# The System of indicators for Regional Development, Structure and Potentials

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# The System of Indicators for Regional Development, Structure and Potentials

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# Preface

This book originated in the CONSPACE project (Common Strategy Network for Spatial Development and Implementation), which was launched in 2003 and dealt with topics of integrated regional planning and sustainable regional development. Its aims were to improve the harmonization of spatial planning, enhance mutual knowledge of planning principles and strategies, elaborate common strategies for spatial development and prepare the implementation of actions. It was realized as part of the INTERREG III B CADSES Operational Program. The central objective of the CONSPACE project was to gain acceptance for a transnational regional development strategy that would show the way to advance and improve existing spatial structures and to reduce regional disparities.

Indicators for an assessment of regional development, structure and potential focuses on the system of indicators for regional development, spatial potential, spatial development and the environment.

The first part of the book sets out some of the theoretical questions about what the indicators are and how they are developed. The second part focuses on examining the concept of indicators within the research project approach. In the third part some of the methodological problems concerning important questions about the criteria for the selection of indicators are explored. The emphasis is on the "methodology sheet" as a method of preparing a common terminology for presenting the basic characteristics of indicators and their connectedness with planning goals, and stating their clear scientific argumentation for their selection in the system of indicators. In the fourth part, using the case study of Slovenia, settlement structure, transportation networks (transportation connections and junctions) and the settlement and transport network are analyzed.

# 1. Introduction

Societies measure what they care about. Measurement helps decision-makers and the public define spatial goals, link them to clear objectives and targets, and assess progress toward meeting those targets. It provides an empirical and numerical basis for evaluating performance, for calculating the impact of our activities on the space and society, and for connecting past and present activities to attain future goals. Measuring spatial development makes it possible for spatial, social and environmental goals to become part of mainstream political and economic discourse.

The need for indicators has become a worldwide phenomenon since the early 1990s. The history of using quantitative indicators can be traced back to the 1940s when the monthly Economic Indicators was first published to measure the buoyancy of the US economy. The term "social indicators" was popularized by Raymond Bauer (1966), who was commissioned by the National Aeronautics and Space Administration (NASA) to examine the impact of the space programme on US society. The idea of compiling social indicators spread rapidly from the USA to international organizations such as the Organization for Economic Co-operation and Development (OECD) and the Social and Economic Council of the United Nations (Horn, 1993)

Some 20-30 years after the initial enthusiasm for the development of indicators in the 1960s and 1970s, another wave of worldwide indicator endeavour began in the 1990s. While the earlier indicators movement was very much developed in the context of social reform and welfare at the national level, the current resurgence of interest in indicators has been largely stimulated by broad environmental concerns related to creating sustainability and quality of life indicators at all spatial scales. The call for suitable "indicators of sustainability", to provide a solid base for decision-making at all levels, was explicitly stated in Agenda 21 (UNCED, 1992: Ch. 40.4). The 1996 Habitat II conference further reinforced the importance of community-based indicator projects to guide and track the progress towards achieving sustainability.

There has been a strong emphasis on and awareness of the importance of using indicators for policy and programme monitoring as well as for developing performance measures. We must realize the benefit of having high-quality information to facilitate partnership and policy debate. So our focus should be on the capacity and aptitude of using indicators to inform policy-making.

Urban development encompasses a wide range of issues, many of which are hard to quantify accurately and appropriately using available data sources. It requires attention to the past, the present, and the future. In recent years, many indicator projects set out to measure concepts such as "sustainable development", "economic competitiveness", "public service delivery" and "polycentric development", which are the outcomes of evolving planning discourses. Many of these key terms in planning discourses are subject to numerous interpretations; hence, it is essential to clarify the content of any such concept to facilitate subsequent analysis and to avoid any attempt to create a multivariate index by simply combining a haphazard choice of possibly related statistics without any theoretical grounding. The recognition of the basic conception is very important as it will

lead to different indicator systems that represent different interests. That is why the first and probably the most important step to start off the process of indicator development is to clarify the basic concept that is to be represented by the analysis and to pinpoint the planning context and rationale against which the indicators will be used. There is a fundamental need to clarify and delimit the meaning of the concept being measured to allow a common understanding of what is exactly the subject of measure.

In spite of the fact that government has increasingly favoured the use of indicators to inform decisions on urban planning issues, it is clear that some are more conceptually developed and embedded in the decision-making process than others. These indicators that are taken more seriously by policy-makers tend to be those with a strong and clear link to public resource allocation. One clear example is the use of so-called urban deprivation indicator. In spite of the flows and recent confusion over the policy usage, deprivation indicators have a higher degree of institutionalization. This is partly due to their long history of development, and partly related to the fact that there are specific policy needs to make use of such information for resource allocation. Hence, there has been continuous effort to refine and update indicators. And there is also a continuous need for the government to issue clear policy frameworks to explain how indicators will be used to inform public funding allocation and policy decisions.

The European Structural Fund and Social Fund are operated on a regional basis and stress the importance of partnership as an implementation mechanism. Spatial targeting and co-ordination of European aid has become more important since the move towards Integrated Development Operational Programmes in the 1990s. The pertinence of indicators in programme monitoring and evaluation was made explicit by the European Commission (Indicators..., 2000), when launching its New Programming period in 2000. The changing face of cities and regions, and the development of new forms of institution and governance at different spatial levels have set in train a very dynamic policy agenda. The political-managerial needs of having some forms of quantifiable measures to justify resource allocation have no doubt boosted the importance of statistics and indicators in the policy arena.

The system of spatial indicators is an instrument by which we measure and evaluate spatial structure, its changes and development, and progress toward spatial development goals and objectives. Such indicators have many uses: they can help identify trends, predict problems, assess options, set performance targets, and evaluate a particular area, jurisdiction or organization. Which indicators are used can significantly affect spatial planning decisions. Indicators can be used to establish specific performance targets and contingency based plans. It may be appropriate to use a limited set of indicators which reflect the scale, resources and responsibilities of a particular sector, jurisdiction or agency. An activity or option may seem good and desirable when evaluated using one set of indicators, but harmful when evaluated using another. It is therefore important to carefully select spatial indicators that reflect overall goals. It is also important to be realistic when selecting spatial indicators, taking into account data availability , understandability and usefulness in decision-making. For spatial planning it is usually best to choose a balanced set of indicators reflecting a combination of economic, social, spatial and environmental objectives. An indicator set that focuses too much on one type of impact or overlooks others can result in decisions that are not optimal overall.

It is important that users understand the perspectives, assumptions and limitations of each indicator.

The prime objective of the system of indicators is therefore to set up an operational system of indicators of development. It should facilitate the measurement, documentation and description of the current state and progress in a region as well as its position in relation to other regions, from the point of view of the spatial, economic and environmental aspects of sustainable development. It should be designed to provide information for the general public, political actors, and planners and administrators. By helping to publicize the objectives of development of a region, the system will constitute an instrument for creating awareness of the consequences of development among the society.

The main purposes of the determination of indicators are:

- to broaden the knowledge base by making available comparable data and indicators, and analyses and research on cross-border, transnational trends which influence development;
- to exchange information on the practice of planning on a comparable basis;
- to observe and evaluate development with implications for the development policy aims and options, as well as for establishing appropriate criteria and indicators;
- to review available data and information system;
- to harmonize the system of indicators with special emphasis on regional, spatial and environmental indicators;
- to use common databases for observation, analysis and evaluation of regional and spatial conditions, development trends, environmental characteristics and potential for development;
- to collect data for unified analysis, categorization and typization, and evaluation of regional development structure;
- to determine methodology of regional profiling and ongoing regional monitoring.

# 2. Theoretical approach

In order to explore the epistemological position of indicators, the analysis has to be focused on the theoretical level and the practical reality of what the indicators are, and how they are developed.

Indicators are statistics that provide some sort of measurement of a particular phenomenon of concern. As with any long-scale quantitative research, indicators tend to be seen as part of the empiricist or positivist tradition. Different emphasis has been placed on the definition of indicators. Each definition represents a particular viewpoint of the nature and purpose of indicators. Indicators can be the result of operationalizing abstract concepts of social and policy problems, and they offer a guide indicating how a particular issue is structured or is changing. The normative emphasis suggests that indicators would be used as a yardstick to measure progress and goal achievement. Indicators as policy instruments are subject to the politicization of interpretation and the possibility of manipulation even to the measurement stage through the choice of indicators, data sources and methods. The debate over the nature and purpose of indicator research has largely been focused on two dichotomies: theoretical versus empirical and basic scientific versus valuative.

The search for appropriate indicators of spatial development has been going on for many years at many different levels of societal organization: small community, city, region and country. There seems to be general agreement that a single indicator of spatial development cannot be defined, and that a substantial number of indicators is necessary to capture all important aspects of spatial development in a particular application. However, defining an appropriate set of indicators for spatial development turns out to be a difficult task. If too few indicators are monitored, crucially important developments may escape attention. If a large number of indicators have to be watched, data acquisition and data analysis may become prohibitively expensive and time-consuming. Obviously, practical schemes cannot include indicators for everything. It is essential to define a set of representative indicators (key indicators) that provide a comprehensive description—as many as essential, but no more. But what are the essential indicators? In the past, this problem has mostly been solved by the intuitive assessment of experts familiar with their particular discipline, for example, economics, ecology, sociology and engineering. Corresponding indicator sets are usually characterized by specific disciplinary biases, with gaping holes of oversight in some critical areas, and overly dense indicator specifications in others.

Science cannot provide an objective method for finding the one-and-only true indicator set for a complex spatial development system. The reason is simple: the number of potential indicator candidates in such systems is very large, while the set of indicators must be relatively compact if it is to be of any value. Hence, there must be selection and aggregation. Moreover, there is always less than full knowledge about a spatial development system or problem, and there is no guarantee that all vital indicators are already in the list of candidates. Hence, there will usually also be a search process that may yield more candidates, but that still cannot guarantee the identification of all vital

indicators. All of these processes of search, selection and aggregation require decisions that are based on the knowledge, experience and values of those who make the search and selection. The best we can do is to accept the unavoidable subjectivity and to make these processes as systematic, scientific and encompassing as possible, i.e., comprehensive, complete and reproducible. This requires transparency and reproducibility of the process, a compact and systematic approach, and comparability of the results. Science can help significantly in assuring that the processes of indicator search, selection and aggregation are as objective and circumspect as possible. Science provides extensive knowledge and complex models in most fields. Even if this information does not and never will represent the ultimate truth, it can be used to inventory and structure available knowledge. In particular, it is important to avoid an ad hoc collection of indicators. The choice should be based on a consistent theoretical framework supported by sufficient empirical evidence. In this way, systematic methods for indicator search and selection can be developed that can assure reliable results if carefully applied.

