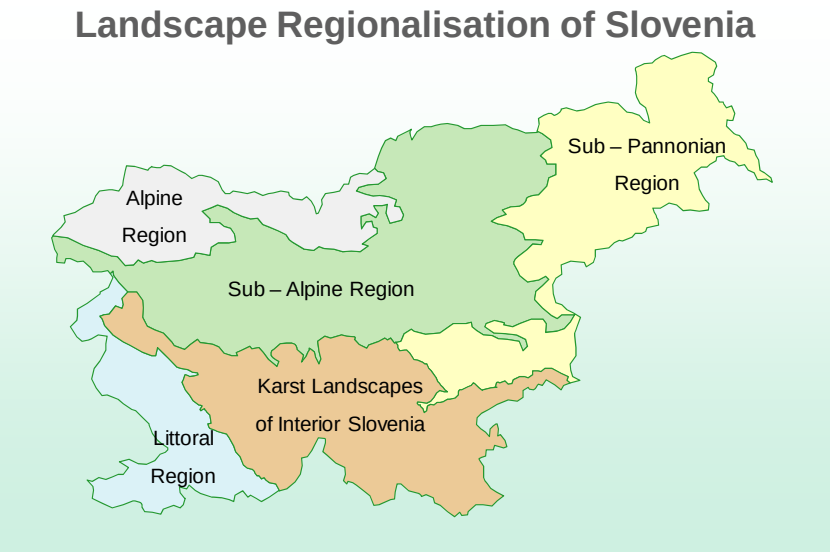
Figure D4: Schematic presentation of criteria for the Typological classification procedure

Procedure of the typological landscape classification:

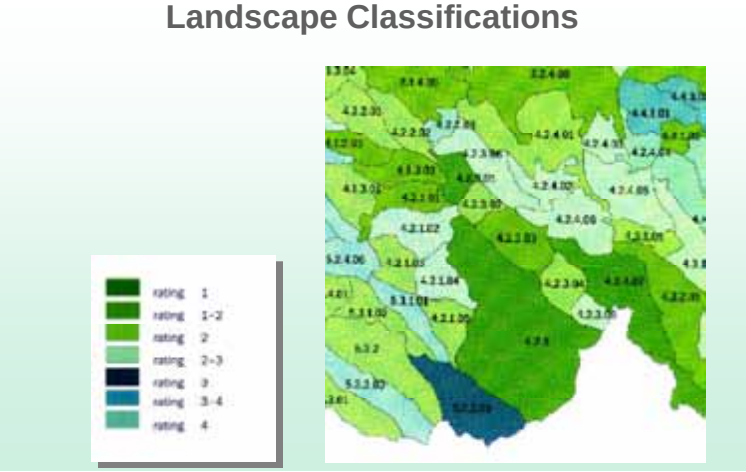


The study *Regional Distribution of Landscape Types in Slovenia* provided the typological classification of Slovene landscapes at three levels:

- National level (level 1): Slovenian landscapes are distinguished in five basic landscape areas, and they are predominantly determined by climate (Alpine landscapes, Sub-Alpine region, Sub-Pannonian landscapes, Karst landscapes, Coastal region landscapes or Sub-Mediterranean landscapes).
- Regional level (level 2): Wider landscapes are defined (the criterion of relief is considered). Landscapes are classified into 20 wider landscape units.
- Local level (levels 3 and 4):
  - Basic landscape units are defined – level 3 (the criterion of land cover is considered), and
  - Landscape patterns as the smallest landscape units – level 4 (the criteria of micro relief characteristic and specific structural characteristic are considered).



Map D4: Five basic Landscape areas (regions) of Slovenia (1. level)



Map D5: Landscape patterns (3. Level) – section

This project was followed by the study *Outstanding Landscapes in Slovenia* (1999) prepared by the same institute. They defined the most valuable and the most typical landscapes of Slovenia which present the Slovene identity and are recognised also at the European and in some cases also at the global level.

The Strategy of Landscape Protection in Slovenia (Ogrin, 1996), within the framework of which a working proposal of a national list of Slovene outstanding landscapes was prepared, underlined the following as criteria for the selection of outstanding landscapes:

- landscapes of a structural value which can also be apprehended as a visual quality and is materialised in the complete or unique landscape pattern;
- landscape with a high level of harmonisation between land use and natural characteristics;
- landscapes with different aspects (economic, ecological and cultural) built in their structure in an appropriate proportion;
- landscapes with the authentic structure, i.e. the traditional parcel structure with a high value of testimony;
- landscapes which are outstanding due to specific natural or cultural characteristics;
- landscapes with urban pattern corresponding to the landscape pattern of an open area;
- landscapes with bigger architectural elements well integrated in the landscape;
- landscapes with the extremely expressed landscape structure;
- landscapes with a complex structure creating the diversity within the same structural unit, e.g. different forms of vegetation – forest, tree clusters, scrubs, etc.;
- landscapes with a clearly readable pattern of a certain social order in the landscape structure;
- landscape as containing a certain symbolism;
- landscape representative for a certain region;
- landscape which is important as a subject for education and training of public or research work due to its outstanding structure;
- landscape with a certain prospect for survival for which adopting measures for its protection can be successful.

Defining the concept of "outstanding landscape" according to the Slovene study "Outstanding Landscapes in Slovenia":

Outstanding landscape *is an area of a high scenic value as a reflection of its unique structure usually with the presence of the following elements:*

- *uniquely organised land use, particularly regarding the adaptation to natural conditions,*
- *appropriate part of natural elements,*
- *specific settlement pattern.*

The final list of criteria for outstanding landscapes in Slovenia referred to in the study *Guidelines for Management of Outstanding Landscapes* (Hudoklin, 1998) is as follows:

- landscapes presenting traditional ways of life and use of land adjusted to the natural landscape structure;
- landscapes with visually expressed settlement patterns and visually exposed architectural elements;
- landscapes with symbolic, cultural and associative values which have a great share of experience value (natural structure, cultural values);
- landscapes which are unique at the regional, national and even broader level;
- landscapes with the outstanding natural structure;
- landscapes with the consistent landscape structure enabling setting of spatial boundaries;
- landscapes with a significant national recognisability.

Based on these criteria, the outstanding landscapes in Slovenia were selected. The current list contains slightly below 100 smaller in size landscapes. (Map, No.6)

Map D6: Outstanding Landscapes in Slovenia, 1999 (Ministry of the Environment and Spatial Planning)

The outstanding landscapes in Slovenia can be typologically classified into field landscapes, meadow landscapes, landscapes of permanent crops, populated landscapes, saltpan landscapes and landscapes with an outstanding natural structure. The spatial issues, the desired state and guidelines for the protection or maintenance of these landscapes are defined for each type of outstanding landscape. Outstanding landscapes in Slovenia comprise small areas and the objective of management of these landscapes is their maintenance and thus preservation of outstanding landscape characteristics of Slovenia.

5. Criteria for the definition of outstanding landscapes

The outstanding landscapes are mostly cultural landscapes usually created as a result of different forms of a traditional land use. They are characterised by a high degree of adaptation of a cultivation method to natural structure and processes (sustainable cultivation) which is nowadays mainly replaced with modern cultivation technologies. This can be most explicitly seen in the field of agriculture with the highest degree of transformation of natural structure.

The protection of cultural landscapes of the highest value formed by means of the traditional land use requires the necessary protection of the basic landscape patterns characteristics. Rare, unique or extremely characteristic and endangered patterns of the landscape structure are usually defined as outstanding cultural landscapes. The highest values are coherent spatial relations between cultivated and settlement areas and consistent implementation of established methods of land cultivation. This is reflected in clear boundaries between settlements and farmlands, a high degree of a spatial order, articulation of spatial elements and in recurring elements of the landscape structure, such as: the cultivated terraces, parcel structure, raster of tree planting, etc., or in the different landmarks in the landscape, such as: churches on peaks, castles on exposed locations, residential villas or other buildings, towers, lighthouses, etc.

When formulating the criteria for defining the outstanding landscapes as the most valuable cultural landscapes, one shall rely on both the rational - cognitive and irrational - subjective expressions. We should take into account that in the landscape typology, and in the defining of outstanding landscapes, the landscapes (or landscape units) are classified and valuated not only on the basis of the objectively defined data on landscape structures, but also on the basis of personal professional experiences based on the observations and understanding of the space.

Landscapes of great values should be defined in the transparent and objective procedure and in the general level (on the basis of certain criteria), although the specialness and uniqueness are essential characteristics of outstanding landscapes.

Based on the international experience, the main characteristics, which could be used for the evaluation of landscapes as outstanding landscapes, are the landscapes that:

- represent the traditional forms of dwelling and land use, adapted to the natural landscape structure;
- have symbolic, cultural and associational values;
- have great impressionable values (natural structures, cultural values);
- have a unique or visually valuable structural pattern;
- are unique on the regional, national or even broader scale;
- have special values of natural landscape structures;
- have special values of cultural landscape structures;
- have authentic structure in terms of the old land subdivision;
- have historical, memorial, archaeological and similar qualities;
- have visually distinctive patterns of settlements and visually expressive architectural elements;
- have a consistent landscape structure which enables their spatial limitation;
- have a high landscape complexity in a harmonious spatial context;
- are of great importance for the national or even international identity;
- are of importance for the public education.

5.1 Evaluation and classification of landscapes

The selection of landscapes for the classification into the highest class within a certain spatial category means finding the most outstanding landscape units. This is an evaluation procedure with the criteria presenting the basic working instrument. The most desired characteristics of the landscape are presented within the category of outstanding landscapes. These are a sort of value characteristics which are readable in the landscape, comparable and enable the transparency, recurrence and objectivity of the evaluation procedure.

Reasons for the selection of criteria for defining the outstanding landscapes

The identification and evaluation of landscapes, which should be classified into the category of landscapes of specific value, should be performed according to the procedure which should be as clear, recurrent and objective as possible. Therefore, a system of the appropriate criteria should be introduced. Above all, the defining characteristics of landscapes to be classified among outstanding should be specified and prepared as criteria while their use in the further procedure of defining the outstanding landscapes must be foreseen.

It is important that the criteria for defining outstanding landscapes are based on the recurrence of certain characteristics of the landscape. In defining these criteria, it should be firstly ascertained which characteristics and spatial elements are connected with the concept of outstanding. Some of them appear frequently in the landscape; they function as a rule and can be extracted as defining without much difficulty. Others, on the contrary, appear explicitly once and as such cannot be designated as criteria but should be dealt with in different assessments. The significance of unique phenomena should also be mentioned, since they are usually potentially defined as outstanding in the landscape and have a very high value.

When defining the criteria, one should also comprise designations/characteristics which will be defined in an identifiable and rational way as well as designations with experience and irrational characteristics. Last but not least, in the typology and definition of outstanding landscapes the experience of space, i.e. based on its observation and perception, are taken into account.

According to different known experiences of Slovenia and other countries in the evaluation of landscapes, the basic criteria for classification of individual areas among the landscapes of specific values or outstanding landscapes can be defined.

A list of criteria for defining the Mediterranean outstanding landscapes was prepared on the basis of the following projects: *Regional distribution of Landscape types in Slovenia* (1998); *Outstanding landscapes of Slovenia* (1999); and *UNESCO world heritage – cultural landscapes,* as well as with taking into consideration the aims of the Barcelona Convention and the European Landscape Convention.

Thus, the following landscapes should be classified into the category of Mediterranean outstanding landscapes based on the following eight criteria:

- landscapes expressing the traditional ways of life and cultivation adapted to natural structure;
- landscapes having visually distinctive settlement patterns and exposed architectural elements;
- landscapes having symbolic, testimonial, cultural or association values;
- landscapes of a high experience value (natural structure and created values);
- landscapes which are unique at the regional, national or even broader level;
- landscapes of specific values of the natural landscape structure;
- landscapes with the consistent structure which can thus be clearly delimited in the space;
- landscapes with the national identity.

5.2 Description of criteria for outstanding landscapes [1]

Traditional ways of life and sustainable cultivation

This criterion includes components of cultural landscapes expressing the human activity, particularly living and food cultivation. These very types of structures are characteristic of a large part of landscapes of the highest value: they express ways of life, tradition, practices, level of development, and last but not least, human's attitude towards the land in past and today.

1) Criteria for the definition of outstanding landscapes are prepared on the bases of the study "Izjemne krajine Slovenije"/ Outstanding landscapes of Slovenia (Ogrin,1996,1999) and "Usmeritve za urejanje izjemnih krajin v Sloveniji" / Guidance for management of outstanding landscapes in Slovenia (Hudoklin, 1998).

Settlements or a method of placing settlements in the landscape and their internal structure, which is mainly the result of human adjustment to natural spatial conditions, are classified among the traditional ways of life and activity or cultivation. This criterion comprises the most significant form of the landscape – the cultural landscape expressing natural conditions and human ability to survive in these conditions, provide for food and ensure existence and development. The traditional cultural landscapes and their components express a high degree of ecological balance and visual coherence and usually have a high experience value. The World Heritage Center classifies the fossil and continued landscapes among the outstanding landscapes; a fossil landscape shows characteristics of a certain past period, whereas in a continued landscape development courses from the past are transferred to the present time.

This criterion identifies the landscape structures reflecting the forms of food production, land cultivation, ways of life as well as religious needs of the past periods or residents of a certain area. The current way of life in such areas is different and thus the landscape structures are endangered. They are often only a more or less useless trace or a relict, although they are a precious document on the culture and history of a nation. This criterion could, for example, be used for defining saltpans along the coast, fruit growing or olive tree terraces, different distinctive examples of the traditional parcel structure and probably also areas where castles, manors or churches have a specific role due to their visual exposure and cultural and historical associations.

Photo D87: Sečovlje saltpan – Slovenia

Photo D88: Ibla, Sicily - Italy

Visually exposed settlement patterns and architectural elements

Landscape classified into this category together with settlement patterns expressing the settlement culture of individual areas and a certain period has specific values due to its visual exposure of these values with more often visited places or communications.

Such landscapes can often present a source of quality experiencing of landscape for a great number of people. This, however, does not mean that a hidden or maybe almost inaccessible or for other reasons poorly known landscape has a lower value. It could be said that a settlement with preserved morphological structure and traditionally coherent connections to farmlands, which is apart from the coherent and valuable spatial structure also visually exposed, but in comparison higher landscape values has a greater significance from settlement of the same quality whose position and morphology cannot be identified from accessible view spots. An example of such a landscape is Cinque Terre, Italy.

Such landscapes are characterised by their vulnerability to activities which can change their structure or landscape image and at the same time decrease the value of surrounding landscapes, which can be found in the same field of vision.

Photo D89: Cinque Terre bay, Italy

Photo D90: Cinque Terre, Italy

Symbolic, testimonial, associative and cultural values of landscapes

In the landscapes which are defined with this criterion, associations referring to the culture and history of a nation play a specific role. They are connected with actual events in the history (medieval castles, manors, etc.) or their interpretation in literature (stories, tales, and legends) or other symbolic meanings (mountain peaks, gulfs, cliffs, etc.). This criterion perhaps proves most explicitly the subjectivity of value assessments and their dependence on social conditions and value systems of a certain environment.

The evaluation of landscapes thus includes completely physical sensory perceptions (sight, hearing and smell) as emotional (association) reactions. Landscapes meeting both criteria mostly remain imprinted on our memory. Visual reactions in particular refer to the structure of shapes and the quality of light and colour. But the reaction to landscape is not only visual. Human memory can increase the enjoyment of experiencing again or make you angry because of new changes. Associations also play a certain role; the landscape is perceived more intensively in a view from ditches of Troy to the plain where Greeks used to fight or when walking along the Roman wall in Cumbria than in a view of the landscape just as such. (*Crowe, S., Mitchell, M.,* 1988).

Photo D91: Andalusia, Spain

Photo D92: Nafplio, Greece

High experience values

This criterion mainly refers to the beauty and coherence of landscapes which can mostly be defined subjectively. Areas with a very complex landscape structure with its elements appearing in coherent relations have high experience values. They also form diverse and harmonious visual scenes in which man-made elements are blended with the natural structure of landscape (e.g. location of settlements in landscape, adaptation of cultivation terraces to the natural relief) or create a tension in contrast relation thus accentuating symbolic and religious meanings of individual objects in the landscape (e.g. a church on peaks of rises, castles on relief piers and slopes, manors with property or designed garden architecture, etc.)

These are above all landscapes with a high level of landscape diversity of natural structure of landscape and man-made elements (natural relief forms, micro relief, cultural terraces and other relief elements with a defined spatial order, retaining walls, strips, hedgerows, individual trees, riverside vegetation, articulated forest edges, surface waters with banks, etc.) Here, mutual relations of individual elements forming a spatial order are significant with more or less harmonious, coherent landscape scenes or those which are in any other way interesting landscape scenarios.

Human reaction to the beauty of the landscape is emotional and connected with all senses: sight, smell, hearing and touch, which all play their roles in the perception of the landscape. Merely visual aspects of landscapes are the easiest to assess, since they can be assessed based on the already established criteria of composition, structure and colour. Parameters of the landscape structure are very complex; thus only reactions to patterns clearly expressing activities and natural processes created are direct and immediate.

Nevertheless, the Countryside Commission, for example, underlines this criterion as the basic characteristic of outstanding landscapes. They are already defined in this way by their name (AONB - Areas of Outstanding Natural Beauty) although in their definition different association values rather than only this aspect are obviously concerned. Well-founded unified criteria for the beauty of the landscape are particularly difficult to define, since the reactions of observers to it are very different not only based on visual perception. However, this criterion must be agreed upon and defined among evaluators at the national level.