Letting a group of experts make a selection of indicators in an area as complex as spatial/regional development is, however, obviously the wrong method. *Because* they are experts, they are likely to focus on issues and items of their professional expertise while neglecting others that may have a significant effect in the real system. A search for indicators can only be as complete and comprehensive as the imagination, knowledge and experience of the investigators allow. But the best knowledge of systems and problems, including their long-term perspective, can usually be found with those who have to cope with them daily: citizens, unemployed persons, small business, managers and administrators, farmers, doctors, social workers, police and educators. Hence, this pool of intimate system and problem knowledge must be systematically included in the process of indicator search and selection. In addition to this effort to cover the full spectrum of knowledge, a similar attempt must be made to represent the full spectrum of values. While available knowledge constrains the search and selection of indicators, values shape it. It is, therefore, necessary to include all relevant world views and value perspectives of a community in a participatory search and selection process.

Information sources change as decision making becomes more market-oriented and decentralized. Although designed for efficiency, the sorts of information-processing strategies often yield systematic and predictable errors that can severely distort both how nations approach spatial decision making and how they analyze and discuss improvements to the system of indicators. The system of spatial indicators counters this tendency by not only permitting but also encouraging change in technical details on how to measure progress toward objectives of spatial development. This bottom-up, evolutionary approach to the system of spatial indicators takes more time and money than repetition of standard sources and methods. It also risks changing overall results so much that the objectivity of the spatial indicators in general can be called into question. Nevertheless, one direction for further work centres on devising a more systematic approach to changing variables and justifying changes so the system of spatial indicators can show where better data needs to percolate up from decentralized and market-oriented decision making processes.

Spatial problems cannot be resolved by improving information flows among decision-making processes, or even by the generation of more and better information. Improved

data and information will not address questions of distributional equity. Nor will information fix human limitations with regard to risk perception. Realizing the possibility may require that national governments devise a decentralized and market-oriented information strategy that identifies gaps by origin (for example, technical and analytic barriers, market failures, and institutional shortcomings) and then decides who should fill them and who should pay. The system of spatial indicators might become a catalyst for such a strategy, by going beyond the "wish list" of better indicators that has been given in different systems and reports. Such a taxonomy would also help to connect indicators to actions, clarifying who should act and what might be done to effect progress on a particular indicator.

Conceptually, spatial development involves a wide range of issues, many of which are hard to quantify accurately and appropriately using available data sources. In general, metrics tend to be closely linked to human activities or human impacts.

Different suggestions have therefore been made regarding the process of developing indicators. There is not a single perfect approach to developing a set of indicators, so a selection must be made even when deciding which indicators are to be included and what types of weightings are to be used in the process. Through open discussion and brainstorming sessions, the issues and concepts to be addressed must be clarified and redefined.

For example, the four-step methodological framework (Coombes and Wong, 1994) has been recently employed by Hemphill et all (2004) to develop indicators for measuring sustainable urban regeneration. The four-step procedure is proposed as the basis for a consistent development process of indicators:

- conceptual consolidation: clarifying the basic concept to be represented by analysis;
- analytical structuring: providing an analytical framework with which indicators will be collected and analyzed;
- identification of indicators: translation of key factors identified in the analytical structuring into specific measurable indicators;
- synthesis of indicators' values: synthesizing the different indicators into an analytical summary (Wong, 2006).

Each indicator should be based on a logic developed by a careful review of the science and the literature in the spatial development field, as well as thorough consultation with experts from across the sciences, research centres, and the academic sector. Ideally, these indicators would include all relevant aspects of functioning spatial systems, be distinct in their cause-effect relationships, permit aggregation, reflect the diversity of circumstances across political jurisdictions (including disaggregated data for large countries), be easily quantifiable, and be scale-neutral. Due to significant data gaps and conceptual limitations, the actual indicator set falls short of the ideal.

Among the most important questions about the criteria for the selection of indicators we need to address are their validity, availability and timeliness, reliability and stability, responsiveness, understandability together with their policy relevance, representativeness, sensitivity, compiling, defining the method of calculation, the year for which data should

be collected, finding data from various sources, calculating data, addressing data gaps and interpreting data.

**Validity.** Does the indicator measure a factor that is directly related to the quality of spatial development? Is the indicator a true reflection of the facts? Were the data collected using scientifically defensible measurement techniques? Will one arrive at the same result if two or more measurements of the indicator are made? Methodological rigor is needed to make the data easily understood by all audiences.

If the indicator moved, would a diverse group of people agree on how that movement affected the spatial circumstances - that is, positively or negatively? If there is considerable disagreement about whether the effect is positive or negative, then we do not have a good indicator. As an example, most people would readily agree that as unemployment decreases, the quality of socio-economic development improves. Hence, this would be a valid indicator. On the other hand, regarding the price of a single family home, some might argue that as the price goes up, the community is improved. Others might say that the increase in price detracts from the quality of development by making homes unaffordable to many. So the price of a single-family home would not be a good indicator. In some cases, there seems to be an optimum level for an indicator. Once it moves beyond that level, the quality of development no longer continues to improve. For example, in a rural community with a dearth of family care physicians, the number of family practice doctors per 1,000 population might be a good indicator initially. However, there could come a time when the optimum number of physicians was reached. Adding more physicians would no longer have a positive impact on the quality of development. With this situation, the annual review process should be used to consider carefully when the optimum is reached. At that point, the indicator should be discarded. In some situations, there will be uncertainty about the influence of an indicator.

**Availability and timeliness**. Is the indicator readily available on an annual basis? Are good quality time series data available at a reasonable cost or is it feasible to initiate a monitoring process that will make the information available in the future? Information tends to cost money, or at least time and effort from many involved. Some of the indicators are not available at all. Others may be available only every ten years via the census. Still others may be collected annually but there may be a significant time lag before they are made available. Sometimes only provisional data can be included in the annual report. In such a case, we may have to include a footnote in the report indicating that the data are provisional, or seek another source, if available.

**Reliability and stability.** Is the statistic compiled in a systematic and fair way that will be repeated every year? When we are collecting data compiled by a small organization, or data not required by an outside source, we may find that the method of collection varies from year to year. Unless the method is standardized and dependable, the indicator will not be a good one. To make a determination, we will have to investigate thoroughly how the data are collected and compiled.

**Responsiveness.** Does the indicator respond quickly and noticeably to real changes? To determine this, we will have to look at historical data and note the trends. Common sense will help here. If we find that the indicator has remained flat over a period of twenty years, we will probably not find it to be useful.

**Understandability.** Is the indicator simple enough to be interpreted readily by the experts? Can the information be presented in an easily understandable, appealing way to the target audience? Even complex issues and calculations should eventually yield clearly presentable information that the experts and general public understands. Arcane formulas and wordy descriptions will elude and confuse the average reader. We will have only a handful of words to describe the indicator, so the sense of it must be self-evident. In some cases, the theoretical foundation and measurement methodology of an indicator will be readily understood only by specialists, yet the general public will be able to interpret it.

**Significance of indicators.** The significance of indicators can also represent a problem since it is difficult to establish objective measurement to identify indicators which are more important than others, because many indicators must be used to describe complicated spatial structure properly.

There are, of course, several criteria for determining the significance of indicators, for example: output, process, contextual, and shadow output indicators. The output indicators are measures of specified, real variables over time that can be directly related to policy objectives. The specified variables are defined in reference to the policy objectives and targets to be measured, recognising data constraints. The process indicators are measures of specified variables over time that relate to the means by which policy objectives are to be delivered in terms of policies, programmes, projects and proposals in lower order plans and strategies. The contextual indicators are measures of specified variables over time that can be only indirectly related to policy objectives and which take into account data constraints. The so-called shadow output indicators are the same as the above-mentioned output indicators, but relate to prospective new objectives and policies which the policy intends to develop in a future review rather than the existing policies. Information about these indicators can be collected prior to the review in order to inform the future spatial planning monitoring report and to provide baseline data for subsequent assessment of the relevant new policies. This classification of the indicators is directed more towards monitoring than the process of measuring (qualitative or quantitative):

- changes in regional trends and conditions (regional monitoring);
- impact of spatial planning policies (policy monitoring);
- performance of policies against policy objectives and targets (plan, strategy monitoring);
- progress in delivering the agreed process (plan audit).

**Policy relevance.** Does the indicator have relevance for development policy decisions? If not, it's not a good indicator. Is the indicator linked to one or several issues around which key policies are formulated? Unless users can see the connection between the indicator and critical decisions and policies, it is unlikely to motivate action. It is for this reason that appropriate explanations of the implications for sustainable development and linkages to other issues are included in the discussion of indicators. The weather, average temperatures, or amount of rainfall, for example, are not amenable to human control. Indicators are a planning tool, designed to influence spatial development and policy and spatial development change.

**Representativeness.** Do the indicators as a group cover important dimensions of the element? Examine the entire element and consider at least the major dimensions within the element. Is the indicator about a very narrow or broad quality of life issue? The list of potential indicators is endless. For practical reasons, indicators that combine information on a range of issues should be preferred. For example, average life expectancy is a useful indicator of human health that aggregates information of many trends that influence this single outcome, such as incidence of diseases, lifestyle, the rate of fatal accidents or even the effectiveness of the health system. For example, land use, water quality and quantity, green space, solid waste disposal, energy use, are important dimensions of the group of indicators. Indicators should be selected for at least several of the important dimensions. Indicators of land use alone would not be representative of the entire group of indicator.

**Sensitivity.** The scope of a single indicator is usually limited, even if it satisfies the criteria of representativeness, if we compare it with the issues decision-makers have to address. Staying with the example of human health, while life expectancy measures an overall outcome, there are measures in the quality of life indicator set that will describe factors that influence health, whether it is child/infant mortality, the availability of hospital beds, or toxic substances in the environment. In cases like this, finding a way to aggregate associated measures will help create an overall picture about a complex issue, such as health, and facilitate its communication to the public and policy-makers. Aggregation is an important tool, but it is not without risks, and requires careful consideration of what is to be included in an aggregate measure and with what weight.

**Compiling indicators.** Once indicators have been selected, a number of major tasks lie ahead in compiling the indicators:

- defining the method of calculation;
- determining the year for which data will be collected;
- finding and checking the data;
- calculating indicator numbers;
- addressing data gaps.

Doing these tasks properly during the project is crucial for its ongoing credibility. If we perform them with clarity, accuracy, and full documentation the first time, the annual updates will be much easier. Continuity and consistency over the years is extremely important.

**Defining the method of calculation.** If the task of defining indicators has been done carefully and completely, the method of calculation for each indicator will have been detailed already. Before plunging into data collection, however, it's wise to review specifically what data are being sought and how they will be used to arrive at the indicator numbers. In particular, it's important to decide what annual figure we will use for each indicator. Choices include at least the following:

- the total number during the year;
- the total number per capita or per other unit;
- the average of numbers throughout the year;

- the number at a representative time during the year;
- and the percentage of frequency or occurrence during the year.

Many of the numbers may be raw figures; others may be in Euros (e.g. per capita spending on the arts); still others may be percentages.

**Determining the year for which data will be collected.** Even after we have clearly defined what numbers will be collected, we must determine the year period or periods for which we will collect them. Consistency is important here because we want, as much as possible, to report the spatial development measurement, as expressed by each indicator, for a single annual period. For most data, we may wish to select the calendar year or a particular time during a calendar year. For educational data, we will probably have to use the school year. For financial data, we may have to use fiscal years, which unfortunately may differ among agencies and organizations. We shall never be able to collect truly current data, since we must wait for the end of whatever yearlong period(s) we choose. We must select the most recent complete year for which data are available, and try to be as consistent among indicators as possible. If we're gathering data for the first time, we may be seeking data for previous years. Often this is difficult, because old numbers may be unavailable or they may be unreliable because of changes from year to year in collection or calculation methods. We must check carefully for consistency in the numbers we receive. It is wise not to include any that aren't comparable.

**Finding and checking the data.** Data may come from a variety of sources, including:

- printed documents such as almanacs, yearbooks, census materials, government reports, and public financial statements;
- unpublished data from government agencies or private bodies such as boards of realtors, arts organizations, and human services agencies; and
- telephone surveys and polls (if indicators are selected which measure public opinions, perceptions, or reported behaviours).

Obtaining data from printed documents is fairly straightforward. It's a mistake to assume, however, that the same numbers from the same document for different years are always comparable. We must check the definition, method of calculation, and documentation for each number carefully, to make sure that we're getting comparable figures from year to year. It's amazing how frequently changes are made in the way numbers are calculated. We do need to document each change and in the published report so that actual trends can be distinguished from those resulting from changes in what the indicator measures. We might also want to calculate what the new numbers would be if the old definition or calculating method were used.

Obtaining data from unpublished sources is more interesting but also more complicated than looking up numbers in the library. The keys to success are finding the person who actually generates the data we need (not a secretary, supervisor, executive, or PR person) and establishing a friendly but businesslike working relationship with that person. Our best approach is to share with the number cruncher our understanding of how important his or her numbers are and how interested we are in them. If we're lucky, the same person will still be there- and remember us - the following year when we write or call (or both) seeking the same numbers as last year. Although the personal contacts are

valuable, it's equally important to get our figures in writing. As with document data, it's wise during our personal contacts to make sure the method of calculation hasn't been changed. If it has, we must get specific documentation of the change. A particular pitfall in the use of unpublished (and even some published) data is that in some cases they are first released in provisional form and then reissued in corrected, final form, perhaps a year or more later. Examples include vital statistics, such as death rates, and labour-force statistics. To avoid the pitfall of provisional data, we first need to know when we have provisional figures. That requires receiving complete and accurate documentation from our source person.

Obtaining survey data requires lots of money, a generous donation by a marketing research company, or some real expertise in the house. In most cases, we would want to consider telephone surveying; it is probably the most cost-effective and accurate way of reaching a random sample of a large community's population. Survey research is not easy to do well; if important indicators require survey responses, it makes no sense to rely on unreliable or invalid surveying. Like other kinds of data, we want survey data to be comparable from year to year so that trend lines can be observed. Therefore, it's important to ask the same questions in the same format each year and to conduct the survey at about the same time of year annually with basically the same methodology. If we decide to use a survey, we should include demographic questions so that we can evaluate responses for differing demographic segments. At a minimum, we may wish to ask about race, gender, age, income, and educational level. Presenting telephone survey indicators creates some confusion with dates. For most number-based indicators, we will be reporting data over a year old. For telephone survey indicators, we may be presenting information obtained quite recently. The only solution to this confusion is to present the dates of all indicators very clearly. Even if we check data carefully as we collect it, we may find that further data checking is required. If we have several years of data for an indicator, we may sometimes discover what appears to be an anomaly in the trend line. It might hint at an inaccurate figure that needs correction or a change in the way a number is being calculated by our source . More importantly, there might be an important and interesting explanation for a positive - or negative - shift in a trend line. It's worth contacting our data source, if possible, seeking an explanation that could be included in the published document. Some volunteer participation can be helpful with data checking before we go public with numbers.

**Calculating indicator numbers.** For many indicators, the numbers presented may not be the raw data we have collected; they may consist of calculated figures derived from our data. Two common kinds of calculated indicator numbers are:

- numbers presented in relation to population so as to eliminate the effects of population growth (e.g. packs of cigarettes sold per capita);
- and Euro figures presented in constant Euros so as to eliminate the effect of inflation on the purchasing power of the Euro.

Of course, these two may be found together in a single indicator. Once a decade, fairly reliable population figures become available through the census. Between censuses, we must rely on estimates, which, unfortunately, are available with varying reliability from many sources. For consistency, we should try to stick with one source of population estimates for

all indicators. We must make it as authoritative a source as possible. The best possibility is state government, which may use estimates of local population in legislated formulas for the distribution of public funds to counties and municipalities. Depending on indicators, we may need several kinds of demographic information, for instance: total population for calculating death rates; population 18 and over for calculating workforce participation.

Some of these kinds of numbers are available already calculated in per capita form. It's more accurate to obtain the raw figures and do the per capita calculation, using the population estimate of our choice.

**Addressing data gaps.** We may encounter situations where data for an indicator are not available for a particular year. If the problem recurs, we may have to consider removing the indicator. However, if the gap is only an aberration, the indicator can still be used, but we should document the gap. As we report the figures, an N/A for not available may be sufficient, along with an explanation of the reason for the gap.

**Considering the compilation of an index.** Whenever we aggregate data into one number, we will inevitably lose the detail and accuracy that we need. Deciding which indicators are more important is a subjective, value-laden decision. Let it remain so. Let numbers reflect exactly what each is intended to reflect.

**Interpreting the data.** We need years of data points before we can draw any conclusions about whether statistically significant changes have actually occurred. And the indicators will not tell why a change has occurred. We have to pursue many leads in attempting to suggest the factors that may have brought about the changes. Therefore we must be very cautious in interpretations and speculations, lest we damage the credibility of the entire product.

Answers to all these questions are necessary to build an appropriate system of indicators for monitoring spatial development and implementation of spatial-planning documents through the evaluation of their goals and effects on the spatial structure and function.

Although we acknowledge that measuring, monitoring and evaluating spatial development is challenging, there are some common misconceptions about how difficult it is.

Some argue the indicators proposed within the system of spatial indicators as constituents of spatial development are causally connected in multiple ways, diminishing their ability to serve as indicators. It is true that the many indicators proposed are connected through complicated pathways of causality. Levels of environmental pollution, for example, can diminish the state of environmental systems, and also affect people and organisms adversely, while social and institutional capacity can intervene either in directly altering any of these phenomena or in changing the nature of the causal connections among them. We agree that this reality makes indicator creation challenging. However, complex causal structures are not a reason for inaction; in fact, we argue that spatial indicators can help make it possible to resolve disputes on causality by strengthening the empirical nature of policy debates.

Spatial development encompasses a wide range of issues. It requires attention to the past, the present, and the future. Underlying natural resource endowments and resource consumption define the spatial starting point for any society. The diversity of issues

embedded in the concept of spatial development makes the need for a broad system of spatial indicators more clear.

The multi-dimensional framework of the system of spatial indicators cannot readily be reduced to a common scale. Transforming spatial indicators to a common metric would imply large-scale assumptions and generalizations that would bias the results and mask much of the analytic fraction of the indicator. Making variables comparable on a cross-national level using GDP, demographic structure, or populated land area as denominators allows the aggregation of information that originally had different units of measurement and is the best option with the variety of the data included in the system of spatial indicators.

But there are also various pitfalls in the construction of indicators, which include the difficulties encountered in the selection, availability and reliability of data, the problem of spatial aggregation of statistics and problems of interpretation. Recognizing the imperfection of the data means that selection of indicators has to be rigorously assessed. Of all the stumbling blocks in indicator research, it is clear that it is data, data and data which make it or break it. Data is both a requirement and a problem for indicator development. Without the basic ingredient of good quality data sets, it is simply not possible to produce reliable and robust indicators. The real concern is, however, how to capture reliable and good quality information efficiently and effectively to provide the basic ingredient for analysis. Indicators as a set of statistics do not convey any meaningful message until we make sense out of them. The analysis and interpretation process thus becomes an integral part of indicator development. What matters is that the assumptions and the rationale underpinning of the analysis are made explicit and that all relevant technical and methodological information is carefully documented for transparency and public scrutiny. Most indicators used to inform urban development tend to be geographically based; the choice of a spatial scale appropriate to the problem is thus very critical.

Another major pitfall in indicator research is the lack of intellectual rigour in validating and evaluating the measures. We have to question whether the indicators at hand are interpretable, relevant and adequately reflect the key issues of concern.

Assessment of regional development should take into consideration the following: aims, visions, goals and targets of regional development, "holistic perspective, essential elements, adequate scope, practical focus, openness, effective communication, broad participation, ongoing assessment, and institutional capacity" (Compendium, 2002; Bosel, 1999).

Regional development should be guided by a clear vision of sustainable regional development and goals that define that vision.

A holistic perspective should include a review of regional development as a whole as well as its parts; consider all the components of regional development, their current state as well as the direction and rate of change of the state, of their component parts, and the interaction between parts and consider both positive and negative consequences of regional development.

Within essential elements of regional development we should consider equity and disparity within the current population and between present and future generations,

dealing with such concerns as resource use, overconsumption and poverty, human rights, and access to services, as appropriate; environmental conditions and economic development and other non-market activities that contribute to regional development.

Adequate scope relates to a time horizon long enough to capture both regional development time scales, thus responding to current short-term decision-making needs as well as those of future generations; defining the space of study large enough to include not only local but also long distance impacts, and historic and current conditions to anticipate future conditions: where we want to go, where we could go.

Practical focus is based on an explicit set of categories or an organizing framework that links vision and goals to indicators and assessment criteria; a limited number of key issues for analysis; a limited number of indicators or indicator combinations to provide a clearer signal of progress; standardizing measurement wherever possible to permit comparison and comparing indicator values to targets, reference values, ranges, thresholds or direction of trends, as appropriate.