Uniqueness

Uniqueness refers to the phenomenon of outstanding structure (natural or created by means of human activity) defining a certain landscape among all others as outstanding and unique. Unique and characteristic landscapes also represent a territory of a certain nation and as such can often be recognized as having the highest level of national identity.

The definition that the landscape is “unique in the Mediterranean region” is as a criterion for defining the outstanding landscapes significant and unambiguous. However, this criterion must be used for defining landscapes with special attention: every landscape can be really unique in a certain area, but it must be classified according to these criteria as unique in its typological group. By means of this criterion, it should be defined in general – i.e. at the national level or even at the level of the entire Mediterranean region rather than only in a certain small area at the local level. These are thus examples of landscapes with very outstanding structures defining this landscape as unique.

Photo D93: Palagruža island – Croatia

Photo D94: Beach on Palagruža island

Photo D95: Palagruža cliff with a church as a landmark

Photo D96: Kornati islands, Croatia

Specific values of natural landscape structure

Some cultural landscape areas of a high value resulting from an outstanding landscape structure can also be logically classified into this category of landscapes of specific value. Land use and activities have been fully adapted to this natural structure or even remained completely natural without human interventions.

There are certainly several such examples in the Mediterranean region which are perhaps most known to a broader public: (example: Santorini island - Greece). These are usually extensive areas with impressive natural relief forms, which can be of volcanic origin, and other unique or rare elements to which the land use was fully adapted in the past.

Photo D97: Baix Ter Illes Medes, Spain

Photo D98: Telašćica National Park, Croatia

Consistent structure, clear spatial boundaries

Consistency and contiguousness of landscape which should be classified into the category of outstanding landscapes are essential in defining the area alone, since one of expressions should be landscape structures of specific value according to which an individual area differs from the remaining landscape.

Boundaries of outstanding landscapes are significant also at later stages, namely, in the operational sense when defining the modes of maintenance and different measures, rules of behaviour, development possibilities, etc.

Photo D99: Almeria, Spain

Photo D100: Santorini, Greece

National identity

Landscape as a place of nation's life and activity and self-realisation contains important elements of identification with its living environment or wider areas.

The category of outstanding landscapes should include all landscapes which are known to the broader and professional public and landscapes for which, based on the professional criteria, the explicit representation of elements with which an individual nation is identified can be ascertained, as well as the elements of cultural structure characteristic of individual areas of a land which is already diverse as to the landscape.

Such elements are, for example, churches on the hills, castles, manors, lighthouses, elements for making hay, for harvesting the crops in vineyards, parcel structure of agricultural lands and its spatial expressiveness, and last but not least, settlement culture with a high degree of adaptation to natural conditions.

Photo D101: St. Stefan view, Montenegro

Photo D102: St. Stefan area, Montenegro

5.3 Implementation of criteria for the selection of outstanding landscapes

The term "outstanding" is relatively difficult to comprise with generally applicable criteria, but it can be defined by means of classification into individual values. A set of criteria for the identification and evaluation of landscapes of the highest value, which is presented in chapter four of the study (see chapter 4.2), presents in more detail and classifies different aspects of landscape values of the greatest importance.

For the performance of identification and evaluation of Mediterranean outstanding landscapes, we suggest considering the criteria referred to in order to ensure the most comprehensive selection of values for outstanding landscapes. The criteria can also be considered in different ways (fewer of them can be comprised) depending on the available time, professional staff and material possibilities. The additional classification of criteria (into more detailed criteria) is also possible as well as the adjustments of a list of criteria by means of which, for example, the highest level of objectivity should be used in the evaluation procedures. This is particularly important considering the fact that a large number of professionally qualified colleagues must be included in such an activity due to a very extensive field under consideration.

Classification into the category of outstanding landscapes according to transparent procedures and based on the predefined criteria is the only way for achieving the greatest degree of objectivity in the evaluation procedure as well as its verifiability and recurrence. Apart from that, the phenomenon of outstanding landscapes of specific values is in the landscape connected with a series of subjective definitions which cannot always be placed within the frameworks of objective decisions on the value.

Thus, a wide range of criteria must be considered in evaluating each individual landscape. Also, the following should be used in adopting a decision:

- yes / no (an individual area is classified among outstanding landscapes or not);
- by means of a multi-level scale or a semantic differential.

For every region it can be based on the field work and knowledge of specific spatial and social conditions rather quickly ascertained whether it meets the criteria for classification among outstanding landscapes or whether according to individual criteria ranked within the range 1-5 (1 – the highest, 5 – the lowest value) a certain area achieves the ratings from 1 to 3. For example:

Characteristic landscapes	1	2	3	4	5	non-characteristic landscapes
Unique landscapes	1	2	3	4	5	usual landscapes
High association values	1	2	3	4	5	low association values

Figure D5: Main criteria for classification among outstanding landscapes

A quite established evaluation method includes using ratings for evaluating individual areas according to individual criteria – example:

Table D2: Criteria for classification of landscapes among outstanding landscapes

Criteria for classification of landscapes among outstanding landscapes	ratings* (A – E)
Traditional cultivation forms, adaptation to natural structure	
Distinctive settlement patterns, visually exposed elements	
Symbolic, testimonial, cultural or association values	
High experience value	
Uniqueness at the regional, national or even broader level	
Specific values of natural landscape structure	
National identity	

*ratings from the scale:
A – outstanding, high level
B – large, high
C – medium
D – small, low
E - irrelevant

Each area which should be classified among outstanding landscapes should at least with one criterion achieve the value “A”, i.e. the outstanding value.

The criteria should also be explained in writing so that they are verifiable and the procedure can be entirely repeated. This evaluation method is the most transparent and therefore the most recommended. It was also used in the presentation of outstanding landscapes (see chapter – Case study) in this study.

Landscapes with the already ascertained inappropriate state in the space (degradation) and a great potential to have a specific value by means of appropriate rehabilitation could also in general be classified into the category of outstanding landscapes. In such areas, which are endangered by the existing inappropriate use measures for the improvement of the state, are all the more necessary.

Such selections should certainly be prepared by landscape architects or other qualified experts with a proper professional qualification and a quite unified and well-founded system of values in this field.

6. Methodology for the selection of outstanding landscapes

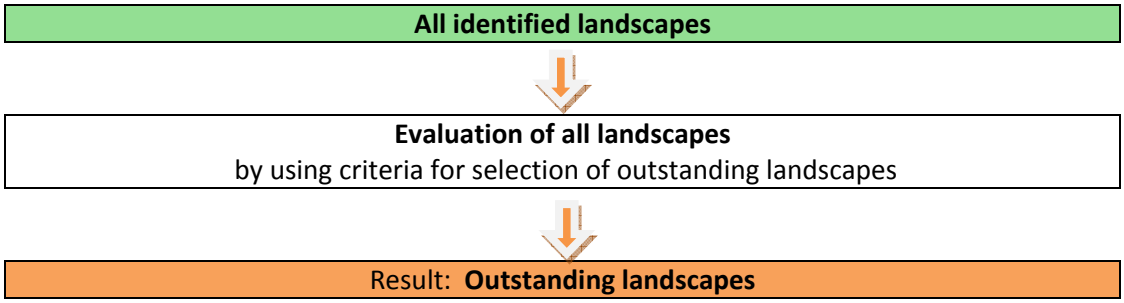
Characteristics and the value of outstanding landscapes are in their uniqueness and outstandingness which principally requires an in-depth treatment of each outstanding landscape separately. Apart from the clearly set criteria for the selection of outstanding landscapes, the knowledge of issues of outstanding landscapes and the state of landscapes in the area dealt with is required.

For a more detailed analytical evaluation of all outstanding Mediterranean landscapes of specific values, an extensive field work and a prompt agreement upon and considering of decisions on the classification of individual areas among those of high value or outstanding, on the desired state of these landscapes and on the possibilities for their realisation must be foreseen.

The specification of the desired state of individual landscapes and instruments for their realisation is possible only based on a thorough evaluation of these areas and the knowledge of actual possibilities for the realisation of the desired state.

An important source of information on this are also competent administrative units at the local, regional and national level, institutions for the protection of the heritage and nature, and other institutions dealing with the issues of these areas (e.g. the reasons for the protection of traditional agricultural landscapes, development tendencies of different activities, the social and demographic structure and other potentials).

Procedure for the selection of outstanding landscapes



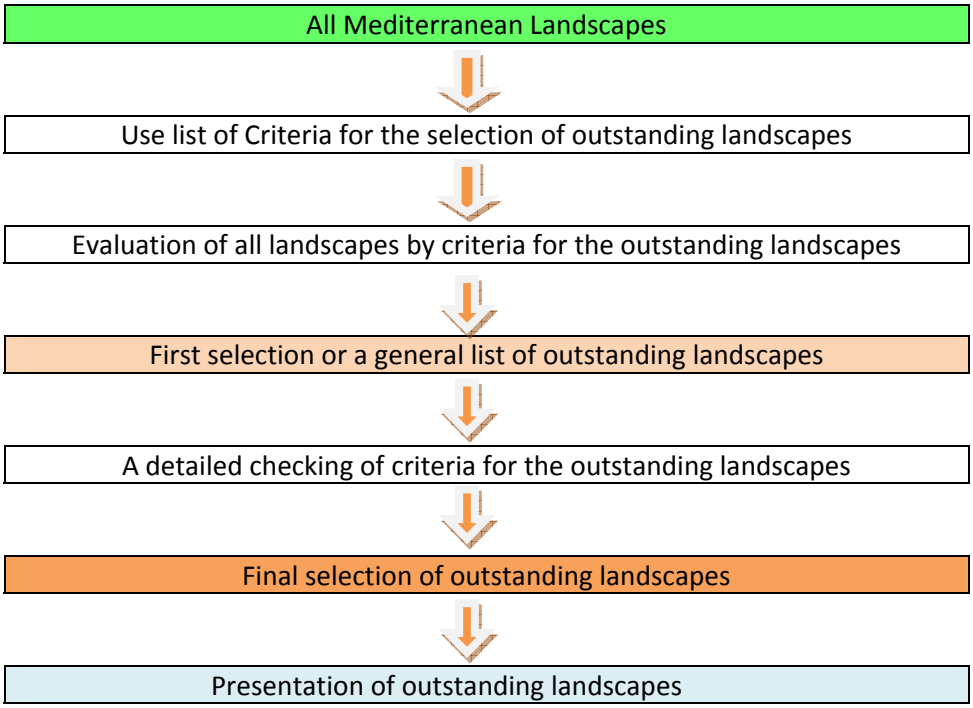
6.1 Working procedure

Defining of outstanding landscapes comprises above all the identification, evaluation and defining of desired states of outstanding landscapes and guidelines for their protection.

The working procedure for the evaluation and selection of outstanding landscapes is as follows:

All the already identified or even typologically defined Mediterranean coastal landscapes in an individual region or a country should be considered as a basis. Based on the list of criteria for the outstanding landscapes (included in this study), the first rough selection of landscapes which could be classified among the outstanding landscapes is performed. It is followed by the identification of each individual potentially outstanding landscape by means of a scale of a wide range of criteria and assigning of value ratings. Then the final selection of the outstanding national landscapes, which could be the highest ranked ones and professionally founded, should be defined. A description should be prepared for all outstanding landscapes while the boundaries of the area, maintenance guidelines and management of these landscapes should be defined.

Schematic presentation of the entire working procedure:



A detailed description of the working procedure

All Mediterranean Landscapes

The first step in the working procedure of defining the outstanding landscapes of a particular area, region or a country is the identification of all landscapes and the definition and checking of their state. The landscapes must be classified into individual landscape types and, more specifically, also into individual landscape patterns and delimited, or their spatial boundaries must be set. Some countries have already performed this definition of landscapes and their classification into individual landscape types and identified these landscapes in the form of an atlas of landscapes at the national level.

Use list of Criteria

The next step is to use a selection of criteria for defining the outstanding landscapes. In the study, a fundamental and comprehensive selection of all criteria of the utmost importance described in more detail and with their meaning was prepared. A proposal of a form for the evaluation and presentation of outstanding landscapes (see p.279) listing the criteria and including them into a systemic form of the entire presentation for an individual outstanding landscape was also prepared. An example of the evaluation based on the criteria for an individual outstanding landscape referred to is presented in chapter seven (Case Study).

Evaluation of all landscapes

Based on the criteria, the evaluation of landscapes is performed by means of value ratings for an individual criterion as explained in the previous chapter – Implementation of criteria for the selection of outstanding landscapes.

In defining the outstanding landscapes, their spatial extent must be defined, i.e. their boundaries must be set. Here, the boundaries of areas presented with the landscape patterns, or the boundaries of landscape regions, can be considered. However, visual characteristics of these areas remain of the utmost importance and thus their visibility and visual exposure, which is not always equal to boundaries of the landscape regions or patterns. The boundaries of landscapes of specific value can be set in the context of scenes, fields of vision and visual contacts (considering the most visited places and the most important starting points of observation).

First selection or a general list of outstanding landscapes

In defining the first rather rough – general set of criteria, the following rapid method for the classification of landscapes into the first selection of potential outstanding landscapes can be used.

Based on the field work and knowledge of specific spatial and social conditions, it can be quite rapidly ascertained for each area or landscape whether it generally meets the criteria for the classification into outstanding landscapes. The decision is adopted by means of YES or NO.

Characteristic landscape	YES or NO	non-characteristic landscapes
Unique landscape	YES or NO	usual landscapes
High association and visual values	YES or NO	low association and visual values

Figure D6: Main criteria for the first general selection of outstanding landscapes

If at least one of the categories is defined with YES, the landscape should be classified into the first selection of outstanding landscapes.

Detailed checking of criteria for the outstanding landscapes

When the first selection of outstanding landscapes - First selection of outstanding Mediterranean landscapes is prepared, all potential outstanding landscapes should be verified or evaluated by means of a list of value ratings of all criteria for the outstanding landscapes. Here, it must be considered that each area which should be classified into the final selection of outstanding landscapes should at least with one criterion achieve the value "A", i.e. the outstanding value.

The more demanding criteria, namely, that an individual landscape must meet at least 2 or 3 different criteria with the value "A" in order to be classified among the outstanding landscapes, can also be set.

Criteria for the classification of landscapes among the outstanding landscapes	ratings* (A – E)
Traditional cultivation forms, adaptation to natural structure	
Distinctive settlement patterns, visually exposed elements	
Symbolic, testimonial, cultural or association values	
Specific values of natural landscape structure	
High experience value	
Uniqueness at the regional, national or even broader level	
National identity	

*ratings from the scale:
A -outstanding, high degree, B - large, high, C - medium, D - small, low degree, E – irrelevant.

Final selection of outstanding landscapes

Based on the identification of all landscapes inscribed on the list of outstanding landscapes, a whole expert group of landscape evaluators adopts a decision and confirms the final selection of outstanding landscapes in a certain region. Then, a full description and presentation of each individual outstanding landscape must be prepared for all these landscapes.

Presentation of outstanding landscapes

Each outstanding landscape must be described in detail and its spatial issues defined. The desired state of a landscape, the guidelines for its maintenance and preservation of landscape characteristics should also be provided. For this purpose, the form for the evaluation and presentation of outstanding landscapes (see the Form proposal) can be used defining the following:

- **State – description of an area:** To describe natural conditions, cultural characteristics, boundaries of an area, the cultural landscape structure, location, value definitions and characteristics of the outstanding landscape. Photographic documentation and presentation of a landscape and wider area must also be included.
- **State – graphical presentation:** A cartographic presentation of a landscape with boundaries must also be provided. If there is some more graphical material available, aero shots and other archival maps or photographs can also be added.
- **Value definition of criteria for the selection of outstanding landscapes**: Specifying ratings for an individual criterion and supporting them by means of a description.
- **Typological group:** Defining the typological group into which an outstanding landscape is classified.
- **Vulnerability:** Specifying the threats to the landscape (the activities or other spatial influences), the level of vulnerability defined (high/medium/low) and land use which should remain as it is or specify the expected land uses. It can also be stated that the outstanding landscapes are not endangered by any activity or any other spatial influences if such a state of the described landscape is identified (not vulnerable).
- **Importance:** The importance of outstanding landscape or its classification according to the significance - local, regional or national or even broader – the European or international importance should be defined.
- **Protection category:** It should be stated whether the area or any of its parts have been legally protected in a form of a natural or cultural heritage or any other form of the legal protection.
- **Target or a desired state:** Here, the expected target or desired state of outstanding landscape must be specified. We can also state the wish to preserve the existing state or suggest the expected land use (activities) for this area.
- **Special characteristics:** Different characteristics of outstanding landscapes, possibilities for the introduction of relevant guidelines and other characteristics, if any, can be specified.

A detailed explanation of defining the outstanding landscape vulnerability

When evaluating an individual outstanding landscape, actual and expected conflicts of development interests must be identified and the level of vulnerability assessed. As for the criteria for evaluating outstanding landscapes, these decisions can also be supported and described with YES / NO or with definitions (vulnerable/not vulnerable) or by means of a multi-level scale (e.g. high, medium, low or insignificant level of vulnerability). We should warn of any existing endangerment (if inappropriate use or the existing irrevocable changes in the landscape structure, which should be removed or restored, are ascertained) or an unforeseen endangerment (if a very great potential for certain activities or changes in technologies of the already present land uses, which are expected to cause degradation of landscape values, are ascertained).