Openness means making the methods and data that are used accessible to all and making explicit all judgments, assumptions and uncertainties in data and interpretations.

Effective communication should be designed to address the needs of the audience and set of users; draw from indicators and other tools that are stimulating and serve to engage decision-makers and aim, from the outset, for simplicity in structure and use of clear and plain language.

Broad participation should obtain broad representation of key grassroots, professional, technical and social groups to ensure recognition of diverse and changing values and ensure the participation of decision-makers to secure a firm link to adopted policies and resulting action.

Ongoing assessment should develop a capacity for repeated measurement to determine trends; be iterative, adaptive and responsive to change and uncertainty; adjust goals, frameworks and indicators as new insights are gained; and promote development of collective learning and feedback to decision making.

Institutional capacity should be assured by clearly assigning responsibility and providing ongoing support in the decision-making process, providing institutional capacity for data collection, maintenance and documentation and supporting the development of local assessment capacity.

Finally, we need to point out that the system of indicators should be transparent, open and evolutionary. It should help to set up links with sector, regional or local systems of indicators of development.

In order to achieve the above-mentioned objectives and to meet the needs of users, the system of indicators should fulfil the following requirements:

- it should be constructed around a systematic framework (e.g. methodological sheets) in order to meet the criteria of independence, neutrality and transparency inherent in public statistics and to allow for future development;
- indicators should be included in the methodological sheets according to a transparent and duly documented selection procedure;

- it should be possible to identify sub-groups adapted to users' needs;
- it should present the indicators in an attractive way which is suited to users' needs;
- it should indicate whether a region is on the right path for achieving spatial development goals and objectives within the principles of sustainable development;
- the indicators should monitor important aspects of the development goals, and thus be relevant for spatial/regional development;
- the total number of indicators should be limited, focusing on key aspects of spatial development;
- the indicators should, as far as possible, be selected and formulated so that experts can understand the meaning of them;
- basic statistics should be available for the indicators;
- international statistical data compilations should be used as much as possible to avoid multiple reporting and duplication of compiling and assessing the data.

It should also be clear that the system of indicators and data for spatial development is a subject which is developing very rapidly. That is why we are confronted with the moving target problem. The theme is one that is developing all the time and factual and legal statements can rapidly become out of date. On the other hand, the spatial structure which can form the planning subject is itself subject to rapid change. Further changes can be expected to continue for a variety of reasons and in response to a variety of pressures. And it should also be clear that spatial planning could hardly control or direct all processes of spatial change, which is why it should seek to influence spatial development.

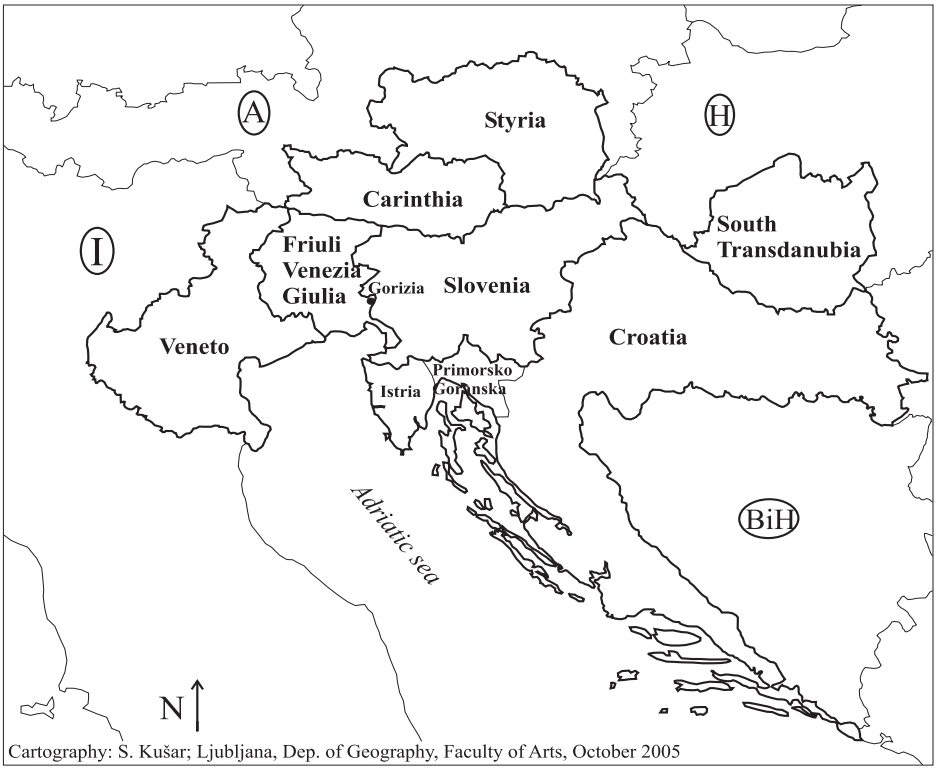
Indicators can play a critical and crucial role in informing and guiding interventions in the spatial development process. They can contribute to the promotion of equity, efficiency and sustainability in environment, rather than the mere pursuit of amenity, convenience, safety or public health. They offer a means of determining contemporary development and of being a key tool for monitoring and evaluating spatial changes towards sustainable development.

# 3. Project approach

The concept of indicators which is presented in this book was determined within the CONSPACE project (Common Strategy Network for Spatial Development and Implementation). The project was launched in 2003. It dealt with topics of integrated regional planning and sustainable regional development. It aimed at improving the harmonization of spatial planning, better mutual knowledge of planning principles and strategies, elaboration of common strategies for spatial development and the preparation of implementation of actions. It was realized as part of the INTERREG III B CADSES Operational Program (Kušar, 2006). The central objective of the CONSPACE project was to get acceptance of a transnational regional development strategy that would show the way to advance and improve existing spatial structure and to reduce regional disparities (Bory and Puchinger, 2005).

CONSPACE project partners were spatial planning authorities representing ten regions in five nations: Carinthia (A), Styria (A), Veneto (I), Friuli-Venezia Giulia (I), Gorizia (I), Slovenia (SI), Croatia (HR), Primorsko-Goranska (HR), Istria (HR) and South Transdanubian regional development agency (Baranya, Somogy and Tolna, HU) (CONSPACE, 2005).

*Figure 1: Territorial extent of the CONSPACE project region*



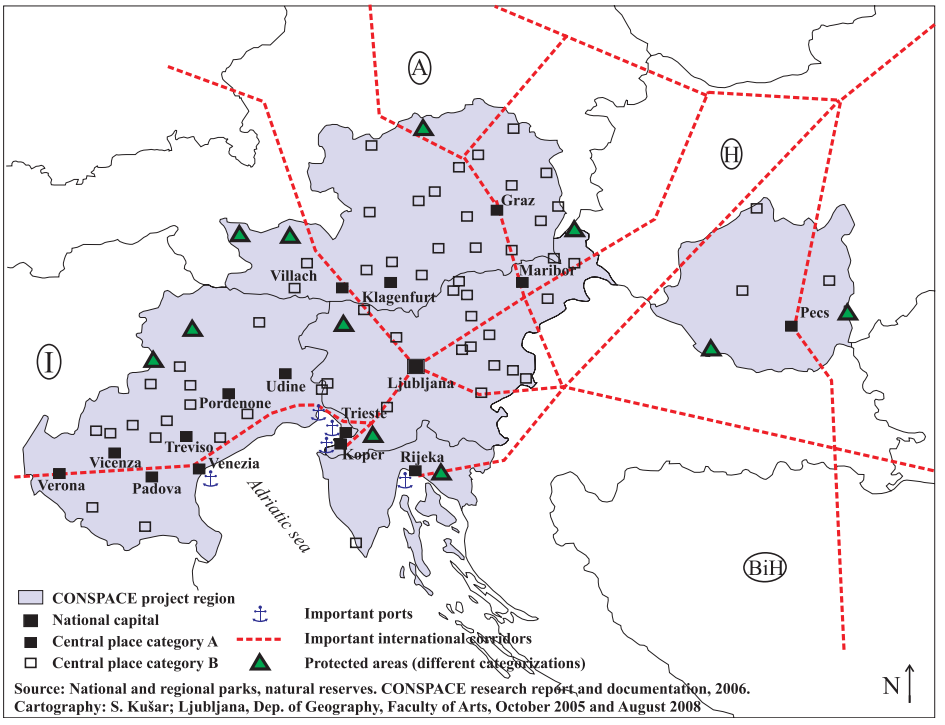

*Source: Kušar, 2006.*

The CONSPACEregion (i.e. area of the CONSPACE partners) is geographically very diverse, but also with important future potential for development. Namely, the CONSPACE project region stretches from the Italian coastal plain in the Veneto region with the famous city of Venice, across the western part of the Southern Alps, the Dinaric plateau of Slovenia and Croatia and through the hilly vineyards of eastern Slovenia and Styria to the southwest of the vast Pannonian plain. The region is therefore characterized by highly diverse types of landscape and physical structure including alpine and coastal zones, in which lie important elements of natural and cultural heritage (Kušar, 2006).

The CONSPACE region has more than 137,000 km$^2$ and almost 15 million inhabitants. The CONSPACE project region is a region where different cultures, languages and religions meet: Romanic, Germanic, Slavic and Finno-Ugric/Hungarian. The region was characterized also by different political systems in the past. Italy and Austria were democratic countries, Hungary belonged to the Soviet bloc, while Yugoslavia was a socialist country, too, but with a different system of governance from Hungary. In the last part of the 20th century a major political shift occurred which enabled better interregional cooperation in the economic, environmental and spatial planning sphere (Kušar, 2006).

The common feature of the region's urban structure is the lack of a European metropolis within the region. The CONSPACE region is organized in a very polycentric way through a system of central places which build the backbone of the settlement structure without

*Figure 2: Basic geographical characteristics of the CONSPACE project region*




*Source: Kušar, 2006.*

a dominating agglomeration. The most important settlement is Ljubljana, which is the only national capital in the region (Zagreb is not included here, because Croatia does not fully cooperate in the project). The region lies in between the "European engines" Vienna and Milan and the "potential MEGAs" of Budapest and Bologna as they are described in the ESPON categorization. The network of research institutions is well developed (Bory and Puchinger 2005).

The CONSPACE project region has an important traffic position. It is situated in the most northern inflow of the Mediterranean basin. Along the coast of the Adriatic Sea there are many ports (Rijeka, Koper, Trieste, Monfalcone, Venice), which are important nodes for the freight shipped from Asian and African countries. Additionally, the network of the north/south and east/west TEN and TINA corridors in this region creates a strong impact on the improved transnational and mutual multimodal accessibility (sea, rail, road, air), economic location development, economic exchange and future prosperity (CONSPACE, 2005).

The CONSPACE project was carried out in the EU Future Region. A majority of the partner regions of the Future Region took part in the project CONSPACE. The EU future region emerged on the political level initiated by the industry interest group. The EU Future Region is an interregional cooperation that aims at contributing towards the establishment of better conditions for social and economic unity and the creation of better competitive conditions for the joint economic area that encompasses more than 17 million inhabitants, making use of the existing opportunities. It was founded in 2002. Its objective is the development of coherent neighbourhood policies and measures in particular in connection with the EU extension (Bory and Puchinger, 2005).

There has already been a tradition of interregional cooperation within the region within the framework of ALPE-ADRIA. The previous period of INTERREG has also been used to intensify this process of exchange. However, these processes never reached the level of joint cohesive action, nor were consistent basics produced or common regional development strategies for mutual benefits developed. But most importantly, there are still quite different administrative structures, planning systems, planning philosophies (Community..., 2003). And that was the starting point of the CONSPACE philosophy: to overcome spatial planning differences with cross-border cooperation between planning authorities and to prepare a common development strategy that would enable activation of spatial potential of the CONSPACE region to become a new growth pole of the European Union, which could act as a counterbalance to spatial polarization in the European Union (Kušar, 2006).

The central objective of the CONSPACE project was to get acceptance of a transnational regional development strategy that would show the way to advance and improve existing spatial structures and to reduce regional disparities. This common transnational strategy referring to physical/spatial planning is oriented at the triangle of objectives of the European Spatial Development Perspective (ESDP) and based on already existing experiences of project partners. It was based on four thematic approaches, which were relevant to the administrative, socio-economic, natural and cultural context of the region (Bory and Puchinger, 2005):

- enhancement of the cohesion of planning tools and procedures, of the compatibility of existing planning databases and information instruments and of planning attitudes;

- development of a common understanding of the logical framework, the content and the elements of balanced spatial development planning of polycentric spatial structure s and promotion of innovative instruments;
- maintenance of cultural and natural heritage in regional development and their integration in physical planning strategies;
- spatial integration of measures for upgrading regional transport networks for a better interconnection to the TEN and TINA corridors.

Expectations of the CONSPACE project were connected with the following (Community..., 2003):

- formation of a consistent set of core planning data and indicators based on compatible systems of GIS. These databases are intended to be used as a tool for the analysis of transnational regional development indicators, for the identification of mutual impact of the accession process on both sides as well as for actions in the field of environmental protection;
- analysis and documentation of the existing development plans and programmes as well as the underlying planning procedures and approaches. Useful elements for the development of a transnational development strategy were expected to be identified with a specific focus on the polycentric structure of the region, its natural and cultural heritage and on the interconnection of its regional transport networks to the TEN and TINA corridors;
- creation of a "to-do-list" which indicates desirable and useful follow-up actions on different administrative or legal levels to secure a sustainable consistent framework for common action in the future and recommendations for policy actions;
- preparation of a draft of a transnational regional development strategy which would be used for political acceptance procedures by each partner. The strategy would include the detailed and communicable goals and visions, the identification of the resources and stakeholders, the definition of development opportunities with special emphasis on innovation and structural change, a general time schedule for actions and a set of strategic measures of implementation.

The need for enlistment of ideal indicators for monitoring spatial development in the states and regions included in the CONSPACE project was conducted for various reasons:

- to analyze the spatial/regional structure and functions of the territory of CONSPACE partners;
- to find out its basic factors of development;
- to determine, according to their spatial/regional structure and functions, what role spatial development has in each region within the territory of CONSPACE partners;
- to evaluate its spatial structure and functions by comparison with the spatial structure of the EU and selected European regions.

This approach should provide reliable input indicators in order to evaluate the whole territory of CONSPACE partners within the context of the EU 25 and European regions, and to determine its spatial development potential and spatial development problems.

The end result should be "the estimation" of structure and processes which are favourable for the CONSPACE territory, and which regional factors are strengthening the spatial development perspective of the CONSPACE territory as a future region within the context of European regions. But indicators can be universally used on other spatial units, too.

# 4. Methodological approach

## 4.1. Basic methodological approach

The search for appropriate indicators of regional development has been going on for many years at many different levels of societal organization: small community, city, region, country and the world as a whole. There seems to be general agreement that a single indicator of regional development cannot be defined, and that a substantial number of indicators is necessary to capture all important aspects of regional development in a particular application. However, defining an appropriate set of indicators for regional development turns out to be a difficult task. If too few indicators are monitored, crucially important developments may escape attention. If a large number of indicators has to be watched, data acquisition and data analysis may become prohibitively expensive and time-consuming.

Obviously, practical schemes cannot include indicators for everything. It is essential to define a set of representative indicators that provide a comprehensive description—as many as essential, but no more. But what are the essential indicators? In the past, this problem has mostly been solved by the intuitive assessment of experts familiar with their particular discipline. Corresponding indicator sets are usually characterized by specific disciplinary biases, with gaping holes of oversight in some critical areas, and overly dense indicator specifications in others.

Following orientation theory, it has been argued that the essential indicators are those that provide a complete description of the state of satisfaction of the fundamental interests of each system, i.e. its basic orientors: existence, effectiveness, freedom of action, security, adaptability, coexistence and psychological needs. This leads to the selection of a comprehensive but minimum set of indicators providing information about all essential aspects of development. Sometimes it may even be necessary to define a set of indicators corresponding to a hierarchy of orientors. Methods such as aggregation, condensation, identifying weakest links, taking averages, or choosing a representative indicator to stand for a whole range of similar developments will have to be used to keep the number of indicators down without losing essential information. Also, it is advisable to concentrate on indicator ratios that compare the rate of system response with the rate of threat, giving early warning where processes are threatening to overwhelm the defensive responses of a system.

The orientor-based approach (Bosel, 1999) of indicator selection is applied retroactively to validate already existing indicator systems, in particular those that are to be used in large-scale international ventures. It may well be that such validation will only confirm the indicator set. But since all of the sets in current use have been derived without a solid systems-theoretical framework, such an orientor-based validation attempt would probably lead to further improvements of the indicator set in question. The orientor-based approach of indicator selection also makes the search process much more meaningful for the various indicator initiatives working or beginning to work in the field. It means that their efforts would first have to concentrate on developing an orientor hierarchy for a specific system in its specific environment, moving down from the basic

orientors. Indicators would then have to be selected to correspond to the orientors on the lowest level of the orientor hierarchy, i.e., closest to reality. The orientor hierarchy encompasses a holistic system understanding as well as the values and visions of the group. This approach makes it highly unlikely that important aspects will be overlooked, and it also makes obvious any attempt of particular stakeholders to bias the indicator selection in their favour.

The focus should be turned from an uncertain ad hoc search and bargaining process to a much more systematic procedure with a clear goal: to find indicators representing all important aspects of regional development.

The methodological approach therefore affects the selection and application of indicators for regional development in the following different domains:

- in the technical domain it provides a framework and guidelines for constructing comprehensive and reliable indicator sets;
- in the capacity domain it focuses data collection on essential data and minimizes unproductive collection, processing and dissemination of irrelevant or redundant data;
- in the institutional domain it provides a common framework facilitating the collection and exchange of data and experience between permanent and networked agencies;
- in the public domain it assists in developing the ability of the public, of administrations and of business to correctly interpret and use indicator sets for sustainable development.

The creation of the list of indicators for assessing regional structure, potential and development was determined on the basis of a selective approach which consists of the following steps:

- determination of types of data and indicators to be reviewed;
- collection and review of available data, indicators and information systems by involving local governments included in the project;
- the enlistment of ideal/optimal indicators for monitoring regional development;
- the adaptation of a common terminology and a unified set of measurable indicators;
- the forecast indicators;
- the final list of indicators;
- the methodology sheets – the basic characteristics of indicators and a clear scientific argumentation for their selection for the system of indicators (to describe, designate and categorize indicators);
- the final proposal of the system of spatial indicators including spatial and environmental indicators.

## 4.2. Methodology sheets

Methodology sheets serve as a method of preparing a common terminology for presenting basic characteristics of indicators, their connection with planning goals and a clear scientific argumentation for their selection for the system of indicators.

Methodology sheets were prepared in order to present basic characteristics of indicators, their connection with goals of regional and spatial development and a clear scientific argumentation for their selection to the system of indicators.

Methodology is constructed around four groups of information.

*Table 1: The content of methodological sheets*

| Group of information | Information |
|---|---|
| **Name of indicator** | unit, calculation, importance, possible variation |
| **Criteria** | scientific argumentation, continuity of collection of data, adequacy for interpretation, supranational suitability, connection with planning goals, availability of data, spatial level resolution and comparability of data |
| **Subjects classification** | group, content, connection with specific (planning) goals and association with other indicators |
| **Argumentation of indicator** | reference for indicator, source for data, spatial level, geographical extent, time frame and final remarks/ comments |

*Source: Černe et al., 2005.*

Within the explanation about the **name of indicator** we tried to determine the following characteristics of indicators:

1. unit ;
2. calculation;
3. importance ;
4. possible variation.

*Table 2: Key information about the indicator: name of the indicator*

| **Indicator No.** | **Name of indicator** |
|---|---|
| **Number of the indicator in data table** | Name of the indicator |
| **Unit** | Unit with which the indicator is presented (number, EUR, ha, $km^2$, etc.) |
| **Calculation** | Method of the indicator calculation/presentation |
| **Importance** | It is defined according to the availability of indicators in the CONSPACE partners: key, core and research indicator |
| **Possible variation** | Similar indicator(s), which can be used instead of the proposed indicator |

*Source: Černe et al., 2005.*

Within the explanation about the **criteria** of indicator we tried to determine the following characteristics of indicators:

1. scientific argumentation;
2. continuity of collection of data;
3. adequacy for interpretation;
4. supranational suitability;
5. connection with EU spatial planning goals;
6. availability of data;
7. spatial level resolution;
8. comparability of data.