Vulnerability of outstanding landscapes is mostly similar in individual typological groups. However, we have to be aware of the fact that the causes for vulnerability of an individual area depend on actual conditions, including not only the spatial ones, which can to some extent be even comprised in typological groups, but also the social and economic conditions that are subject to very different laws when the identification of causes or elimination of consequences are concerned.

6.2 Proposal of a Form for the evaluation and presentation of outstanding landscapes

Table D3 (Prepared on the basis of a study »Usmeritve za urejanje izjemnih krajin v Sloveniji« (Hudoklin,1998).)

Name of an area:	Country: Serial No.:
1. PRESENTATION OF AREA –	**descriptions, value ratings**
State - description: Photo prepared on the basis of the study	- landscape structure – landscape patterns, recognisability and natural conditions (relief, vegetation, waters) and created conditions (settlement culture, land use), - cultural characteristics and history, - size and boundaries (completion) of an area, - spatial issues, appropriateness of the state, - valid spatial documentation and assessment of its appropriateness, - infrastructural facilities, - development tendencies, - other characteristics;
State – graphical presentation (relevant for the presentation of values of individual areas, topographical map – boundaries of the area): - location of the area in the region	- topographical maps, - cadastral maps, - existing state and archival cadastral, - aerophotos, - photos;
2. CRITERIA FORTHE EVALUATION – CLASSIFICATION AMONG THE OUTSTANDING LANDSCAPES	rating: A – outstanding, high level B – large, high C – medium D – small, low E – irrelevant
1. traditional forms of living, cultivation	- a rating should be specified
2. expressiveness of settlement patterns	- a rating should be specified
3. exposed architectural elements	- a rating should be specified
4. specific values of the natural landscape structure	- a rating should be specified
5. symbolic, testimonial, cultural or association values	- a rating should be specified
6. experience values	- a rating should be specified
7. uniqueness at the regional, national or broader level	- a rating should be specified
8. importance for the national identity	- a rating should be specified
3. TYPOLOGICAL GROUP	- the name of the group into which outstanding landscape is classified
4. VULNERABILITY	- level of vulnerability: high/medium/low or (not vulnerable) - what endangers the area dealt with, - activity or land use (existing, expected)
5. IMPORTANCE	- importance (at the local, regional, national, European or international level)
6. PROTECTION CATEGORY	- it should be stated (whether the area or any of its parts have already been legally protected – the natural or cultural heritage or any other category)
7. TARGET OR DESIRED STATE	- state of the cultural structure - land use and recommended activities
8. GUIDELINES - methods for achieving a desired state of the landscape in the space should be specified (modes of maintenance of the state, spatial documentation)	- what sort of conditions should be provided - restrictions for individual activities - recommended development guidelines for individual activities - type of the spatial documentation (technical bases – spatial, development, plan)
9. SPECIAL CHARACTERISTICS	- different stresses, possibilities for the implementation of relevant guidelines must be specified

6.3 Working method

A group of experts performing the evaluation should first survey the existing cartographic material of the studied area (geographical maps, atlases of landscapes, etc.), aerophotos, photographic material, cadastral and inventories of any protected areas or other sectoral definitions (nature conservation, culture heritage, etc.) and records of evaluated landscapes and, if possible, typologically classified landscapes. Based on the collected material and information, the knowledge of the area under evaluation and the use of criteria for evaluating the outstanding landscapes, the first selection of the potential outstanding landscapes can be performed.

The next step of the working method is the field work. It comprises the observation, recording, taking photographs of landscape characteristics, landscape patterns, landscape structures and definitions of outstanding landscape boundaries, classification hierarchy, etc. The description structure has to be agreed on in advance, and subsequently further co-ordinated and amended.

In order to reduce the excessive subjective approach, the working procedure involves precisely defined working methods by stages or steps, multiple verifications and workshop confrontations and discussions among professional workers.

At the level of defining the area of outstanding landscapes, the landscape should be presented by colour photographs, maps and other graphical material.

A description is added to each outstanding landscape, providing the most important landscape pattern characteristics. The terms used to describe the landscape characteristics are generally established in the field.

Through the experience gained from the field work and processing of the material collected *in situ*, the boundaries of each outstanding landscape are defined. For defining clear boundaries of the landscape, “the outstanding landscape unit is perceived as an area with common character” has to be considered above all.

After the filed work, the desk work follows during which the description and complete evaluation of outstanding landscapes are performed. Then, a description of all parameters specified in the form for a presentation of outstanding landscapes is prepared and each individual value rating is supported by means of a description. A selected graphical and photographic material showing the boundaries of the area and the most characteristic photographs of the area should also be added to the description. Also, any value findings and all relevant information of other institutions defining their protection, development or other guidelines in the area of the outstanding landscape should be included.

When all descriptions and graphical presentations for individual outstanding landscapes are prepared, their locations should be inscribed on the common map of all outstanding landscapes of a region or a country dealt with.

The final result is a common map of the Mediterranean outstanding landscapes of individual countries and a file with photographic material and a sort of a catalogue of written and graphical presentation of all outstanding landscapes.

Thus prepared, the final result of outstanding landscapes can be transparently presented in a publication and on the website. The final contents of outstanding landscapes can now be used for the purpose of education and raising awareness of the professional and broader public, as well as a professional basis for the legal protection of outstanding landscapes.

7. Proposal on how to introduce the outstanding landscapes into national policies

The outstanding landscapes are landscapes of specific value and, therefore, an important holder of cultural values. They are usually a result of different forms of a traditional land use. Therefore, the guidelines for the development of activities in a landscape mainly refer to spatial elements and their classification and formation in directions of a desired state of spatial structures, presenting at the same time the starting points and requirements for the adjustments of land-use technologies (this particularly applies to agriculture).

The inclusion and consideration of outstanding landscapes in the spatial planning presents a possibility of providing the guidelines for spatial development of different activities in the landscapes of the high-value Mediterranean region. The guidelines for the protection and management of individual types of outstanding landscapes should be prepared. First, the desired state of spatial structures in areas of outstanding landscapes must be defined – we usually want to preserve them as they are, then, presenting the starting points and requirements for the adjustment of the land-use technology. The preservation of the desired state of outstanding landscapes depends in many ways on instruments for establishing and maintaining the desired states of these highest value landscapes. The definition of these instruments must apart from spatial measures include the social, legal, financial and other systemic issues.

The purpose of defining the outstanding landscapes is the protection of landscape, and symbolic and other spatial characteristics important for the recognisability of coastal Mediterranean areas. Therefore, the outstanding landscapes should be legally recognised and included in the policy of spatial planning and the policies of other sectors – such as agriculture, forestry, economy, tourism, etc.

The outstanding landscapes should be under the responsibility of the national level of an individual country, but, however, within the unified framework of the whole wider region of the Mediterranean. A unified way of defining, protection and arrangement of outstanding landscapes of the Mediterranean is necessary if we would like to protect the most valuable cultural heritage of the Mediterranean.

Each Mediterranean country should thus within the spatial management ensure professional bases and the appropriate legal and material conditions for the establishment of the outstanding landscapes system. The country should thus be competent for:

- the preparation of systemic solutions (subsidies, taxes and other financial proposals);
- the preparation of the basic professional guidelines for the protection and management of individual outstanding landscapes and for an efficient provision of the guidelines for spatial development in these areas;
- the preparation of legal instruments for placing the outstanding landscapes in the system of formal protection.

7.1 Landscape policy

By means of the landscape policy, the guidelines for further management of land or landscapes in the spatial planning system are provided. The landscape policy is also used for the preparation of the basic guidelines for a long-term, constant and harmonised spatial development of landscapes considering the legal order of a country, the cultural originality of a nation and life interests of all residents. By means of the landscape policy, the necessary agreement on the most important aims of landscape

management and on how to realise them at the national, regional and local level can be reached. The landscape policy can also form a basis for ensuring a harmonised and connected functioning of all factors and activities which are a part of the spatial planning system at all levels of decisions making.

It is recommended to develop an independent landscape policy including the outstanding landscapes, their definition and programme of their protection and management. The state of landscapes, reasons for defining the most valuable landscapes and clear guidelines for planning, protection and management of outstanding landscapes must be specified.

The general guidelines refer to spatial conditions for the activities and land uses which are the most frequent in the area of outstanding landscapes. These are the settlement, agriculture, forestry, tourism, sport and recreation, infrastructure, water management and shipping.

The basic principles and goals of outstanding landscapes in the landscape policy can be as follows:

- to ensure sustainable development in the entire area of Mediterranean landscapes;
- to adopt rapid measures as a condition for the protection and improvement of the state of outstanding landscapes;
- to ensure legal and responsible acting of the state administration of an individual Mediterranean country which will establish a system of outstanding landscapes;
- to deal comprehensively with spatial contents such as settlement, infrastructure and landscape in all areas and particularly in areas of outstanding landscapes;
- to accelerate the rehabilitation of the over-polluted environment or degraded landscapes and thus ensure a healthy living environment;
- to define possibilities for tourist establishment and promotion by means of the system of outstanding landscapes (defining the trademark);
- to ensure monitoring of the state of outstanding landscapes and the efficient adoption of measures for preventing any unwanted changes.

7.2 Incorporation of outstanding landscapes in other sectoral policies

A different definition is also possible when including the contents of the protection and development of outstanding landscapes in all other relevant sectoral policies such as spatial planning, culture, environmental protection, and agriculture, social and economic policies as well as all other policies which could directly or indirectly influence the landscape. In order to realise the spatial planning goals in the areas of outstanding landscapes, the guidelines for the protection and arrangement of outstanding landscapes, which should be included and considered by all other activities or sectors, should be specified.

Individual sectors, which are actively included in the areas of outstanding landscapes of the Mediterranean (above all agriculture, settlement, infrastructure and tourism), should be particularly prepared for more specific protection guidelines and restrictions and inter-sectoral reconciliation of different interests in all areas. Protection requirements and any restrictions introduced for areas of outstanding landscapes should also be included in the programmes of sectors, preparation of sectoral plans, organisation of professional sectoral services, co-funding system, etc.

7.3 Instruments for establishing a desired state of outstanding landscapes

The outstanding landscapes should be incorporated in the system of spatial planning as a protection category. The jurisdiction for the definition, arrangement and protection of outstanding landscapes should mainly be at the national level and then, consequently, also included in the planning at lower levels – the regional and local level.

In the protection of outstanding landscapes, the appropriate land use should be provided, whereas the areas of values, such as naturally preserved areas, should be covered by the system of protection of natural heritage and parts of cultural values.

Taking care and maintenance of outstanding landscapes should, apart from the protection of the outstanding landscape as a national identity rather than being understood only as an additional "burden of the country, region or local community", ensure also the following:

- protection of settlement in demographically abandoned areas;
- protection of traditional agricultural use;
- prevention of uncontrolled sale of lands (e.g. to foreigners) in areas which are important for the local or even national identity;
- prevention of uncontrolled building-up and above all uncontrolled expansion of tourist areas causing degradation of Mediterranean landscapes;
- protection of areas where sustainable tourism and educational activities can be performed;
- protection of a characteristic image of landscapes forming the basis for the attractiveness of the Mediterranean and individual countries.

At the general level, the problem of subsidies and grants for supporting landscape areas of the highest value at the national level should be tackled systemically. It depends on this whether the modes of protection/maintenance can be realised at all. Otherwise, only landscapes which are outstanding due to their natural structure and natural processes will preserve their specific values. However, the cultural landscape cannot exist without constant investments which should be based on the acceptable development programmes. Here, the phenomenon of acceptability can mainly refer to protective use or maintenance or to such a use bringing about a greater vitality and economic efficiency. In any case, the use should have such characteristics so as not to cause a considerable deviation from the structural state of landscape owing to which the landscape was declared outstanding.

Legal aspect

Implementation of measures within the framework of protection and management/creation of outstanding landscapes should be performed in accordance with the applicable legislation and valid spatial planning documentation and, if necessary, new spatial planning documents should be prepared and approved. The consideration of International Conventions should also be ensured. The activity in accordance with the provisions of the European Landscape Convention, which is bounding for the signatory members of the Convention, and in accordance with the provisions of the ICZM Protocol, must be ensured within the framework of implementation of the Barcelona Convention.

Financial aspect:

The areas of outstanding landscapes particularly oriented towards the protection usually allow cultivation and other types of development below the limit of economy. Therefore, it is reasonable to ensure financial incentives or financial compensations for the owners so that they can protect the traditional image and state of outstanding landscapes.

Financial incentives can vary considerably, whereas the following are the most efficient:

- subsidies for individual activities (e.g. agriculture, if a certain traditional manual cultivation has to be preserved);
- financial compensation for the maintenance of specific structures which are very demanding for the cultivation (cultivation on

the steep slopes, manual cultivation or maintenance of terraces, stone walls, etc.) or living;

- indirect financial incentives, such as: lower taxes or even exemption from taxes, free professional consulting services, development of certain activities in these areas which would be financed from the state resources, etc.

7.4 Use of results of defining outstanding landscapes

The results of defining and establishing outstanding landscapes, rather than only achieving the definition and identification of landscape areas of the highest value, can be used for different purposes, including: spatial planning; heritage protection; environmental protection; tourism development; development and protection of agriculture; training and education; and public awareness-raising.

In more detail, these results can be used:

- as a professional basis in the preparation of development and protection strategies (spatial, economic and sectoral);
- in spatial planning for the preparation of spatial planning acts;
- as a value assessment of the state of spatial development;
- within the framework of protection of the natural and cultural heritage;
- as a basis for the assessment of impact on landscape in procedures of Strategic Environmental Assessment (SEA);
- in planning economic activities, such as tourism;
- in the development of agriculture;
- in the preparation of research studies;
- for public awareness-raising and training and educational purposes.

8. Case study – presentation of two examples

8.1 Saltpans of Strunjan, Slovenia – proposal

Name of Outstanding Landscape: Saltpans of Strunjan (proposal)	**Country:** Slovenia **No.:** 01
1.PRESENTATION OF AREA	**description, value of evaluation**
1. Situation: photo documentation  Photo D103: Saltpans of Strunjan  Photo D104: Saltpans of Strunjan  Photo D105: Photo of the entire area	The Saltpans of Strunjan are the northernmost saltpans in the Mediterranean in which salt is still produced in a traditional way. Together with the lagoon of Stjuža, the saltpans form an outstanding blend of living environments hosting a diversity of flora and fauna. The saltpans are located on the eastern coast of the Gulf of Trieste, near the town of Strunjan, where the land meets the sea. Between the 15th and 17th century, the saltpans of Strunjan were, apart from the Saltpans of Sečovlje, the most important saltpans in the Republic of Venice They were formed on the deposits of Strunjan Peninsula. Works in the saltpans were stopped for some time and in the 3rd millennium, the desalinisation in a medieval style was revived for tourist reasons with the purpose of preserving the tradition and protecting the cultural heritage. The Lagoon of Stjuža and Saltpans form a connection of the sea and land water with specific ecological conditions favouring particularly adapted life forms. According to their structure, the Saltpans of Strunjan differ from those of Sečovlje, since they have differently routed channels. There are three saltpan houses there protected as ethnologic monuments. Two of them were built at the beginning of the 20th century and the third in the 17th or 18th century. The older saltpan house is an example of typical saltpan architecture. The ground floor is used as storage for salt and the first floor as a saltpan worker's family flat. The abandoned saltpans, which are partly overgrown by halophyte vegetation, preserved their original spatial organisation and are thus an example of a rare seaside cultural landscape in its transitional form. The saltpans on the Slovene coast are spatially very limited due to their distinctive physical connection with the sea and are classified into the category of saltpan landscapes. The preserved structure of saltpans shows the traditional salt-making forms and location of saltpans, i.e. the contact of the sea and land is ecologically very important.

Photo D106: Saltpan house and channel

Photo D107: Saltpans of Strunjan – view 1

Photo D108: Saltpans of Strunjan – view2

Photo D109: Saltpans of Strunjan – view3

The result of such a location is a blend of cultural and natural values, since the saltpans represent a technical cultural heritage, on the one hand, and an important ornithological site, on the other.

The spatial issues of these areas are also connected with that: the maintenance of saltpans requires reconstruction and maintenance of channels and other arrangements of these devices as well as their regular use, i.e. salt-making. On the other hand, the protection of natural values of the saltpans excludes human activity in this area which is, particularly in winter, an important asylum for numerous bird species.

Cultural heritage

Salt is produced according to the medieval tradition. The salt-making procedure was in a way modernised by the Austrians in 1904. Salt-making takes place on a *petola*, a layer of bio-sediment preventing the migration of sea mud to salt and fixation of unwanted ions on salt crystals. *Petola* is a characteristic of the salt-making procedure which was preserved only in the Saltpans of Sečovlje and Strunjan. The saltpans represent an outstanding technical heritage and also contribute to the formation of a unique cultural landscape.

Nature protection

Natural reserves of Stjuža and the Saltpans of Strunjan

Stjuža is the only sea lagoon on the Slovene coast. It used to be an open gulf, and then, more than 200 years ago, a dyke was built between the sea and the gulf so that today, the lagoon is connected with the sea only through a channel. The name Stjuža derives from the Italian word "*chiusa* "– closed. The lagoon is very shallow. The movement of water depends on the high and low tide and there are no waves and sea currents.

Lagoons in the Adriatic can most frequently be found on the western coast and in the utmost northern part of the Adriatic Sea (Gradež, Marano). They are mainly known for numerous bird species and breeding of fish. The diversity of living environments and species provides food and shelter to birds and fish. Fish were also bred in Stjuža, but this activity was abandoned as early as in the thirties of the 20th century.