*Table 3: Criteria for the selection of the indicator*

| **Criteria** | |
|---|---|
| **Scientific argumentation** | Indicator is based on recognized standards: yes/no |
| **Continuity of collection of data** | Data are collected regularly: yes/no |
| **Adequacy for interpretation** | Indicator is easily interpreted, it is possible to form time sets |
| **Supranational suitability** | Indicator describes topics which are relevant in all CONSPACE partners: yes/no |
| **Connection with ESDP goals** | Yes/no; in the case of clusters B and C number of ESDP goals* are defined |
| **Availability of data** | Degree of availability:<br>A: available for all spatial units;<br>B: available for more than (or equal to) 50% of all spatial units;<br>C: available for less than 50% of all spatial units;<br>D: not available; |
| **Spatial level resolution** | Defined according to the NUTS system for which data should be collected: NUTS 1, 2, 3, 4, 5 |
| **Comparability of data** | Methodological issues influence of the comparability of data: high/medium/low |

*Notes: *ESDP goals: Policy Aims and Options for the Territory of the EU:*

*3.1 Spatial Orientation of Policies*
*3.2 Polycentric Spatial Development and a New Urban-Rural Relationship*
*3.2.1 Polycentric and Balanced Spatial Development in the EU*
*3.2.2 Dynamic, Attractive and Competitive Cities and Urbanized Regions*
*3.2.3 Indigenous Development, Diverse and Productive Rural Areas*
*3.2.4 Urban-Rural Partnership*
*3.3 Parity of Access to Infrastructure and Knowledge*
*3.3.1 An Integrated Approach for Improved Transport Links and Access to Knowledge*
*3.3.2 Polycentric Development Model: A Basis for Better Accessibility*
*3.3.3 Efficient and Sustainable Use of the Infrastructure*
*3.3.4 Diffusion of Innovation and Knowledge*
*3.4 Wise Management of the Natural and Cultural Heritage*
*3.4.1 Natural and Cultural Heritage as a Development Asset*
*3.4.2 Preservation and Development of the Natural Heritage*
*3.4.3 Water Resource Management – a Special Challenge for Spatial Development*
*3.4.4 Creative Management of Cultural Landscapes*
*3.4.5 Creative Management of the Cultural Heritage*

*Source: Černe et al., 2005; European Spatial Development Perspective, 1999.*

Within the explanation about the **subject classification** of indicators we tried to determine the following characteristics of indicators:

1. group;
2. content;
3. connection with CONSPACE goals;
4. association with other indicators.

*Table 4: Classification of the indicator*

| **Subjects classification** | |
|---|---|
| **Group** | Thematic group in which the indicator is defined: monitoring/spatial potential/spatial development |
| **Content** | Subgroup of indicators |
| **Connection with CONSPACE goals** | Numbers of spatial planning goals in CONSPACE partners which are relevant for the indicator are specified ** |
| **Association with other indicators** | List of indicators which are related to the selected indicator or help in its explanation: the number and the name of the indicator are specified |

*Notes: ** - goals of spatial development in the CONSPACE partners:*

**1. Regional power and identity**
*1.1. Ensuring spatial preconditions for an efficient economy*
*1.2. Strengthening regional identity*
*1.3. Development of the economic and social structure*
*1.4. Strengthening the power of the region*
**2. Environment**
*2.1. Preservation of the functioning capacity of ecosystems*
*2.2. Preservation of (spatial, bio) diversity*
*2.3. Rehabilitation of an excessively polluted environment*
*2.4. Protection from pollution*
*2.5. Protection from natural hazards*
*2.6. Protection of the landscape*
*2.7. Protection of the natural environment*
**3. Landscape**
*3.1. Protection and further development of natural resources (water, agriculture land, forests, raw materials)*
*3.2. Preservation of cultural heritage*
**4. Settlement structure and development**
*4.1. Provision of population with commodities, goods and services*
*4.2. Development of settlement structure*
*4.3. Polycentric development of settlement structure*
*4.4. Development of regional centres*
**5. Accessibility, transport**
*5.1. Development of accessibility and transport management*
**6. Activities**
*6.1. Preservation of spatial preconditions for different uses*
*6.2. Waste disposal*
**7. Cohesion**
*7.1. Cohesion between central and peripheral areas*
*7.2. Integration into EU systems*
*7.3. Cross border cooperation*
*7.4. Assurance of social tolerance/cohesion/equal opportunities*
*7.5. Welfare of the population*
**8. Spatial management**
*8.1. Improvement of spatial management*

Within the explanation for the **argumentation** of an indicator we tried to determine the following characteristics of indicators:

1. argumentation;
2. reference for indicator;
3. source for data;

4. spatial level;
5. geographical extent;
6. time frame;
7. remarks/comments.

*Table 5: Argumentation of the indicator*

| **Argumentation of indicator** | |
|---|---|
| **Argumentation** | Scientific argumentation of the indicator (reasons for its definition, etc.) |
| **Reference for indicator** | Projects that support the use of the indicator:<br>ALPS: indicators used in the System of Indicators and the Concept for The Alps Condition Report<br>COH: indicators used in the Third Cohesion Report<br>CON: indicators used in the Comparative Analysis of Goals, Indicators and Data of Spatial Development in States and Regions Included in the CONSPACE project<br>ESP: indicators used in the ESPON project (European Spatial Planning Observation Network)<br>MARS: indicators used in the MARS project (Monitoring the Alpine Region's Sustainability) |
| **Source for data** | Institution that collects data: the case of Slovenia; SORS: Statistical Office of the Republic of Slovenia |
| **Spatial level** | Spatial level for which data should be collected: NUTS system |
| **Geographical extent** | Names of the CONSPACE partners for which data are available:<br>All CONSPACE partners<br>CAR- Carinthia (Austria)<br>GOR- the province of Gorizia (Italy)<br>FVG – the region of Friuli Venezia Giulia (Italy)<br>ISTR- the region of Istria (Croatia)<br>SLO - Slovenia<br>S.TRA - South Transdanubia (Hungary)<br>STYR - Styria (Austria)<br>VEN – the region of Veneto (Italy) |
| **Time frame** | Time frame for which data should be collected:<br>Statistical census/annual reports, etc. |
| **Remarks/comments** | Additional remarks or comments regarding methodological or other questions |

*Source : Černe et al., 2005.*

The final outcome can be seen in the next example.

*Table 6: An example of methodological sheets*

| **Indicator No.** | **Name of indicator** |
|---|---|
| **6.11.** | **Railway network** |
| **Unit** | km; $km^2$ |
| **Calculation** | Length and density of railway network |
| **Importance** | Key |
| **Possible variation** | Changes of length and density of railway |
| **Criteria** | |
| **Scientific argumentation** | Yes |
| **Continuity of collection of data** | Yes |
| **Adequacy for interpretation** | Yes |
| **Supranational suitability** | Yes |
| **Connection with ESDP goals** | Yes |
| **Availability of data** | A |
| **Spatial level resolution** | NUTS 1-5 |
| **Comparability of data** | High |
| **Subjects classification** | |
| **Group** | Monitoring |
| **Content** | Infrastructure |
| **Connection with CONSPACE goals** | 1.1., 2.4., 4.1., 4.3., 5.1., 7.2., 7.3. |
| **Connectedness with other indicators** | 6.1. Number of passengers<br>6.2. Freight transport<br>6.5. Traffic expenditure<br>6.6. Accessibility index (centre)<br>6.8. Accessibility index (stopping place)<br>6.12. Railway network (new construction) |

| **Argumentation of indicator** | |
|---|---|
| **Argumentation** | Railway network (density) measures the length of railways (in km) per square kilometre. Although the era of the most dense railway network is probably finished, the railway network is still one of the most important factors for the sustainable development of economy and makes daily commuting from suburban and rural areas to urban areas much easier. New policies on infrastructure development give to railways an even more prominent place in the whole infrastructure system, because roads are experiencing their maximum possible load. |
| **Reference for indicator** | COH, CON, ESP |
| **Source for data** | SORS, Ministry of Transport (Slo) |
| **Spatial level** | NUTS 1-5 |
| **Geographical extent** | All CONSPACE partners |
| **Time frame** | Statistical census, annual reports |
| **Remarks/comments** | / |

*Source: Černe et al., 2005.*

Methodology sheets were prepared for all indicators included in the system of indicators for monitoring regional development, defining spatial potential, spatial structure and environmental indicators.

# 5. Indicators for regional development, structure and potential

## 5.1. Indicators for monitoring regional development

The draft list of indicators for monitoring regional development was selected on the basis of several sources, the most important being Comparative analysis of goals, indicators and data of spatial development in the states and regions included in the CONSPACE project (Černe at al., 2004a), which presents the system of spatial planning in the CONSPACE partners.

The analysis of spatial planning systems showed that all planning authorities already use some indicators for monitoring their regional and spatial development. The starting point for the enlistment of indicators for monitoring regional development in the CONSPACE project region was therefore the current system of indicators in the CONSPACE partners: we believe that it will be easier to implement the proposed system of indicators if it includes indicators for which a monitoring system is already built and data are collected on regular basis.

The first step for the enlistment of "ideal" indicators for monitoring regional development was therefore the analysis of indicators that are already used for monitoring regional/spatial development in the CONSPACE partners. They can be presented in a system of indicators consisting of two main groups of indicators, which are later divided into basic indicators.

The first group of indicators consists of eight indicators:

- baseline factors of spatial development;
- settlement structure;
- infrastructural equipment;
- socio-economic structure of the countryside;
- landscape;
- areas with natural hazards and protected areas;
- functioning of a system of spatial development;
- education, research and development.

**Baseline factors of spatial development** (demographic characteristics, economic structure and labour market, social welfare and standard of living) try to paint a broad picture of the socio-economic environment in which the spatial policy is placed. We must not forget that spatial policy also has socio-economic consequences. The first group of indicators therefore serves as an instrument for monitoring the influence of spatial policy on socio-economic structures.

Baseline factors of spatial development are determined according to ten indicators of group 2 with 48 basic indicators.

*Table 7: Baseline indicators of spatial development*

| Group of indicators | Basic indicators |
|---|---|
| **demographic characteristics – number of inhabitants and population density** | • number of inhabitants;<br>• changes in number of inhabitants;<br>• density of settlements;<br>• changes in density of settlements;<br>• population density;<br>• changes in population density. |
| **demographic characteristics – net reproduction rate** | • natural increase of population per 1000 inhabitants;<br>• net reproduction rate;<br>• fertility;<br>• mortality |
| **demographic characteristics – migrations** | • the volume of migration/gross migration (person registered/person deleted);<br>• the balance of migration/net migration (person registered/person deleted);<br>• the balance of migration/net migration (distinction for foreign residents);<br>• share of migration in population growth |
| **demographic characteristics – age/sex structure** | • sex structure;<br>• aging index;<br>• age groups-children;<br>• age groups-old age;<br>• typical age groups-working population |
| **demographic characteristics – households** | • number of households;<br>• index of growth;<br>• household average size |
| **economic structure and labour market – economic strength** | • structure of value added in statistical regions;<br>• GDP per capita in statistical regions;<br>• GDP per employed in statistical regions |
| **tourism** | • development and structure of stays (domestic, foreigners, winter/summer/total);<br>• average duration (stays);<br>• number of beds (hotels, private, camping);<br>• further information (summer/winter sports, congresses, fairs, culture…) |

| | |
|---|---|
| **economic structure and labour market – employment** | • employed population;<br>• employed in agriculture;<br>• employed in industry;<br>• employed in service activities;<br>• employed structure (important branches, e.g. steel machinery, transport, tourism);<br>• employed and (their) qualification structure;<br>• employed women;<br>• daily migration;<br>• size of enterprise by branches |
| **economic structure and labour market – unemployment rate** | • unemployment rate;<br>• unemployment rate among women;<br>• development of unemployment (total, female, male);<br>• structure of unemployment (branches, duration, age) |
| **social welfare and standard of living** | • student share;<br>• income tax per capita;<br>• health infrastructure – number of doctors per 100 inhabitants;<br>• health infrastructure – hospital capacity;<br>• kindergarten;<br>• social security |

*Source: Černe at al., 2004a.*

The next group of indicators presents the **settlement structure**: settlement net, urban system connectivity and living standard in municipal centres and regional centres. It includes 41 basic indicators.

*Table 8: Settlement structure*

| Group of indicators | Basic indicators |
|---|---|
| **settlement network** | • urban areas;<br>• suburban areas;<br>• rural areas;<br>• boundary zones (10 km belt);<br>• mountainous, karstic and hilly areas;<br>• depressed, underdeveloped areas;<br>• structure and number of activities of social interest/settlement;<br>• structure and number of activities of social interest/settlement (sport);<br>• structure and number of activities of social interest/settlement (cinema);<br>• structure and number of activities of social interest/settlement (theatre); |

| | |
|---|---|
| | • structure and number of activities of social interest/settlement (state museum);<br>• structure and number of activities of social interest/settlement (regional and local museum);<br>• amount for type of event (theatre, cinema, sport);<br>• central functions in urban settlements and municipal centres;<br>• settlement area-extent;<br>• settlement area-changes;<br>• strength of urban-rural migration flows;<br>• strength of rural-urban migration flows |
| **urban system connectivity** | • population density and employment density;<br>• employment density;<br>• traffic connectivity between municipal centres and regional centres;<br>• settlements;<br>• residential density-urban sprawl;<br>• extent of built-up areas;<br>• extent of non built-up areas;<br>• industrial and military areas-extent;<br>• urban areas with low level of living and ecological conditions-extent;<br>• rehabilitation of urban areas-extent;<br>• occupancy rate |
| **living standard in municipal centres and regional centres** | • cleaning: streets, squares, pavements;<br>• public green areas and children's playgrounds;<br>• parking places;<br>• length of pavements-pedestrian surfaces;<br>• length of cycle tracks;<br>• public lighting-streets, squares, parking places, parks;<br>• household gas supply;<br>• new apartments;<br>• living standard-number of rooms;<br>• living standard-m2 per inhabitant;<br>• living standard-number of shelters;<br>• living standard-number of single-family dwellings |

*Source: Černe at al., 2004a.*

**Infrastructural equipment** presents indicators describing the situation in transport infrastructure (public transport, accessibility, roads, railways), telecommunication infrastructure and information society, energy infrastructure (consumption of energy) and environmental management (consumption of water, water supply, wastewater treatment, sewage system, etc.). There are 30 basic indicators in this group of indicators grouped into 4 group of indicators 2.

*Table 9: Infrastructural equipment*

| Group of indicators | Basic indicators |
|---|---|
| **transport infrastructure** | • public transport-buses;<br>• public transport-railways;<br>• accessibility index-distance from centre;<br>• accessibility index-stopping place;<br>• accessibility index-highway;<br>• state (regional) in local roads-density;<br>• state (regional) in local roads-new construction;<br>• railway network-density;<br>• railway network-new construction;<br>• infrastructural surfaces-extent;<br>• infrastructural surfaces-changes;<br>• Trans European Network: rail and road networks, airports, harbours |
| **telecommunication infrastructure and information society** | • number of telephone connections;<br>• number of subscribers to mobile telephone network;<br>• number of households with internet access;<br>• number of places with public access to internet;<br>• cable connections;<br>• satellite connections;<br>• basic stations |
| **energetic infrastructure** | • gas conduit;<br>• consumption of electric energy per capita;<br>• consumption of electric energy per employed;<br>• energy networks (pipelines, power plants, etc.) |
| **environmental management** | • consumption of water;<br>• household water-supply from primary water-supply network;<br>• household water-supply from secondary water-supply network;<br>• wastewater treated;<br>• sewage system;<br>• quantities of purified waste water;<br>• solid waste disposal |

*Source: Černe at al., 2004a.*

One of the most important group of factors is also the **socio-economic structure** of the countryside. In this set the situation in the agrarian sector is presented. It includes 11 basic indicators.

*Table 10: Socio-economic structure*

| Group of indicators | Basic indicators |
|---|---|
| **(no)** | • active rural population-age structure;<br>• active rural population-qualification structure;<br>• full-time farmers;<br>• farm size;<br>• number of farms;<br>• role of stockbreeding;<br>• agricultural production-structure;<br>• agricultural income;<br>• biological farming (number of farms with this type of production);<br>• supplementary activities on farms;<br>• employment in other activities |

*Source: Černe at al., 2004a.*

The group of indicators describing the **landscape** presents land use data, degraded areas and spatial identity. 28 indicators are presented in 3 groups.

*Table 11: The landscape*

| Group of indicators | Basic indicators |
|---|---|
| **land use** | • agricultural land-extent;<br>• agricultural land-changes;<br>• fields-extent;<br>• fields-changes;<br>• meadows-extent;<br>• meadows-changes;<br>• forest-extent;<br>• forest-changes;<br>• pastureland-extent;<br>• pastureland-changes;<br>• mining areas-extent;<br>• mining areas-changes;<br>• water areas-extent;<br>• water areas-changes;<br>• recreational and free time areas-extent;<br>• recreational and free time areas-changes;<br>• protected areas (national, regional, landscape, natural parks)-extent;<br>• protected areas (national, regional, landscape, natural parks)-changes |
| **degraded areas** | • damaged forest-extent;<br>• polluted soils;<br>• areas with air pollution ;<br>• water pollution;<br>• underground water pollution |
| **spatial identity** | • exceptional landscape areas-extent;<br>• exceptional landscape areas-changes;<br>• areas of landscape recognition-extent;<br>• areas of landscape recognition-changes;<br>• number of cultural monuments and cultural heritage |

*Source: Černe at al., 2004a.*

**Areas with natural hazards and protected areas** are presented with 3 groups of indicators with altogether 16 basic indicators.

*Table 12: Areas with natural hazards and protected areas*

| Group of indicators | Basic indicators |
|---|---|
| **areas with natural hazards** | • flood-prone areas;<br>• areas of seismic activity;<br>• landslide and erosion areas;<br>• avalanche areas;<br>• fire areas;<br>• collision of land use in areas with natural hazards areas |
| **protected areas** | • protected forest-extent;<br>• protected forest-changes;<br>• protected agricultural land-extent;<br>• protected agricultural land-changes;<br>• protected natural environment-extent;<br>• protected natural environment-changes;<br>• protected cultural heritage areas-extent;<br>• protected cultural heritage areas-changes;<br>• protected water resources areas-extent;<br>• protected water resources areas-changes |

*Source: Černe at al., 2004a.*

**Functioning of system of spatial development** with 2 basic indicators is also described.

*Table 13: Functioning of system of spatial development*

| Group of indicators | Basic indicators |
|---|---|
| **(no)** | • illegal housing;<br>• number of building permits |

*Source: Černe at al., 2004a.*

**Education, research and development** are determined according to the two indicators of group 2 with altogether 4 indicators.

*Table 14: Education, research and development*

| Group of indicators | Basic indicators |
|---|---|
| **education** | • educational infrastructure (colleges, universities);<br>• level of education (number of persons with college/ university degree);<br>• special higher education |
| **research and development** | • R&D institutions |

*Source: Černe at al., 2004a.*

The number of indicators in each group and their percentage are summarized in the next two tables.

*Table 15: Number of indicators already used for monitoring regional and spatial development*

| Group of indicators 1 | Group of indicators 2 | Indicators: description |
|---|---|---|
| **Baseline factors of spatial development** | 10 (41.7%) | 48 (26.7%) |
| **Settlement structure** | 3 (12.5%) | 41 (22.8%) |
| **Infrastructural equipment** | 4 (16.7%) | 30 (16.7%) |
| **Socio-economic structure of the countryside** | 0 | 11 (6.1%) |
| **Landscape** | 3 (12.5%) | 28 (15.6%) |
| **Areas with natural hazards and protected areas** | 2 (8.3%) | 16 (8.9%) |
| **Functioning of system of spatial development** | 0 | 2 (1.1%) |
| **Education, research and development** | 2 (8.3%) | 4 (2.2%) |
| **Total** | 24 (100.0%) | 180 (100.0%) |

*Source: Černe at al., 2004a.*

The biggest emphasis in the group of indicators 2 is on baseline factors of spatial development. More than 41% of all the indicators of group 2 are devoted to them. We can conclude that the baseline factors are the most important indicators for monitoring spatial development. According to the number of indicators of group 2, the second most important indicators are indicators for infrastructural equipment. They are followed by indicators for landscape and settlement structure, and at the end by indicators for areas with natural hazards and protected areas. It is surprising that there are no indicators of group 2 for socio-economic structure of the countryside, although these are the

areas of different spatial changes and areas experiencing variety of pressures. Some indicators from landscape can give an approximate clue as to what is happening in the countryside from the spatial aspect, but not from the aspect of changes in socio-economic structure. Functioning of the system of spatial development also has no indicators at the second level. It looks like they have no role in changing spatial structure or spatial development.

According to the number of basic indicators the baseline factors of spatial development are the most important indicators for spatial development (48 indicators) followed by the settlement structure, which is represented by 41 indicators. Both groups of indicators are followed by indicators for infrastructure equipment and landscape, which are described by 30 and 28 indicators. Areas with natural hazards and protected areas are described by 16, socio-economic structure of the countryside by 11 and functioning of system of spatial planning by 2 indicators. Education, research and development are described by 4 basic indicators.