Stjuža and the Saltpans of Strunjan present an outstanding blend of living environments which cannot be found anywhere else on the Slovene coast. The bottom of the lagoon is covered by a meadow of lesser Neptune grass, eelgrass and dwarf eelgrass. The underwater meadow is a treasury of different species of crabs, molluscs, fish and other animals. Visible inhabitants of the lagoon and saltpans are birds

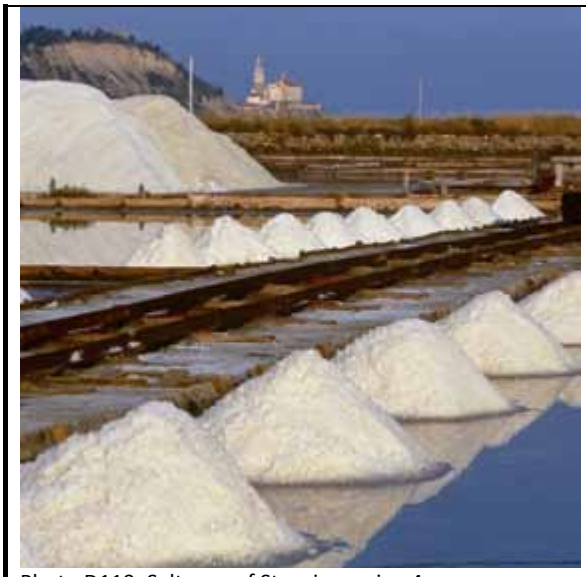


Photo D110: Saltpans of Strunjan – view4

Photo D111: Area of Strunjan Saltpans

Photo D112: Gulf of Stjuža

Photo D113: Saltpans of Strunjan – view5

looking for food and shelter or nesting on the dykes and banks among halophilous plants and rushes. Little egret and grey heron are the most frequent among them.

Broader area:

Landscape Park of Strunjan

The Saltpans of Strunjan are a part of the Landscape Park of Strunjan. The Landscape Park of Strunjan comprises a great part of the Strunjan Peninsula presenting a characteristic pattern of the flysch landscape of the coastal area; despite intensive urbanisation, it preserved a mainly agricultural character with a characteristic scattered settlement and a typical littoral rural architecture, cultural terraces and saltpans which were formed on the deposits of the Strunjan Peninsula. A few kilometres of unspoilt cliff with steep walls and erosion gorges on the northern side of the Strunjan Peninsula are declared a natural reserve together with the associated zone of a 200 m-long coastal sea. Due to its geological and geomorphologic characteristics and a great biotic diversity, and being the longest continued part of the natural coast in the entire Gulf of Trieste, it has an outstanding importance from the aspect of the protection of our natural heritage as well as for the protection of the ecological stability and biotic diversity of the entire Gulf of Trieste. (Krajinski park Strunjan / Landscape park Strunjan – online)

State – graphical presentation  Figure D7: Location of Strunjan saltpan in Slovenia  Map D7: Area – cartographic presentation	 Photo D114: Aero shot – saltpan of Strunjan
2.CRITERIA FOR DEFINING OF OUTSTANDING LANDSCAPES	rating: A – outstanding, high level B – large, high C – medium D – small, low level E – irrelevant.
1. traditional forms of living, cultivation	A
2. expressiveness of settlement patterns	B
3. outstanding architectural elements	B
4. specific values of natural landscape structure	B
5. symbolic, information providing, cultural or association values	A
6. experience values	B
7. uniqueness at the regional, national or broader level	A
8. importance for national identity	A
3.TYPOLOGICAL GROUP Type – *Saltpan landscape*	Cultivated landscapes or landscapes with special traditional cultivation by human
4. VULNERABILITY - level of vulnerability - what endangers the area dealt with	Level of vulnerability: - (high/medium/)low Type of vulnerability: pressure of urban development, building, construction of additional infrastructure – landscape vulnerable to activities which could change their structure or the present landscape image. - activity or land use (existing, expected) existing: salt-making, tourism – the aim is to preserve the existing activities
5. IMPORTANCE/ (local, national, European)	- Importance: local and national
6. PROTECTION CATEGORY (if the area or any of its parts has already been legally protected - natural or cultural heritage or any other category)	– natural heritage – Natural reserve of Stjuža (saltpans and the Gulf of Stjuža), - Area of Natura 2000, - Part of the Landscape Park of Strunjan, - Technical and cultural heritage (houses and channels).
7. TARGET - DESIRED STATE	In the area of saltpans, the spatial structure and operation of saltpans as economic areas have to be preserved including water channels, access routes, pools, saltpan houses and other facilities.
8. GUIDELINES - methods to achieve a desired state of a landscape	- to ascertain the possibilities for the reconciliation of protection interests from the aspect of cultural

(modes of maintenance of the state, spatial planning documentation)	heritage (technical heritage) and nature protection (an important ornithological area); - to define areas where maintenance of saltpans as farmlands will be ensured by means of further traditional salt-making activity (maintenance of channels for water supply and pools for desalinisation, etc.); - to define any areas where further maintenance is not necessary, efficient or cannot be ensured and saltpans should therefore be left to natural succession; - to prevent implementation of other uses and activities in the narrow and wide area of saltpans (visual contact, functionally connected areas, etc.); - to prevent the construction of infrastructure facilities and corridors, particularly air power lines across this area; - to preserve the existing water regime in the area of saltpans and in their immediate vicinity.
9.SPECIAL CHARACTERISTICS (different stresses, possibilities for the implementation of the guidelines referred to above, etc.)	- cultural landscape heritage; - ornithological value; - nature protection – the most preserved area of halophilous plants in Slovenia.

Justification of criteria

Traditional forms of living, cultivation – A: Saltpans present a type of cultural landscape which expresses human activity and transformation of landscape for the purpose of salt-making to a great extent. It is also a traditional form of salt-making from the medieval period. The Saltpans of Strunjan are classified into the type of landscapes referred to as "saltpan landscapes".

These types of cultural landscapes are characterised by expressing special forms of life, traditions, practices and the stage of development and human attitude towards the landscape in the past which can be still seen today. The highest rating A is given, since the Saltpans of Strunjan comprise all stated characteristics. This is also a traditional cultural landscape characteristic of coastal areas with its components expressing a high degree of ecological balance and visual harmony which thus has a high level of experience value.

Expressiveness of settlement patterns – B: The saltpans of Strunjan express a specific settlement culture of this area from the medieval period. The salt-making area with saltpan channels, fields and remains of stone houses give a character of special settlement structure depending on the activity to the area. The area is visually exposed and a source of quality experience of landscape.

Outstanding architectural elements – B: Saltpan houses are the remains of families which used to produce salt. There are three saltpan houses protected as ethnologic monuments in the Saltpans of Strunjan: two of them were built at the beginning of the twentieth century and the third in the seventeenth or eighteenth century. The older saltpan house is an example of typical saltpan architecture, whereas the ground floor is used as storage for salt and the first floor as a flat of saltpan worker's family.

Specific values of natural landscape structure – B: The area of Saltpans of Strunjan is the most preserved and complex area of halophilous plants in Slovenia. The Gulf of Stjuža and the Saltpans of Strunjan present an outstanding blending of living environments which cannot be found anywhere else on the Slovene coast. The area is also ornithologically very important.

Symbolic, testimonial, cultural or association values – A: The regular structure of forms,

geometrical net structure of channels, openness of the area and visual exposure enable a quality visual experience of landscape. The landscape is symbolically connected with the testimonial value of salt-making from the times when salt was one of the important resources of the rich and a sign of wealth and quality of life. (A story about Martin Krpan and transport of salt to Vienna to the Emperor – a national symbol and information providing value).

Experience values – B: The harmonisation of the saltpan landscape with the surrounding typical Mediterranean terraced landscape can be seen. The landscape structure mainly consists of geometrical elements completed by organic areas of halophilous plants, grass and rushes. The contact of the sea and the land and the surrounding landscape, which is typically Mediterranean, are also distinctive.

Uniqueness – A: The Saltpans of Strunjan are unique in the typology of saltpan landscapes of the Mediterranean, since they are the northernmost Mediterranean saltpans. Thus the rare appearance of this landscape and its uniqueness are also expressed.

Importance for the national identity – A: The Saltpans of Strunjan present a recognisability at the local and regional level for the coastal landscapes in Slovenia as well as the national identity because of their settlement and cultivation culture with a high degree of adaptation to natural conditions and a high testimonial value.

8.2 Proposals of possible outstanding landscapes in Croatia

Croatia has an extremely long, contrasting and diverse coast and thus a large area where the outstanding coastal landscapes of the Mediterranean can be found. The Croatian landscapes are typologically very diverse and rich in structure patterns.

Obviously, those of the highest value and thus also the most outstanding ones, as well as those presenting the recognisability of the Croatian Mediterranean area, could be selected and evaluated.

Two examples can be suggested. In the typological group of agricultural landscapes, two examples which are special or outstanding owing to the traditional cultivation method, can be stressed, namely, the terraced landscapes on the island of Korčula and the agricultural landscape in the area of the Neretva river delta.

The terraced landscapes on the island of Korčula, their characteristics and importance were already presented in the study *Revitalisation of the Rural Landscape of the Blato Area on the Island of Korčula* (Faculty of Agriculture, University of Zagreb, PAP/RAC, May 2007). The terraced landscapes as a special method of land cultivation for the purpose of agricultural cultivation in the Mediterranean, in the areas with steep slopes are very frequent since thus farmers prevented erosion and obtained the additional agricultural lands sufficiently exposed to the sun. However, terraces, fully formed as outstanding stone structures, manually built walls on the steep slopes, which were mainly used for plantations of grapevine, olive trees or tobacco, etc., are in some places very well preserved on the island of Korčula.

Photo D115: Photo: Old stone terraces in the island of Korčula

Photo D116: Traditional agricultural terraces, Croatia

Photo D117: Renewed stone terraces in the island of Korčula

The other example from the Neretva river delta is presented in more detail, as follows:

Landscape of the Neretva river delta, Croatia – a proposal for outstanding landscape

Name of area: Neretva river delta – proposal	Country: **Croatia** No.: **02**
1. PRESENTATION OF THE AREA –	**descriptions, value ratings**
State - description: cultivated agricultural landscape  Photo D118: Blend of water surfaces with mandarin tree plantations  Photo D119: Mandarin tree plantations - view	In the area of Neretva river delta, water and agricultural areas are outstandingly and very specifically blended. The traditional cultivation method considered natural conditions and was adapted so as to use the advantages of this area such as the possibility of land irrigation. A very interesting blend of land use was formed with mandarin plantations in the form of zones among which wide water fields can be found. The pattern is even more interesting since the plantation zones and water channels in the area run radially from the rise with the lifted relief or a hill in the centre of the landscape. The outstandingness of this landscape is above all in the uniqueness of the area due to its unique structure by means of which a unique landscape pattern was formed.
State – graphical presentation	 Photo D120: Airplane shots of the area of outstanding landscape

2. CRITERIA FOR EVALUATION – CLASSIFICATION AMONG OUTSTANDING LANDSCAPES	rating: A – outstanding, high level B – large, high C – medium D – small, low E - irrelevant
1. traditional forms of living, cultivation	**A**
2. expressiveness of settlement patterns	**/**
3. outstanding architectural elements	**/**
4. specific values of the natural landscape structure	**B**
5. symbolic, testimonial, cultural or association values	**B**
6. experience values	**A**
7. uniqueness at the regional, national or broader level	**A**
8. importance for the national identity	**A**
3. TYPOLOGICAL GROUP – agricultural landscape	Cultivated landscapes or landscapes with special traditional cultivation by human
4. VULNERABILITY	- level of vulnerability: high/medium/low or (not vulnerable) - what endangers the area dealt with, - activity or land use (existing, expected)
5. IMPORTANCE	- importance: at the local, national and Mediterranean level
6. PROTECTION CATEGORY	/
7. TARGET OR DESIRED STATE	- To protect the existing state of landscape structure - To preserve the existing land use
8. GUIDELINES - methods for achieving a desired state of landscape in space should be specified (modes of maintenance of state, spatial documentation)	To ensure the traditional, existing technology of citrus fruit cultivation (maintenance of water channels and zones of farmlands) - To ascertain possibilities for reconciliation of protection interests from the aspect of protection of natural and cultural heritage
9. SPECIAL CHARACTERISTICS	/

Justification of criteria

In this case, four criteria could be given a rating "A" and other criteria the rating "B". There is no settlement in this landscape, therefore, the criteria of expressiveness of settlement patterns and outstanding architectural elements were not assessed.

Traditional forms of living, cultivation - A: The area of river Neretva delta with water surface and mandarin plantations presents a type of cultivated cultural landscape expressing human activity and transformation of landscape for the purpose of plantation cultivation of citrus fruit. This is a traditional form of citrus fruit cultivation, however, in a special, outstanding way with plantations in the form of zones of cultivation land between water surfaces. The highest rating "A" is given, since the landscape is outstanding as a special landscape pattern (radial zones of water and plantation running from the rise in the centre of the area). This is also a traditional agricultural cultural landscape characteristic of coastal cultural landscapes of this part of the Adriatic coast. The landscape structure expresses a high

level of regular recurrent order and visual coherence and thus also has a high level of experience value.

Specific values of natural landscape structure - B: The landscape area of river Neretva delta is an explicitly preserved and complex area where natural and cultural structures are blended. The landscape presents an outstanding blend of natural conditions with sustainable influence of human use which cannot be found anywhere else on the Adriatic coast. The area is also important from the aspect of protection of nature as an ecosystem.

Symbolic, information providing, cultural or association values – A: The regular structure of forms, geometrical longitudinal structure of cultivation and water zones, openness of the area and visual exposure enable a quality visual experience of landscape. The landscape is symbolically connected with the value of cultivation of citrus fruit which is very characteristic of the Mediterranean area. The mandarins of Neretva are particularly well-known as a species of great quality at the broader international level.

Experience values - A: As it has already been mentioned in the criteria described above, the coherence of the described landscape with the surrounding typical Mediterranean plain landscape can be seen. The landscape structure mainly consists of a sort of geometrical surface elements completed by volume geomorphological elements in organic form. The contact between the water surface and farmlands and the pattern of a recurring order are distinctive.

Uniqueness – A: The landscape is unique of Mediterranean cultivated agricultural landscapes. Such a landscape pattern cannot be found anywhere else in this area, or in any other area at the national level, thus expressing its rareness or its uniqueness.

Importance for the national identity – A: The landscape of river Neretva delta is recognisable at the local, regional and national level. It presents a national identity, since it is a cultivation cultural landscape with a high degree of adaptation to natural conditions and a high testimonial value at the local, regional and national level.

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Areas of Outstanding Natural Beauty

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Barcelona Convention - UNEP

http://www.unep.ch/regionalseas/regions/med/t_barcel.htm

ICZM Protocol – the seventh Protocol in the framework of the Barcelona Convention

http://www.pap-thecoastcentre.org/razno/ICZM_flyer_final_print.pdf

European Landscape Convention – Council of Europe
http://www.coe.int/t/dg4/cultureheritage/heritage/landscape/default_EN.asp

Google map

http://maps.google.com

IUCN, the International Union for Conservation of Nature

http://www.iucn.org/

UNESCO, The World Heritage, Cultural landscapes

http://whc.unesco.org/en/culturallandscape

Krajinski park Strunjan – Strunjanske soline

http://www.parkstrunjan.si

Strunjanske soline zelo slana tla za zelo redke rastline - zgibanka

http://www.natura2000.gov.si/uploads/tx_library/natura2000_strunjan.pdf

ZRSVN Piran, Slovenija

http://www.zrsvn.si

REVITALISATION OF LANDSCAPES

Thematic Study **E**

REVITALISATION OF THE RURAL LANDSCAPE OF BLATO AREA ON THE ISLAND OF KORČULA

2007

Authors: Prof. **Branka Aničić**, Ph.D.,

Prof. **Dušan Ogrin**, Landscape architect

Goran Andlar, Ms., Landscape architect

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1. Introduction

In the very particular world of the Mediterranean basin, a specific type of landscape has developed as a result of a long-lasting economic use of space with distinguishable agricultural peculiarities: the terraced landscapes, vineyards, olive groves, orchards and vegetable gardens, usually interlaced with drystone walls.

Changes and processes related to agricultural landscapes, namely, the modernisation of agriculture, on the one hand, and the abandonment, on the other, are common problems in Mediterranean countries. Both processes are reflected in the landscape and can have positive or negative implications on it. Therefore, it is necessary to develop and put in practice instruments to keep the farmers on the land. A precondition for this is the introduction of new technologies and provision of support to farmers in the form of subsidies. In parallel, the planning instruments and procedures, such as the landscape planning, should be introduced to respond adequately to these needs. In this context, the participatory approach is very important for the planning since the physical plans at the local level mainly define the land use, but not the structural elements of the landscape, which are essential for a quality spatial development. It is obvious that financial support to farmers aimed at modernisation of farming technologies is crucial. In the case when the public budget is used for introducing changes and transformations of the rural landscape, the public has the right to participate in defining the landscape values to be protected as well as in deciding on the extent to which the transformations are positive in a specific socio-economic context.

In Croatia, the cultural landscape in the karst has also evolved through long historical continuity under the influence of traditional agriculture developing into a regional landscape of unique identity and importance (Gams 1993). It is characterised by vast typological variations and authenticity of both natural and cultivated landscape structures, which makes a distinctive element of formation of the human environment. Certain rare landscape sites in the coastal and Dalmatian area in the Republic of Croatia bear witness to our cultural heritage and understanding of real value of these spaces are minor and still unexplored.

Due to their characteristics, these spaces are rather vulnerable and endangered, undergoing changes and anticipating the new ones resulting from the foreign investment inflow, accelerated tourist development, new infrastructure, especially the main traffic arteries, and the like. However, their decay and disappearance is not inevitable. The solution lies in finding an interest in preserving and protecting some of these through a special economic policy, and the most exquisite ones of them through a category of monuments. It is also necessary to establish that this space has no future unless the physical planning strategy guarantees its economic safety.

The island of Korčula is a typical coastal area with the problems common to other Mediterranean countries and in particular to the islands, i.e. the abandoned agricultural land and other developmental pressures that can significantly change the landscape if the transformation process is not supported by expert proposals. It is more than obvious that the landscape transformations are not only a spatial issue but more a socio-economic one.

This study resulted from a workshop, which took place in Blato on the island of Korčula, in September 2006. The workshop was organised within the framework of three scientific projects:

- "Landscape Management in the Mediterranean" – led by the Priority Actions Programme Regional Activity Centre (PAP/RAC);
- "The Mediterranean Landscape as a Factor of Identity of Croatia, its Protection and Development" - a scientific project proposed by the relevant Ministry, i.e. then the Ministry of Science, Education and Sport of the Republic of Croatia, and by the Department of Landscape Architecture of the Faculty of Agriculture of the University in Zagreb; and
- "Preservation and development of rural areas of Croatia, valorisation, zoning and revitalisation of the landscape on Korčula" –

led by the Croatian Institute for Agricultural and Advisory Service.

Besides, it was the second joint workshop in a sequence of advisory projects aimed at developing modelling approaches for revitalisation of agrarian districts and their landscapes. The first one was organised in Krašić, in 2003, and the third was planned in the Pannonian region, in 2007.

This Blato workshop was organised and conducted by the Department of Landscape Architecture of the Faculty of Agriculture of the University in Zagreb. Lectures were given jointly by the advisors of the Croatian Institute for Agricultural and Advisory Service of the Ministry of Agriculture, Forestry and Water Management, and by representatives of various interest groups from the local community. Graduate engineers of agriculture of different specialties with a lifelong professional experience and skilled in making development models in agriculture along with stakeholders can create a scientific basis for development by stimulating development and preservation of a defined space. Implementation was based on two methods, namely, ”learning by doing” and Participatory Rural Appraisal (PRA). The first method, ”learning by doing”, is a standard working method in education of adults. PRA is a method which emphasises a group approach, i.e. taking part of all participants in the area and in this way providing assistance to the local community on the occasion of developing plans, in decision making and fostering awareness for the benefit of an active participation.

Four lectures were delivered by, respectively: Prof. Dušan Ogrin, Prof. Nikola Mirošević Ph.D., Prof. Branka Aničić, Ph.D. and Ivka Veić M.sc., making an introduction into the subject matter. During these lectures, the participants were acquainted with the diversity and characteristics of cultural landscape of the Republic of Croatia and the working procedure to obtain the expected results. On the fifth day, after four days of hard work, the participants independently made their own presentations on the entire procedure.

1.1 Structural and formal features of the Landscape in the karst

The most important natural features of the karst are numerous labyrinths of stony peaks, deeply furrowed canyons and gorges, marine bays, pits and abysses, underground holes, cracks in the limestone, sink-holes, *dolinas* and valleys. These diverse relief patterns were used and modified by humans to the best of their abilities thus creating new structures and forms which brought even a wider diversity of the landscape. They emerged from the need for arable land, differing among each other according to the natural conditions, agricultural practices, methods and intensity of soil exploitation, producing various types of cultural karst landscape.

The basic land categories created in this area are: pastures, grassland, vegetable garden, fields, mixed cultures, orchards, vineyards, forest, barren land, and settlements. Each rural land-use category is distinctive depending on the quantity of stone gathered and the way of its arrangement. Stones gathered were arranged in drystone walls and heaps which were constantly changing and enlarging thus creating structures that support, intersect and border arable lands of various shapes and sizes. Depending on their function, they can be bordering walls (solitary structures) and supporting walls (escarpments), with vast complexity of shapes and methods of stone arrangement, height, texture and width (low, high, narrow, wide, thin, permeable, thick, filled, symmetrical, asymmetric, smooth, rough, dark light etc), (Gams 1991). Regarding their wide distribution and recognisability, they are the dominant structural element of the karst cultural landscape.

Relief features and ways of their exploitation, together with drystone walls, have influenced creation of a certain type of karst cultural landscape (Ogrin 2005):

1.

One of those is a pasture landscape which exhibits several patterns:

a) an open treeless pastureland and b) pastures with scattered trees, providing shade and preventing soil drainage. There is a structural

diversity even within those categories. In the beginning, pastures required only gathering of crashed stones, which were piled onto bedrock in stone gorges. Later on, with a shift from meat-oriented to milk-oriented animal husbandry, stone gathering was intensified in order to create larger areas of grassland. Stones were heaped into earthless and grassless topographic depressions. At the same time, drystone walls were built to enclose symmetrical and asymmetrical plots of land, to protect grassland and control grazing.

2.

Another type of karst landscape make sinkholes and karst valleys with varying widths and depths. These are naturally rounded, funnel-shaped or elongated recesses, of different widths, depths and lengths, with substantial layer of fertile land. Depending on the purpose and type of drystone wall, there are:

a) enclosed sinkholes and karst valleys, with a single row drystone wall, with oval shapes following the relief forms. Extraction of stone has resulted in wider grassland areas or homogenous arable grounds. At higher altitudes, there are cattle pens - *drmuns* (enclosed plots with natural vegetation), whereas at lower altitudes, closer to settlements, these are arable fields.

b) serial karst valleys – fields in a series, individually enclosed with a single-row drystone wall, located in a valley; they follow its configuration and emerge in various shapes - asymmetric, round, elongated and square plots.

c) fragmented karst valley - adapted for a multi-purpose cultivation. A smooth, straight plot at the bottom was created by gathering stones for pastures or grasslands. On one side of the slope there is usually a field, and on the other -several terraces with escarpments. This type of karst valleys is the only one without external walls.

3.

The third type is a karst field with arable land. The fields are situated in the zone of elongated valley depressions, with a road cutting through the middle, influencing the development and structure of the fields. Arable plots are usually stretching perpendicularly towards the road, formed as a symmetrical rectangular network.

4.

The fourth type of the karst cultural landscape are hollows on the southern slopes of the islands of Brač and Hvar and Pelješac peninsula. They come as elongated stretches of plains, depending on the soil type and topography.

5.

The fifth landscape type make the terraced drystone walls. These were created on the karst slopes with a 6-20 degree inclination. Stone was gathered and piled along the slopes in the form of escarpments in order to form terraces. They come in a) symmetrical and b) asymmetrical shapes. The asymmetrical terraces can be found on the moderate slopes suitable for growing fruit trees (olive-trees, fig-trees, carob-trees, citruses, etc.). The trees grow far apart and planting in regular straight rows is not required, which allows for the rock outcrops to remain untouched in the ground. These results in smaller planting plots, with semicircular, considerably short escarpments adapted to the land figuration at the foothills.

The largest influence and the most widespread changes in the karst came from the construction of terraces with escarpments for planting grapevine. Stone was arranged in the upward direction, and terraces were filled by earth gathered in situ or ex situ. The escarpment height and width are proportionate to the inclination and volume of earth gathered. The most peculiar shape of terraces can be found on the islands, formed as equal narrow stretches going upward parallel to the slope. However, there are terraces created on the slope of 20 degrees and more, where escarpments are considerably compact, and some even supported by a solid rock; therefore, distances between them vary. On the lower level terrain, with predominant karst surfaces, terraces are predominantly rectangular, with escarpments coupled by transversal partitions and larger heaps of stone (gomilas and varvakanas).

This brief overview testifies to a remarkable diversity of landscape types that have developed in these poor, stringent living conditions. They should be registered and any efforts to preserve them would be well deserved.

1.2 Social characteristics of the space and transformation

Compared to other European regions undergoing the same processes, this region has experienced far more intensive and more variable human activity, so the most dynamic and complex section of this area can be found in the Adriatic mega-region of Croatia (Nicod & Sauro 1993).

First evident changes in this area took place during the Illyrian period in the 2nd century BC. Known as herdsmen and nomads, they were cutting the forest, clearing the maquis and removing stones, thus creating pastures. These were the first changes of landscape, slowly undergoing transformation, from natural forest into open cultivated pastureland.

More intensive felling was done during the Antiquity, which was continued proportionally to demographic growth.

The impact of forest burning and felling, erosion and inadequate soil fertility was at its peak in the mid 19th century. Such a situation hindered the self-restoration of forest vegetation. At the same time, it has enabled the evolution of the traditional karst cultural landscape based on a high degree of integration of various uses-agricultural productions and residential with natural landscape conditions. The tools implemented were those causing least harm for the landscape and its natural resources, yielding optimal economic and other results, preserving at the same time the balance of the landscape development dynamics.

Almost two millennia of stone gathering have enabled creation of arable land across the karst surface. Before the Middle Ages, the pastureland was dominant, after which, until the 17th century, the main economic branch along with cattle-breeding (sheep and goat, but also pigs and bovine) was farming (cultivation of farm crops, olives and grapevine). In this very period of significant structural changes of cultural karst landscape in pasture and meadow, plots were separated by partitions, along with an increased need for expanding arable plots and more intensive grapevine growing. Slopes are being taken for private possession, and new escarpments and terraces were built on them, which added to the creation of a largely complex and culturally significant landscape (Gams 1987; Julian & Nicod 1989; Sauro 1987). The second blooming of intensive vineyard oriented soil-cultivation and creation of new terraces took place in the mid 19th century and lasted up until the outbreak of phylloxera in 1909 (Encyclopaedia 1973). At the time, what weren't arable plots was covered by degraded karst-mostly bare and ecologically poor landscape. More intensive attempts of forest restoration were very slow, hindered not only by the natural conditions, but also by agricultural expansion. Searching for a solution through reforestation, in the second half of the 19th century, some autochthonous species were introduced, such as – Black pine (*Pinus nigra*) and Allepo pine (*Pinus halepensis)* (Horvat 1951). These fast growing species, adaptable to limestone land and resistant to high summer temperatures responded well, whereas, the autochthonous holly-oak forest (*Orno-Quercetum ilicis*) almost completely disappeared.

The social system is changing, along with the economic cultural and technological progress causing also transformations in spatial organisation. Socio-economic processes of the post-war period have triggered depopulation of large regions in the entire Mediterranean. Rural areas of the islands and the coast share the same fate reflected in abandonment of cultivated land, more or less together with the abandonment of settlements. The consequence of such trends is uncontrolled self-rejuvenation of forests, erosion, and deterioration of centuries-old terraces which all contributed to overall degradation of karst landscape.

Today, tourism is an extremely prominent activity in this area. However, it is also considered as the most questionable in the Mediterranean landscape. Tourism is an ambitious consumer of natural resources, showing its special interest in the most attractive parts of landscape, including agricultural land. Tourism is spreading at an unstoppable pace, extensively taking up land and following a linear pattern along entire seacoast. Its extended

reproduction is opening distinct environmental conflicts, causing even wider changes in space. (Barisel 1969, Ogrin 2005). Spreading of new residential development around old Mediterranean settlements is changing the traditional balanced karst agricultural landscape. Conflicting with the space, construction of illegal weekend-settlements, metal, petrochemical, and shipbuilding industrial complexes and energy facilities, seriously threaten the area.

Compared with an inherited harmonised relationship of the environment and agriculture, the observed evolution along the coast has twofold effects. On the one hand, development of certain parts of coastal area is transforming quickly and unstoppably changing the traditional karst landscape into an urban one with constant presence of further construction. On the other hand, agriculture and other traditional activities are abandoned, surrendering this space to natural succession, erosion and overgrowth, which permanently deprives the area of its cultural character. In such circumstances, devastating forest fires become ever more frequent and far-reaching. Recently, forest fires occur on abandoned, uncultivated areas covered by underbush, grass and medicinal plants, which dry up in the summer and easily catch fire. These processes are a direct consequence of the absence of man and of soil cultivation. As fires are most frequent in the summer heats, they tend to spread very quickly into forests and present a severe hazard for human settlements. Damage of livelihood resources caused by erosion and fires, mostly endangers the quality of life of local population. In the same manner such a devastated landscape is equally, although indirectly, unsuitable for tourism. Of all adaptation mechanisms used by humans, cultural adaptation (in the sense of achieving balanced, harmonious relations) carries the most weight. Nowadays, physical planning emerges as direct and effective means towards the preferred harmony (Odum 1971).

Optimal management, in this sensitive Mediterranean area, can be achieved primarily with the help of certain planning procedures that emphasise the features of a particular landscape, its contents, patterns and possible land- use evaluation, which is normally in line with justified, anticipated social requirements or interests, and can be incorporated in any physical planning form (Marušić 2001). It is a framework that requires a well prepared basis for defining and singling out valuable karst landscapes (primarily belonging to the category of traditional cultural landscape, but not excluding regionally determined categories) of national importance accompanied by relevant protection guidelines.

Identification of valuable landscapes of Croatia and their categorisation is in the course. This will improve our comprehensive knowledge of the national landscape heritage and will serve as a valuable point in making decisions on landscape protection and future land-uses (Aničić 2003).

Based upon this insight, an approach was made in the quest for site selection location where a revitalisation model of a decayed cultural landscape of a great value could be defined and tested.

Photo E1: View of Blato field with Blato settlement from the west

2. Selection of location – Blato on the island of Korčula

Evident proofs of a long agricultural tradition can be noticed in the near surroundings of Blato, on the island of Korčula. Although neglected, this cultural landscape along with the Blato settlement still attracts attention by its structural and complex diversity. As the time went by, on the morphologically developed terrain specific landscape structures were generated, composed of very different terrace types, above which prevails a process of ongoing degradation. Despite this, according to the measures for the selection of a distinguished landscape (Ogrin 1996), the entire Blato area forms a distinguished landscape. It is necessary to quote the definition of this spatial category: A distinguished landscape is an area which can express scenery as a reflection of peculiar structures, as a rule, with the presence of theseelements:

- unique implementation (land use);
- favourable disposition of natural elements;
- special settlement pattern.

This part of Korčula offers exceptionally favourable life conditions. There are many proofs of life existing already in the course of the Bronze and Iron Ages, including eight prehistorical hillforts and about ten stone tumuli. Those in the elevation served as lookouts for observation and the ones in the lower areas were usually graves. Numerous chapels, as known historical monuments are preserved in the area, while small stone houses of specific structure are located in the field. This very fact, as well as a possibility to watch upon this landscape as a cultural one and to handle it accordingly stimulated us to investigate a solution of its potential protection and development.

2.1 Social and natural characteristics of Blato area

Photo E2: Western part of the island of Korčula (www.prizba /netkorculamap4.html)

The western part of the island of Korčula has always been more populated and more active due to its favourable relief, climatic and therefore existential conditions. During the Middle Ages, there was a case that the population kept moving contrary from one could have expected in the time, i.e. people from the town of Korčula would move towards villages. Thus, Blato as the oldest and the biggest settlement on the island was located on the plateau in the middle of its western part at the junction of almost all important routes, next to the karst field, having the same name - the Blato field. The settlement is located amphitheatrically among seven hills covered in pine forest and orchards. Such a peculiar location resulted in genuine settlement pattern where streets, houses and agricultural plots follow the terrain topography up to the very peaks of Mali and Veliki Učijak.

Photo E3: Segment from the settlement from digital orthophoto - map, 2001

Photos E4 and E5: View of Blato settlement
Photos E6 and E7: View of the western and eastern part of Blato field

Large cultivated fields dominate in the area of this municipality, around which slopes enclosed by drystone walls once planted in olives and vineyards keep alternating. In the 19th and at the beginning of the 20th century, the population number in Blato reaches its peak. It was then, when the entire necessary urban infrastructure was built, such as: hospital, schools, and open public spaces (squares, tree avenues and parks laid out and the like). The most propulsive branch of that period was agriculture; there was 10,000 000 litres (2,193.000 gallons) market surplus of wine and 300,000 litres (65,000 gallons) of oil exported. In order to increase production, they started draining the marshes of the lake by excavating through the tunnel when additional 130 ha of fertile plough-land – the present Blato field was created. With the onset of phylloxera, a mass emigrating process was even more accelerated and its intensity would last all until 1970. After the census conducted in 1991, it was asserted that for the last 80 years the population number was reduced by 53% (Blato Annal 2002). In the course of the last 10 years, the immigration wave went up and it is estimated that the population number increased by 20%, thus stimulating the economic growth and further development. Currently, Blato has 4,000 inhabitants and is the settlement with the largest population on the island.

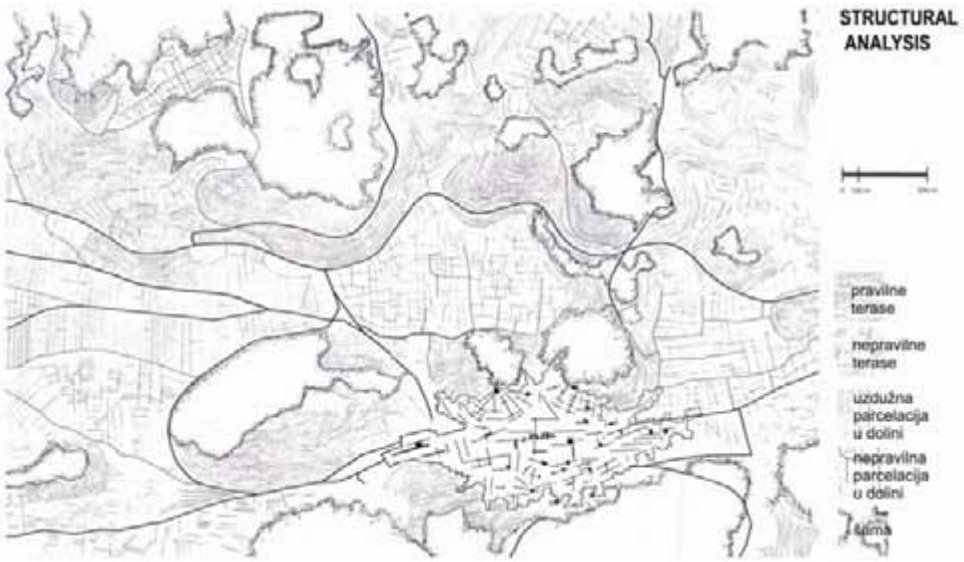
Tourism has become a basic strategic branch of economy. The inhabitants help fostering much greater awareness of the agricultural potential of this traditional cultural space. They wish to return to agriculture, to their roots, to produce without devastating the existing landscape structures, but the problem keeps arising from small fragmentation of planting lots and unresolved ownership (owners of the title). All these entrepreneurial ideas of revitalisation end up on small and non-profitable land plots. By restoring vineyards and olive groves, a new economic perspective could be generated, not only by means of agriculture but also through agro-tourism. Progress in agriculture will not be possible without regrouping of agricultural land, but the main obstacle is inaccessibility or indifference of its owners living in the overseas countries (South America and Australia).

From times immemorial water shortage has always been a problem on islands, since the rain water collecting was its only source. However, Blato has such a location that it disposes of several karst fields at the foothills, which are just a few metres above sea level, representing the only and the largest natural accumulation of rain-water used in water supply network for settlements in the entire western part of Korčula. The subject matter is a closed karst field before regulation and tunnel construction, its confluent and own waters have frequently flooded vast field areas. Water would sometimes remain for several years but it would often inundate only through autumn and winter periods. Today, we can see several wells in the valley connected to the water supply system and quite a few of shallow wells with a depth between 4-20 metres. Their main purpose is irrigation of crops in the valley. Due to some easier usage of new technologies in tillage practices, despite inversion, almost the entire agricultural production has moved from the slopes into the valley. Thus how a diversified structure of cultivable plots developed in these elongated fertile fields, contributing towards its visual quality by their shape, texture and volume of crops diversity. Meanwhile, this intensive production activity threatens nowadays to pollute drinking water, so either some new production programmes and technologies are being introduced instantaneously, with the least possible impact on the environment or production in the valley is being completely abandoned in order to reoccupy terraces on the surrounding hillsides.

2.2 The Blato landscape

The Blato landscape is thoroughly cultivated, all natural relief formations were exploited for agriculture in the past. It was abandoned by agriculture altogether and has become covered with natural vegetation (underwood or forest). It was not until the last fire that these centennial terraces were discovered, as nobody was aware of their previous existence. In Blato environs, two basic types of cultural landscape can be noticed. Division is made according to structural features since it is possible to identify processes effectively and have them easily surveyed only by means of monitoring the alterations in landscape. Based upon this understanding, it will be possible to fix guidelines for its development and space management.

Among different types in the surroundings of Blato, we can trace the field landscape and the drystone walls landscape. The drystone walls landscape is dominant and can be divided into two subtypes: the drystone walls landscape as the element of escarpments and the terraced drystone walls. Terraces occupy the major part of agricultural land and represent the main symbol of recognisability of this location. One can clearly distinguish two types of terraces: the long regular terraces on the sloping terrains and the asymmetrical wider terraces on somewhat milder slopes. The Blato elongated field spreads on the very foothills in the EW direction. The quality soil which is obtained from the lake drainage favoured viticulture so a field landscape was created in the field. Parcelling and land distribution policy has conditioned some varieties, such as: symmetrical, elongated, asymmetrical and irregular planting lots. These tilled fields are rather complex in the structural sense and are also visually impressive.



Map 1: Structural analysis

2.2.1 Landscape of drystone walls and terraces

Terraces with a symmetrical elongated type are located on the steeper slopes and follow the hill and terrain topography in its entirety. On these terraces, grapevine was grown while olives and fruit trees appear less frequently. We can classify them according to their width as distinctly narrow and narrow ones.

Photos E8 and E9: Due to lack of fertile soil peasants exploited each square metre of land, even in the most unsuitable terrain, so these types of structures used to wrap in entire hills. This is also an example of narrow symmetrical terraces, which have before all become prone to overgrowth.

Photo E10: Restored olive groves and vineyards on terraces near Blato

Photo E11: Draft of a symmetrical terrace parcelling

The narrow type of terraced drystone walls do not form a terrace but they either separate (or enclose) it. They can be seen on more gentle slopes on a gradient of 12-30 degrees, planted with olive trees and on a smaller scale by grapevines. More than one half of these plots are surrendered to overgrowth, covered with macquis or in some places with forest. In the present time, these types of terraces were the first which have sporadically undergone clearing and restoration.

Photo E12: Agricultural production is hardly visibly regaining the hilly terrains around Blato. Olives are less demanding trees; therefore, they are the only visible ones on partially restored terraces. A close proximity to road has probably favoured revitalisation of olive groves on this site.

Photos E13 and E14: It took an agricultural labourer a period of fifty years to build drystone walls up to 1 m thickness. Although this example of terraces is exceptionally valuable, they fall into decay due to the absence of heirs.

The elongated wide and asymmetrical terraces are located on the gentle slopes up to 12 degrees inclination; they are mainly situated on the edge of hollows and fields. They form an interesting pattern with their structure. This type of terraces was mainly covered with olive-trees, while a mosaic displaying the agricultural land use appeared closer to the settlement. Even though this type of landscape is neglected, its proportion is the highest among still cultivated agricultural areas.

Photos E15 and E16: Wider type of asymmetrical terraces developed on more gentle slopes. Studying COC from 1971, it was established that these terraces were once mainly cultivated with olives. The same location captioned from the road and from the air.

(The state ortho – photo 2000)

Photo E17: Sketch of asymmetrical terrace parcelling

2.2.2 Field landscape

This type of landscape develops on the almost flat terrain (up to 5 degrees slope). The Blato field is a typical karst field which is, according to the soil property, divided into two mapping units. The eastern side comprises the red soil *lessivée* which as dominant is typically deep, next to the brown on limestone and red calcareous – dolomitic, while the western major part is trenched on loess as dominant against sirozem siliceous carbonate and eutric brown on loess as dominant (Mirošević&Romić 2006). This pedological difference is supported by the diversity in its structural sense through parcelling and its surface cover. The biggest proportions in the existing type of landscape are those still cultivated areas. Crops mainly consist of vineyards, orchards and vegetable gardens, while ploughlands are quite rare.

A) The western part of Blato field is characterised by fragmented parcelling and by an elongated *dolina* type field structure.

Photo E18: Blato field in which typical elongated plots are predominant of a shape which is probably predetermined by road access and land-reclamation canals

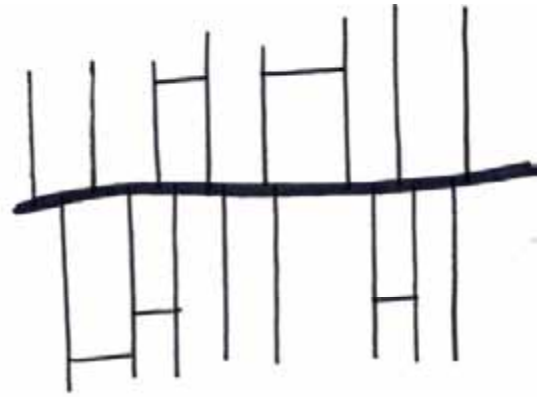


Photo E19: Sketch depicting asymmetrical elongated plot parcelling

Photo E20: A view of the same field (DOF 2000)

B) Southern side of Blato field is characterised by asymmetrical square parcelling shape representing fields planted with diverse cultures.

Photo E21: Aerial photo (the state ortho – photo 2000)

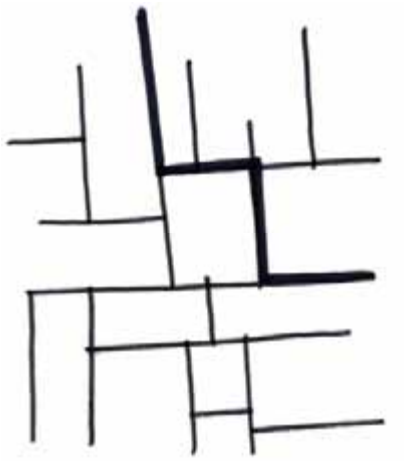


Photo E22: Sketch depicting an asymmetrical elongated plot parcelling

Photos E23: and E24: Asymmetrical parcelling on the eastern side (the above picture was taken in 2000; below, picture taken in 2006)

3. Defining problems

Succession represents a major issue in this space, since in a developed cultural, but structurally diversified space, on the one hand, the natural potential keeps regenerating, which, on the other hand, represents a potential danger from fires and a permanent loss. Frequent fires cause soil erosion and threaten with a lasting devastation of terraces and stone structures. Drystone walls are being pulled down and are going to disappear, while stone is used for building purposes. The uncontrolled and exaggerated use of pesticides and pertaining agricultural measures tackle the key issue of drinking water quality and their sources in the valley, *dolina*. A high degree of depopulation is a serious problem in Blato. Depopulation has not only dragged this problem tackling the lack of farming people, but also a non-definable ownership, thus discouraging the local residents in their plans to restore the existing abandoned agricultural planting plots, whether the subject matter is aiming at enlarging land plots or renting them for production purposes. Should agriculture be reactivated on these elevated sloping terrains around the Blato field, we would come across the problem of present-day technologies. Inaccessible terrain renders the use of modern equipment impossible, since it could destabilise terraces. It is also necessary to mention that understanding of these problems and values of distinguished landscapes, contributing towards the identity in the general public is very low.

3.1 Objectives

The objectives are the following:

- Identification of cultural and natural landscape values;
- Defining the degraded cultural values;
- Recognising of existing trends in further development processes in space with their consequences;
- Defining the type of production in the future and commitment to dominant activities;
- Proposing models of developing activities (those ones which are going to have the greatest impact on environment) along with protective measures to achieve the landscape development optimum;
- Defining areas suitable for revitalisation and description of space use, having in mind each specific activity.

3.2 Working method

The method of work was based upon some aforementioned issues in order to obtain a land-use plan which is integral with regard to technological and economical, ecological and cultural requirements of the newly created landscape. The first steps taken comprised inventarisation, analysis and valorisation of the monitored area. Inventarisation comprised collecting elementary and inferred particulars on this space presented in a sequence of thematic maps (pedology, vegetation, hydrology, inclinations of the terrain, etc.). These data were further used for the analysis and valorisation of the space and elaborated on the two essential starting points. Firstly, it was necessary to ensure the attractiveness of the area for the productive economy and secondly, to guarantee the pursuit of landscape values in the newly arranged area. In the analyses of attractiveness, to locate certain activities for a productive economy, we sought for the most attractive areas. As distinguished from them, the landscape values (protective model) had to be incorporated within natural and cultural features of this space. They can be manifested in different

ways (as visual characteristics, through the degree of preservation of the traditional land use or parcelling, etc.).

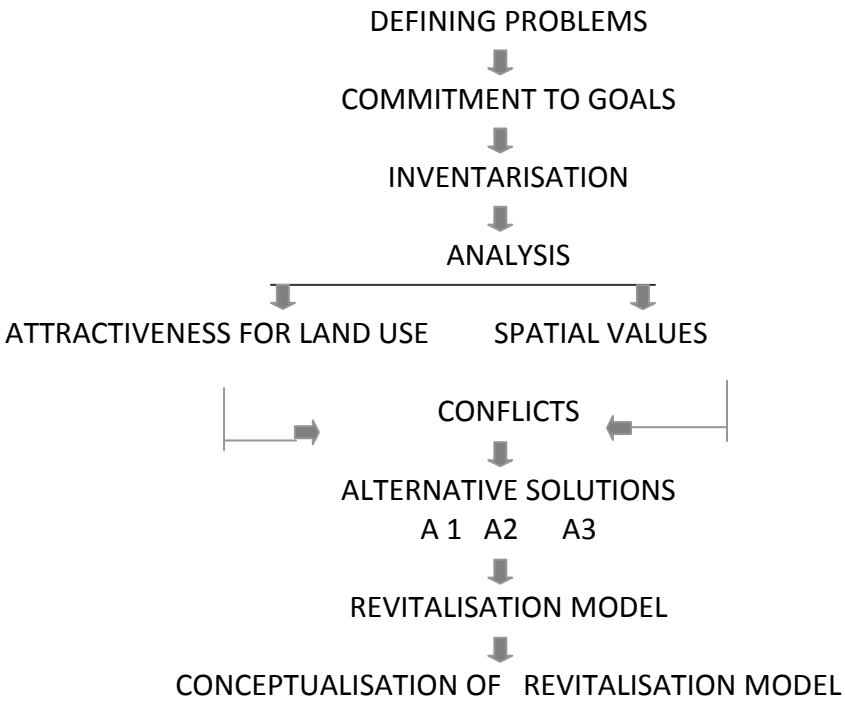
As an outright result of this analysis and valorisation maps, the graphic surveys of areas with the greatest attractiveness (models of attractiveness) were obtained for a productive economy, as well as the maps of landscape values (models of landscape values).

Putting these models into mutual relations - for a productive economy and model of landscape values, the possible spatial conflicts are reduced to the smallest possible degree. This is depicted by means of several alternative solutions. They can favour technological and economical visions to a smaller or a greater degree, and respect ecological, i.e. cultural landscape values, just as well. As an optimal model, and simultaneously, a final product of the planning process of this workshop, a land-use plan was created, which in a newly structured landscape ensures preservation of ecological and cultural values to the highest degree. But, on the other hand, it ensures far the most profitable engagement in agriculture. The importance of such an approach is derived from the fact that this kind of the landscape can offer a basis for different forms of rural tourism retaining the original landscape values along with the possibilities for the proportionally profitable agriculture.

3.3 Vision

The landscape in the surroundings of Blato has a very high value due to the presence of terraces as the best proof of a long-standing traditional agriculture. The working hypothesis prescribes that only through a successful economy one could prevent further demographic decline and restore the vital traditional landscape. It is impossible to stop the spatial processes which radically change traditional features of rural areas, but it is possible to direct and build these processes on the principle which follows the historical continuity of the space. This could lead towards the creation of a new type of a landscape which is going to satisfy the economic, cultural and ecological vision.

3.4 Working Process

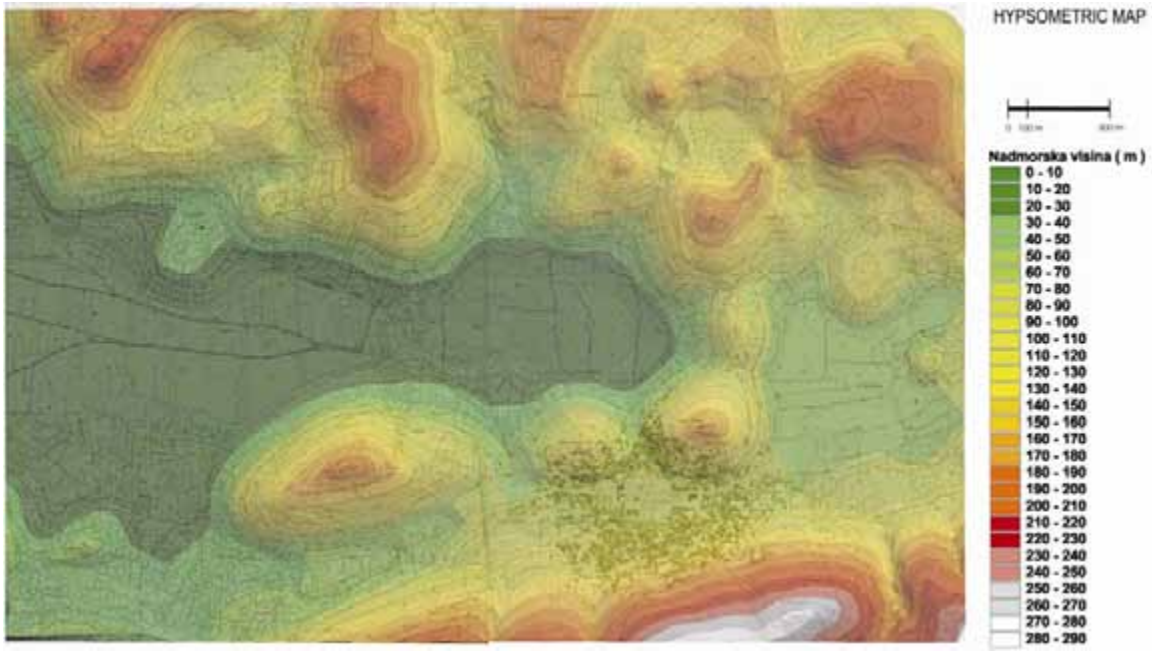


4. Inventarisation

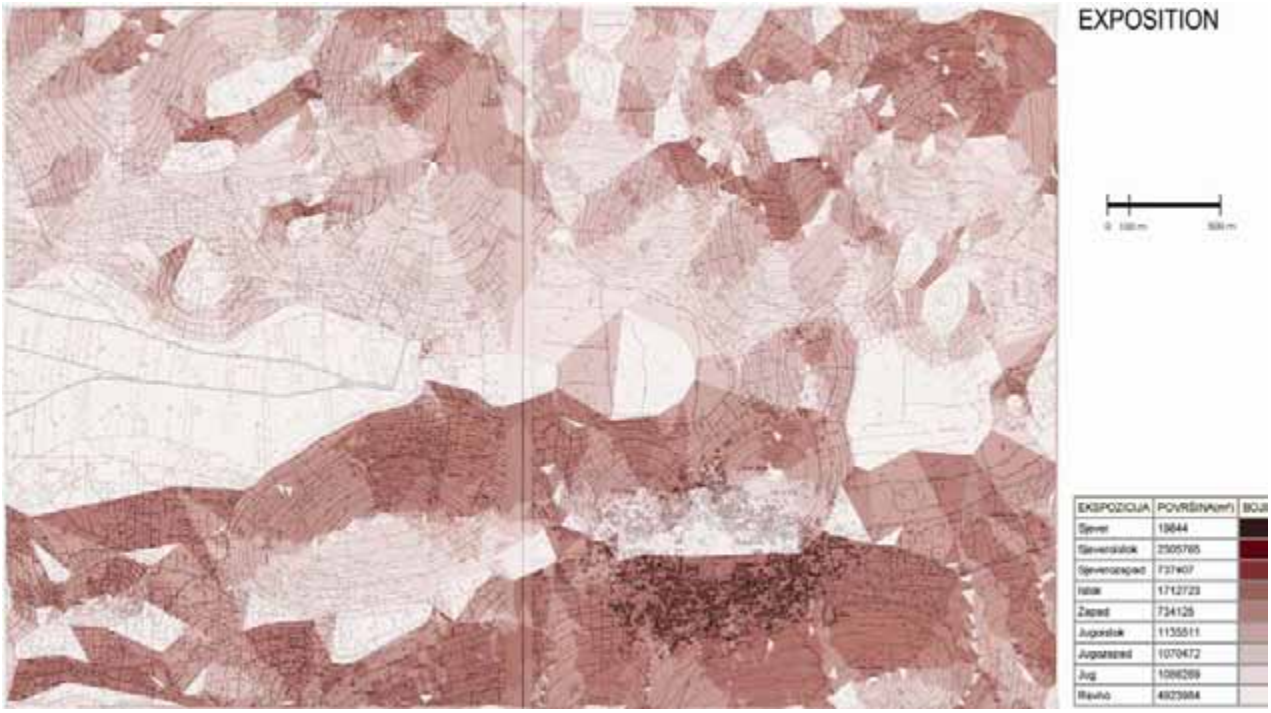
The inventarisation procedures are related to the identification and description of a landscape structure as well as their processes (parts and structures). The result of each inventarisation is a database making a true copy of the entire area under observation with all particulars considered relevant regarding the commitment to goals. Data collected through inventarisation serve as a basis for further analytical steps and spatial assessment. In compliance with these goals, the database completed by means of thematic maps comprises the following relevant data for the area of Blato:

- HYPSOMETRIC MAP
- TERRAIN EXPOSITIONS
- LAND USE
- SLOPES
- PEDOLOGICAL MAP
- HYDROLOGICAL CHARACTERISTICS
- PARCELLING OF LAND
- VISUAL CHARACTERISTICS

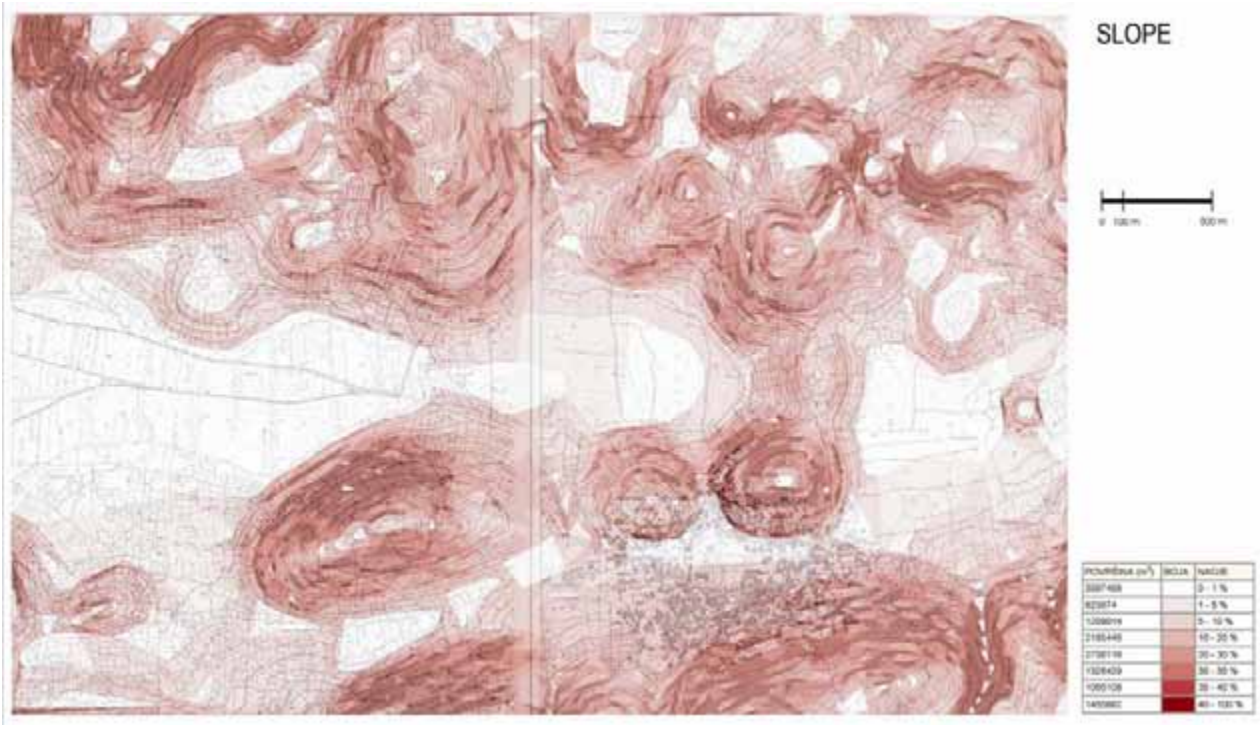
The basic state map (*Osnovna državna karta*) - on a scale 1: 5000, and an aerial photo served as a basis. At the same time, we used data on demographic and economic characteristics including relevant figures from the physical plan. An informative discussion took place with the local community representatives, who got us presented with problems of development in their region.



Hypsometric map - depicts elevation above sea level from 0- 290 m on a 10 metres gradient



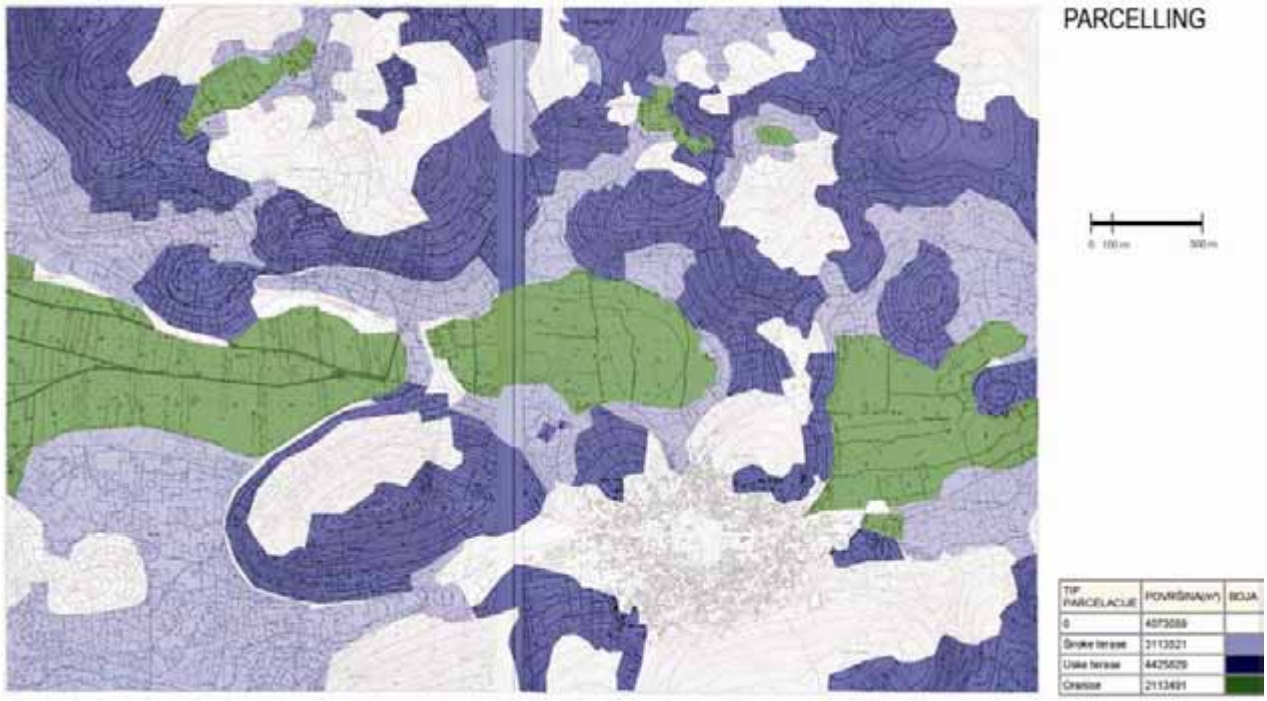
Exposition – a survey of the terrain in relation to insolation (N, NE, E, SE, S, SW, W, NW expositions)



Slope - divided into 8 groups

LAND USE - a survey of the elementary zone of land use: inhabited area, cultivated areas (olive groves, orchards, and vineyards)

Land use - situation in 2006



Parcelling – an overview of the fundamental zone of planting plot types (wide terraces, narrow terraces, tilled field, ploughland, forest areas and settlements, etc.)

5. Analysis and valorisation of the area

A) Analysis and valorisation of a productive economic operation from the feasibility standpoint

The feasibility of a productive economic operation of this area is related to the identification of possible uses of different types of soil for particular purposes. These comprise three kinds of agricultural intended use, namely: viticulture, fruit-growing and cultivation of olives. In order to find an area with the highest potential for their development, the models were made (depicted by maps of attractiveness) with a fixed position for each of these branches in space. The models are established on predetermined criteria in compliance with spatial conditions required by a specified branch and their most desirable development (types of soils, topographic characteristics, planting plot sizes for profitable use and the like). For each of these activities, criteria are singled out as evaluation instruments (depending on spatial demands of these activities), and each criterion specified was discussed and evaluated separately. The aim of this evaluation is to define a certain criterion assessment, depending on the feasibility level for the development of the activity. For example, criteria on the terrain exposition for fruit-growing are divided into several categories: the most favourable exposition (S), less convenient (SE) and the least adequate exposition (SW), while the other expositions are evaluated as unfavourable ones.

Based upon criteria determined within each single branch for these three agricultural intended uses, a graph is made (model of attractiveness) showing attractive areas for the location of these activities.

A.1 Model of attractiveness for vineyards

In order to specify attractive spaces for viticulture, it is necessary to understand climatic characteristics of the location. Out of microclimatic components, the following factors are important for the cultivation of grapevines: heat, light, precipitations (humidity) and winds. Some sorts grow well on the flat terrains, while some do on the slopes. In most cases, wine species are much better adapted to the hilly terrains, so the best steep terrains for their cultivation are gradients between 10% and 30%. Grapevine is adapted to life in the most diversified types of soil; therefore, it can successfully grow in the barren karst. Hilly terrains are by far the best, without being influenced by fog, freezing or high presence of moisture, air, i.e. more airy and better lit spaces (Mirošević 1996). The forest proximity plays an important role, too. It acts as a humidity regulator and protects from northern winds. The role of viticulture in these parts is primarily cultivation of grapes for wine production.

These are criteria for the most desirable location:

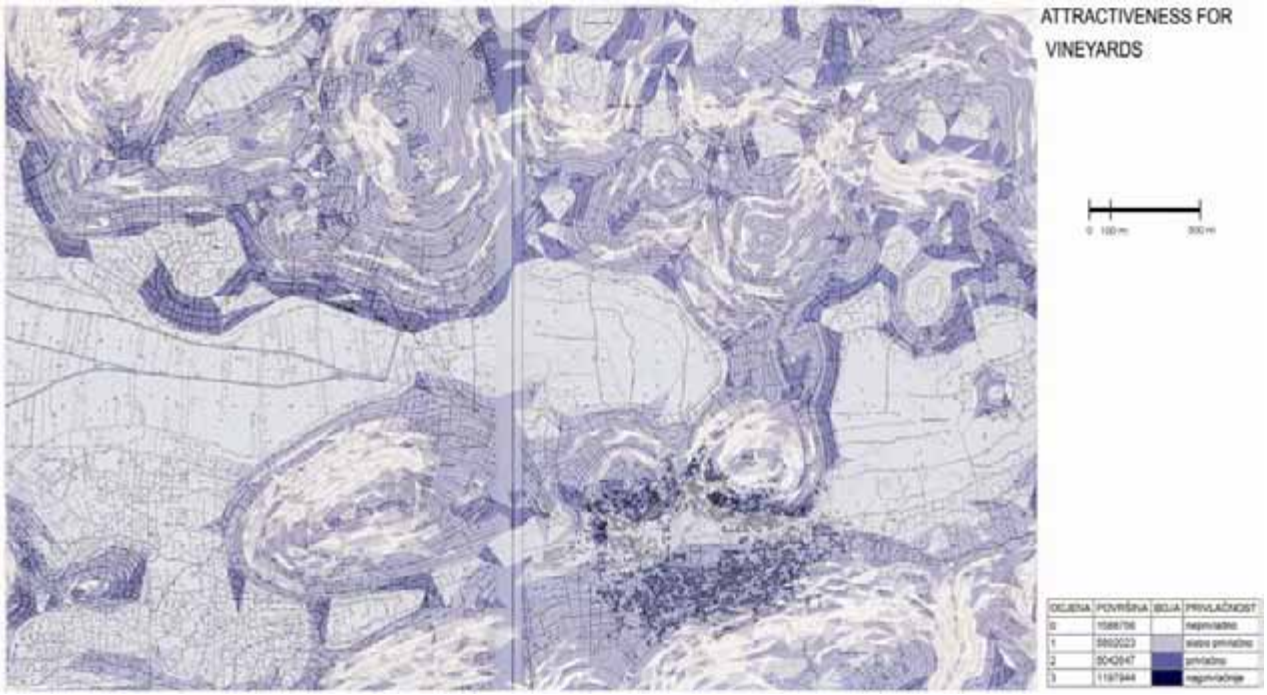
Exposition:

- southern**,** south-eastern and western as the most attractive;
- south-eastern and eastern as medium attractive; and
- northern, north-western and north-eastern as the least attractive.

Slope inclination:

- from 10 to 20%, the most attractive;
- from 20 to 35%, medium attractive;
- from 0 to 10%, the least attractive.

Terrace shape: Narrow terraces on steeper terrains are considered preferential.



A.2 Model of attractiveness for orchards

In order to determine attractive planting spaces for fruit-growing, it is necessary to be familiar with soil, relief and climate of the area. Apart from macroclimatic factors, microclimatic ones, such as frost and incidence of low temperatures, are essential. In a successful fruit-growing it is important to avoid open locations with direct wind impacts. It is also important to avoid ravines and *dolinas* where air stagnation and temperature drop might occur, what is typical of Blato region. The most suitable expositions for fruit-growing are southern, south-eastern and south-western positions. Slanting is fundamental, since production becomes more costly, as the gradient tends to grow. It is considered that 15% slanting is the most appropriate, but we must take into consideration that the points in question are mainly already existing terraced terrains; therefore, the elevation difference has already been overcome. In this case, acceptable inclination would be up to 35% (Miljković 1991). Semi intensive crops, such as: fig-tree (*Ficus indica*), almond-tree (*Prunus amygdalus*), carob-tree (*Ceratonia siliqua*) and strawberry-tree (*Arbutus unedo*) are suitable.

These are criteria for site location:

Soil:

- anthropogenic soils - the most attractive;
- red soil - terra rossa - medium attractive;
- brown on limestone bedrock - the least attractive.

Exposition:

- southern**,** south-eastern and south-western are the most attractive;
- western and eastern as attractive; and
- northern, north-western and north-eastern as the least attractive.

Slope inclination:

- from 5 to 20% - the most attractive;
- from 20 to 35% - attractive;
- from 0 to 5% - the least attractive.

A.3 Model of attractiveness for cultivation of olive trees

In the Adriatic region, olives are the most widespread plantations. In the last couple of decades, their cultivation was pretty neglected and most of olive groves fell into decay. Favourable climatic conditions and the growing demand for the quality olive oil should become a stimulus for the revitalisation and further development of this activity. Olive-tree is an evergreen tree with broad leaves, growing to live for several centuries, and sometimes for several thousand years. The success of its inflorescence and fecundation depends on the climate. During its inflorescence, a mild breeze is desirable. One should avoid the areas with strong winds since they accelerate the fall of fruit before its maturity to the full. Permeable soils are more adequate. It is possible to preserve humidity, partially by spreading a layer of organic substance (mulch). This plant alone is not susceptible to drought, but water quantity contributes to its quality and quantity. Gathering olives comprises major production costs (50-70%); therefore, mechanisation is recommended. It also dictates the selection of production facilities (slope).

These are criteria for site location:

Exposition:

- southern, south-western and south-eastern as the most attractive,
- south-eastern, south-western, western and eastern as medium attractive, and
- flat as the least attractive;

Slope inclination:

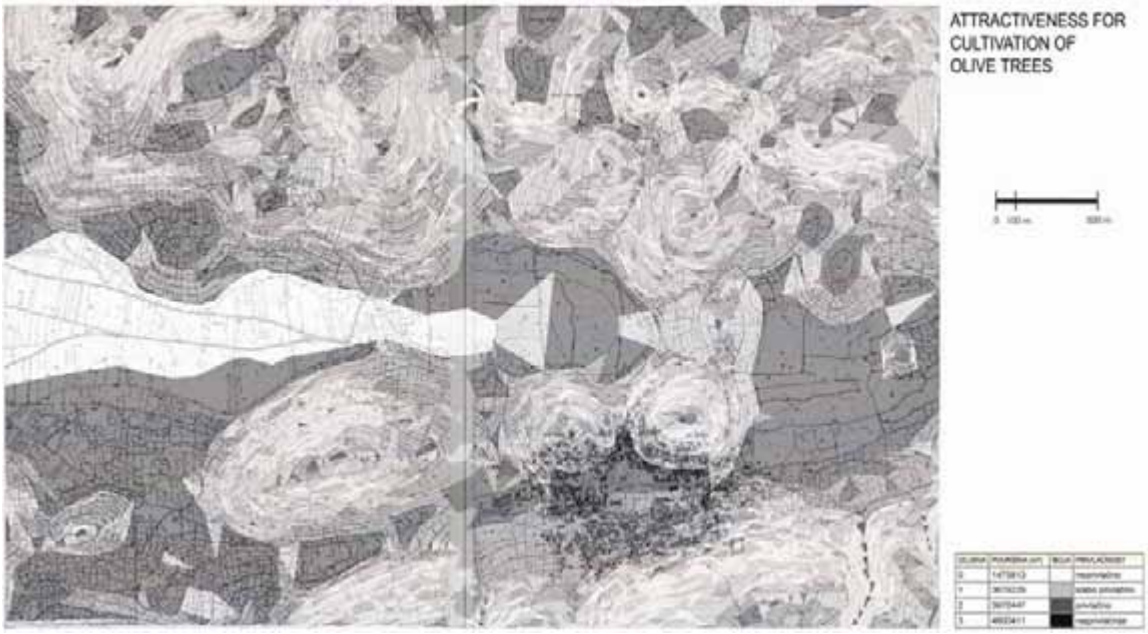
- from 0 to 5% - the most attractive,
- from 5 to 15% - medium attractive,
- from 15 to 35% - the least attractive;

Elevation:

- acceptable 10 m above the sea level;

Terrace shape:

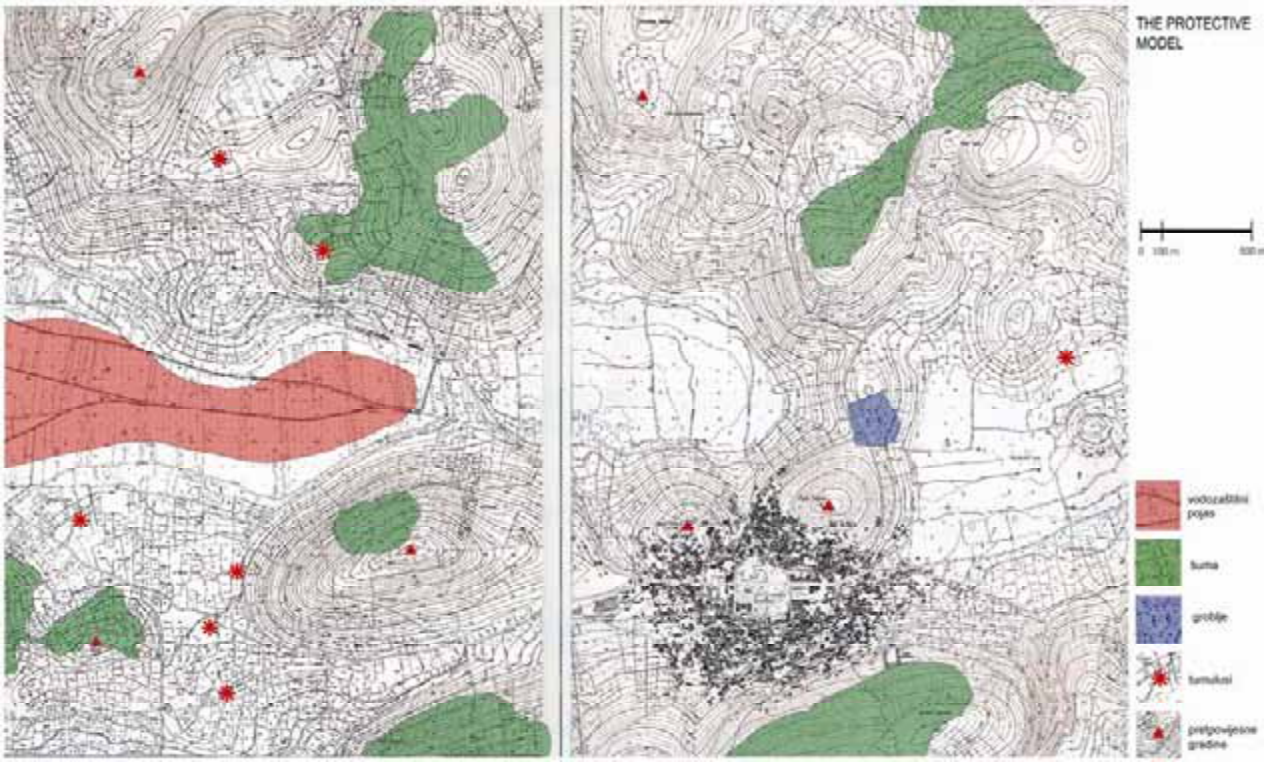
- wide terraces are considered preferential.



B) Analysis and valorisation of the area in regard with spatial values

Since models of attractiveness represent development aspects, i.e. a maximum possible development of each agricultural activity, it is also necessary to take the protective model into consideration. We define spatial values which could become endangered with the introduction of planned interventions. By means of a protective model, we can see the following spatial qualities: water-protective belt; the existing forests; and historical heritage. Agricultural development with the exaggerated use of pesticides could endanger drinking water of Blato valley, so this potentially endangered valley is marked on the map. Forest lands are just as valuable and should be preserved as for their natural resource, so as for their site specific character. Valuable forest areas are selected by means of a digital ortho-photo map of this district in which the major, more compact and darker stretches, displaying older cover, were taken into consideration.

Through overlapping this map with the attractiveness of the district, these valuable spaces will be eliminated from the potential production. In Blato and in its surroundings, there is a considerable number of prehistorical hillforts from the Bronze and Iron Ages, tumuli and some Roman buildings. These points in space should be marked and well incorporated within the planned activities by connecting them to the existing communications to gain their access.


THE PROTECTIVE MODEL
vodozaštitni pojas
šuma
groblje
tumulusi
pretpovijesne gradine

6. Conflicts

Upon completion of the development models and models of landscape values, zoning of this district is formulated. It has established a mutual relationship between the development vision of monitored activities (viticulture, fruit-growing, cultivation of olives) and spatial values (protection model). With their overlapping we can separate sources of conflicts in space, which are mainly related to competitiveness of diverse activities on the same locations, as well as overlapping in attractiveness of certain activities with their spatial values. In resolving these conflicts, the two basic dilemmas are comprised: location of activities and their internal analytical break down, i.e. where it will be located (land-use plan) and in what way it is going to be assigned (structural plan). Several propositions which were considered have determined the final decision:

- to take into account how big the total proportion of each single activity in space occurs with the competitiveness of more activities on the same location (decision on location will give preference to the activity with better opportunity for development);
- to consider a wider context of development range, for example, if tourism activity is planned during the decision-making procedure on the implementation and structuring of a new landscape, a very important criterion is to respect visual significance of such a landscape (for example: agriculture cannot occupy the entire landscape, nor can be permitted to assume an intensive character);
- to ensure that determination of the proportion of each activity will depend on a wider context of space development (for example: fruit-growing and viticulture are more attractive for development of tourism than farming and growing of vegetables);
- to make allowance for the possibility that the decisions about structuring and a manner of land use for a certain activity are based on spatial values (for example: a new parcelling of land coinciding exactly with the traditional parcelling, the decision on the protection of the existing parcelling, fostering crops which are profitable on such planting plots).

7. Revitalisation model

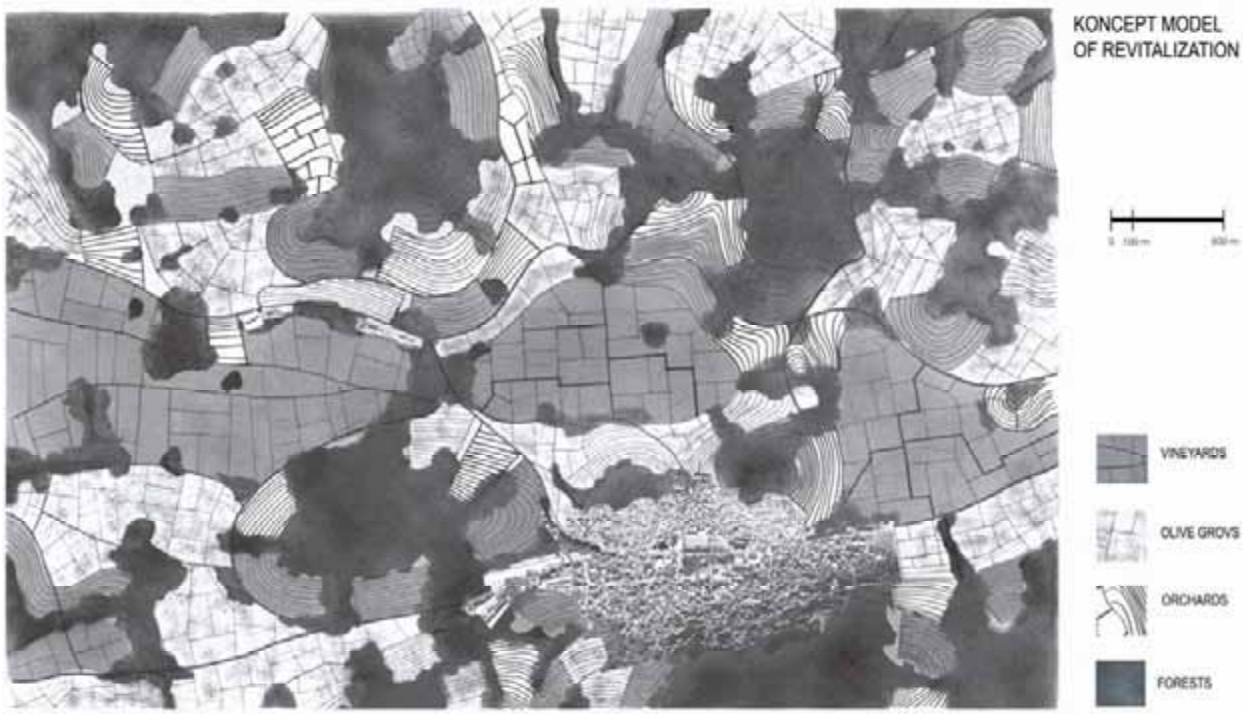
Based on these propositions, alternative solutions were considered. The final outcome is an optimal model of a revitalisation made, i.e. a plan of land use which represents possibilities of special restructuring that could be economically feasible, but at the same time contributing to a more complex landscape picture. The most cost-efficient areas were defined in which agricultural production can develop without jeopardising the traditional pattern. Thus, in this model, the structure of future planting plots is clearly depicted consistently following the land configuration and respecting the existing parcelling shapes. With overlapping of this attractiveness, preference is given to viticulture, as to the most profitable and the most recognisable crop cultivation in this region. The second most widespread field crops are olives spreading all over the northern expositions on wider terraces with access for mechanisation. Orchards are the least present ones, being located on more or less accessible locations due to the very character of their growing. To justify the selection of a location, we propose the semi intense crops, such as: fig-trees (*Ficus carica),* almond trees (*Prunus amygdalus*), carob-trees (*Ceratonia siliqua),* pistachio (*Pistacia vera*), jujuba-tree (*Zizyphus jujuba*) and strawberry-tree (*Arbutus unedo*).

Shapes of these plots are adapted to the land configuration. The goal is to achieve an optimal relation in sizes and shapes of these elements (forest, vineyards, orchards and olive groves) in such a manner to create the more complex image of the space, so to avoid large level surfaces of identical crops. There exists cultivation of a single agricultural product to the exclusion of other uses of the land - areas under monocultures in the hollows, while smaller plots alternate with other kinds of crops and belts of greenery on the terraced slopes.

Apart from the existing forests, which were worth preserving, some new ones were added and their joint growth is conceived in several ways. Most of the forestlands are surrendered to a spontaneous succession, but in order to create the diversity in a visual and economic sense, a directed succession is rendered possible by planting pine-trees and holm-oaks.

Yet, another category of forest areas, which might contribute to their diversity, would be an intervention of level surface plantations. This type of planting would be adequate for the exposed and enhanced smaller areas among the plots or passing over from flat terrains onto terraces. Species, such as heather (*Erica mediteranea, Erica arborea*), flowering ash (*Fraxinus ornus*) and mock privet (*Phillyrea latifolia*) might be taken into consideration. Planting of fruit bearing flowery ligneous species is possible alongside the main access paths.

The problem of accumulation in the Blato field and potential pollution of drinking water owing to more intensive growing is solved by planting autochthonous resistant species of grapevines which demand protection to a lesser degree, as well as with partial leaving out in agricultural production. The rural landscape shaped in this manner is attractive for tourism purposes not only for its visual complexity but also an opportunity to develop tourism in rural households.


KONCEPT MODEL
OF REVITALIZATION
VINEYARDS
OLIVE GROVS
ORCHARDS
FORESTS

8. Discussion with public participation

At the end, all participants of the workshop prepared a comprehensive presentation of the entire work which was open to all local residents from Blato. The Mayor of Blato also took part with his associates. Subsequently, a discussion was generated on the possible implementation of this plan as well as the use of this method to achieve optimal spatial solutions of revitalisation of the cultural landscape.

The revitalisation plan overlapped with the adopted spatial plan, which was carried out by using another method. This confronting was especially useful to indicate to the incompleteness of these plans with regard to revitalisation of this valuable agricultural space, as well as to the benefit of development in agricultural production.

The participants of the local community were obviously surprised with the results achieved from the workshop and especially with its outcome in relation with the adopted plan.

Photo E25: Proposal of revitalisation

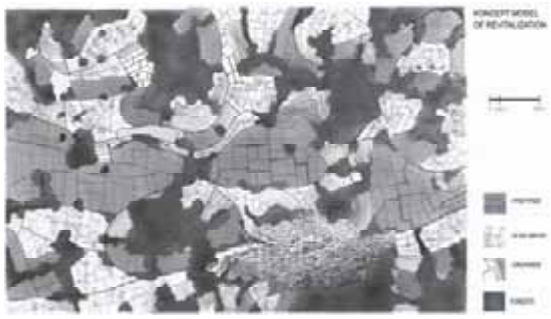


Photo E26: Adopted physical plan (land use and intended plan of land use)

The adopted plan has completely disregarded cultural features of the traditional landscape. Still, further neglect, i.e. surrender of major part of agrarian areas to the forestland (green areas) is anticipated, the Blato field is classified as a very valuable agricultural soil (brown areas), without any guidelines on what to do and how to act in this particularly delicate area. The rest of surfaces, other than the settlement itself, are marked (yellow) and classified only as other cultivable land (ocher) have also remained without guidelines for further activity (Photo E26).

On the contrary, cultural and natural landscape values are identified in the plan of revitalisation model (Photo 25). Fundamental agricultural branches, which are the most productive ones for this location, are defined. Priorities are also defined: viticulture as the predominant activity, olive growing and finally vegetables growing. The revitalisation model indicates to the possible more intensive agriculture, based on the principles of sustainable development in which exploitation of natural resources is rationalised, agro-technical measures restricted and the traditional parcelling pattern respected.

With overlapping it was ascertained that a great number of cultivable areas was lost in the physical plan and those planned to serve the purpose are located on the most unsuitable locations, without any support for further agricultural development of the commune. Nor has it supported revitalisation of this cultural landscape, in general.

According to the revitalisation model, a simulation of the possible revitalisation of Blato field was presented on the principle of intensifying agricultural production, through regrouping of plots of vineyards around water protective belt and renewal of olive groves and terraces with orchards. All this understands the compliance with the existing spatial structures (Photos E27-E28).

Finally, simulations of the expected consequences in this valuable space caused by abandoning agriculture were finally elaborated. Terraces will gradually be covered by maquis and by forest and will become in the long run completely amalgamated with the forest. This represents a lasting loss of these valuable structures and consequently this visually diversified and attractive place of abode will become transformed into a uniform landscape of exclusively natural features as depicted in the pictures (Photos E29-E31).

Photo E27: Existing situation in 2005

Photo E28: Proposal of revitalisation of Blato field

Photo E29: Present view of Blato field

Photo E30: Aspect in case of partial succession, several small plots with vineyards are visible in the valley and olive groves up in the mountain

Photo E31: Complete overgrowth, the space without identity and complexity

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