*Table 16: Number of indicators (group 2) and basic indicators*

| Group of indicators 1 | Group of indicators 2 | Basic indicators |
|---|---|---|
| **Baseline factors of spatial development** | demographic characteristics – number of inhabitants and population density | 6 |
| | net reproduction rate | 4 |
| | migrations | 4 |
| | age/sex structure | 5 |
| | households | 3 |
| | economic structure and labour market – economic strength | 3 |
| | tourism | 4 |
| | employment | 9 |
| | unemployment rate | 4 |
| | social welfare and standard of living. | 6 |
| **Settlement structure** | settlement network | 18 |
| | urban system connectivity | 11 |
| | living standard in municipal centres and regional centres | 12 |
| **Infrastructural equipment** | transport infrastructure | 12 |
| | telecommunication infrastructure and information society | 7 |
| | energy infrastructure | 4 |
| | environmental management | 7 |
| **Socio-economic structure of the countryside** | (no) | 11 |
| **Landscape** | land use | 18 |
| | degraded areas | 5 |
| | spatial identity | 5 |
| **Areas with natural hazards and protected areas** | areas with natural hazards | 6 |
| | protected areas | 10 |
| **Functioning of system of spatial development** | (no) | 2 |
| **Education, research and development** | education | 3 |
| | research and development | 1 |

*Source: Černe at al., 2004a.*

The starting point for the enlistment of indicators for monitoring regional development was therefore 180 basic indicators, which are already used in the planning systems of

the CONSPACE partners. But not all indicators were selected for the final list of indicators for monitoring regional development. It was important to know which indicators are used more often and which indicators are used only in a small number of CONSPACE partners.

*Table 17: The number of indicators that are available for CONSPACE partners*

| Number of CONSPACE partners | Number of indicators that are available | Percentage of available indicators |
|---|---|---|
| **Eight partners** | 33 | 18.3 |
| **Seven partners** | 26 | 14.4 |
| **Six partners** | 24 | 13.3 |
| **Five partners** | 27 | 15.0 |
| **Four partners** | 18 | 10.0 |
| **Three partners** | 13 | 7.2 |
| **Two partners** | 8 | 4.4 |
| **One partner** | 28 | 15.6 |
| **None** | 3 | 1.7 |
| | 180 | 100.0 |

*Source: Černe at al., 2004a.*

It is surprising that the spatial development process and process of spatial changes can be compared in all eight CONSPACE partners only by 33 indicators, which mean by only 18.3% of all the indicators listed.

At the beginning we classified those indicators which were available in all CONSPACE partners and indicators which were available in seven CONSPACE partners. The list of 59 indicators was analyzed based on their accordance with the main (i.e. first) group of seven indicators (baseline factors of spatial development, settlement structure, infrastructure equipment, socio-economic structure of the countryside, landscape, areas with natural hazards and protected areas, functioning of the system of spatial development). This list of the most available indicators in CONSPACE partners was then complemented by the other indicators, which applied to some of the CONSPACE regions and states. The end list of the indicators was than "evaluated" according to the list of indicators for monitoring European territory (European Spatial Planning Observation Network - ESPON), Monitoring the Alpine Region's Sustainability (MARS) and cohesion objectives achievement (A New Partnership for Cohesion). On the basis of this analysis we proposed a list of possible ideal/optimal indicators for monitoring spatial and regional development.

All selected indicators were then divided into three main groups according to their significance: **key** indicators, **core** indicators, and **research** indicators. The criteria for structuring indicators according to their significance was mainly the degree of their availability: indicators available in all CONSPACE partners are key indicators, indicators available in the majority of CONSPACE partners are core indicators. All other indicators are research indicators, for which additional research or collecting of data should be done.

Although we could have used several criteria for determination of their significance, the main criteria for determining the significance of indicators for monitoring spatial development was only their data constraints.

A similar approach was noted also in the Habitat Agenda. The Habitat Agenda indicators, for example, are composed of:

- 20 key indicators, which are both important for policy and relatively easy to collect. They are expressed either in numbers, percentages, or ratios;
- 9 checklist indicators, which give an assessment of areas not easily measured quantitatively. They are audit questions generally accompanied by checkboxes intended for a yes or no answer;
- 13 extensive indicators, which are intended to complement the results of the key indicators and qualitative data in order to make a more in-depth assessment of the issue.

The final list of indicators for monitoring regional development together with their argumentation based on the scientific literature and already known projects (European Spatial Planning Observation Network - ESPON, Monitoring the Alpine Region's Sustainability – MARS, Cohesion objectives achievement - A New Partnership for Cohesion) is presented in the next chapter. The list of ideal indicators contains above all (but not exclusively) basic indicators (basic data for indicators), which can be used for calculating the so-called derived (synthesized) indicators at the regional level.

Before turning to the final list of indicators for monitoring regional development we need to provide the argumentation for all the listed indicators.

- **Demographic structure**
- analysis of the most important indicators of the population situated in space.

All different kinds of planning are practiced not due to the object of the planning itself but because of the people and for the people. The object of spatial planning is space with all its components, categories, and related issues. This space, however, is not a sterile object comprising only its different elements. On the contrary, space is a complicated formation in which society lives and accordingly changes with its creativeness. Knowledge of a demographic structure, defined through biological events/processes that contribute to changes in population size either through its replacement or loss, is a key element in understanding the present and future needs for different infrastructure equipment, the extent of urban areas, etc.

Demographic structure may explain region-specific indicators of spatial development and can, through the definition of areas with growing/diminishing population, determine regional levels of other indicators. Discrepancies between the structure of space and demographic potential can lead to migratory outflow of the population and can show that the current spatial structure is problematic from the demographic perspective.

**Number of inhabitants** is the key indicator which shows the number of the total population that lives inside the selected territorial unit.

**Population density** shows how many inhabitants live per square kilometre. It is essential that this indicator is given for different territorial units at all possible levels as it shows the actual mode of population. In more congested areas other spatial necessities are more present than in sparsely populated areas.

**Natural balance** is an indicator composed of two components: live births and deaths. The difference between those two indicators shows whether there are more live births than deaths, or the other way around, in a selected period of time. If the difference is positive, than the number of births exceeds the number of deaths. In areas with a negative relationship other spatial measurements have to be taken compared to those in the areas with a positive balance.

**Migratory balance** shows demographic processes and is also a good indicator of the attractiveness and openness of the territorial unit. A relatively high immigration rate indicates a counterpart of a diminishing number of births, whereas a high emigration could lead to a depopulation of a region. Higher emigration could be interpreted as a reaction to serious social and spatial problems. Rural-urban and urban-rural migrations are, especially for urban planning, one of the most important starting-points in creating appropriate spatial plans.

**Migratory balance (distinction for foreign residents)** needs to be evaluated separately, because in a globalized world the percentage and the dynamics of foreign residents is one of the most important indicators for monitoring the attractiveness and openness of the space, and includes important spatial elements which have to be considered in spatial planning, too (social and spatial segregation).

**Share of migration in population growth.** The ratio between natural population growth and net migration can offer insight into spatial processes of concentration, deconcentration – urbanization, suburbanization and depopulation.

**Age groups (children).** Indicators of the number of inhabitants of various age groups are useful yardsticks for sustainable development and future needs of different infrastructure. According to Urban Indicators Guidelines (2004), the adult population should be taken, for employment indicators, as persons of 15 years of age or more. In other indicators relating to family type, the term should refer to persons having reached majority or voting age, or defined as adult for census purposes. Age groups (children) are defined as a percentage of population below 15 years of age. In a mature demographic regime the size of this population is small. In some areas numbers are extremely low and, as such, critical for further development of the region.

**Age groups (old age).** If a large percentage of a society's population is represented by inhabitants older than 64, then this can lead to a serious problem in the future, including the growth of the state/regional financial burden.

**Age groups (working population)** is the biggest group of population, aged between 15-64. This is the total number of the possible active population, which means that they are earners of money and intensive users of spatial elements. However, in this group there are some inhabitants that are actually not active: students, the unemployed, and the sick. Some inactive groups of population are considered in other indicators of socio-economic structure.

**Number of households.** For describing the social structure of the region the number of households is crucial since it is a basic indicator that enables creation of other indicators. A household is a person or group of persons who make common provision for food or other essentials of living, and often share a common budget. A group of people who eat one meal together daily may be considered a household. This definition includes domestic servants. The notion of head of household assumes that most households are family households (in other words, that they consist entirely, except possibly for domestic servants, of persons related by blood, marriage or adoption) and that one person in such a family household has primary authority and responsibility for household affaires and is, in the majority of the cases, its chief economic supporter. This person is then designated as the head of the household. A female-headed household is a household headed by a woman, i.e. who has the primary authority and responsibility for the household's affairs, usually as chief economic supporter (see above definition of head of household). However, in most countries, women are not usually enumerated as heads of households unless they are either living alone (that is, in one-person household) or there is no adult male in the household (Urban Indicators Guidelines, 2004).

- **Socio-economic structure**
- analysis of the most important indicators of the population's social structure (employment, unemployment, qualification structure);
- analysis of key economic indicators of the region.

The object of planning is space. Spatial planning is interested in the processes as they occur in space. Space, however, is not limited only to land use categories; there are many other activities that include spatial dimensions. For this very reason, spatial planning is interested in spatial relationships between social and economic activities, too (Černe, 1997). Social and economic activities are usually described through some general indicators presenting production, employment and social characteristics of the population.

**GDP per capita:** Gross domestic product according to purchasing power parities in EUR. The economic performance of a region is of central importance to the question of whether or not the economic development is sustainable. Performance is measured with the gross domestic product per head of the population, a figure that gauges the region's ability to provide prosperity for its inhabitants.

**GDP per employed** (in buying power per employed in EUR) is a similar measure of regional wealth as GDP per capita, but with the emphasis on labour productivity. More developed regions are expected to have higher GDP per employed.

**Structure of GDP** tries to determine the regional economic specialization. Usually percentages of GDP in agriculture, industry and service activities are presented.

**R&D expenditure.** Modern regional and spatial policy sees potential for faster and more balanced regional development in the research and development sector, which produces new ideas and products later on used in practice. The indicator Amount of

GDP for R&D activities tries to define the importance of this economic sector. It should be noted that some special infrastructure equipment is needed for R&D activities. This indicator is strongly correlated with the indicator **R&D personnel** (number of labour force employed in R&D activities), which tries to represent the demographic importance of new economic activities.

The number of population aged over 14 with primary school or even lower education shows a **low qualification structure** of the population. The human capital is higher if the qualification structure is better. The indicator **high qualification structure** shows how many inhabitants are better or even very well educated (population aged over 14 with high school or higher education). These two indicators give a good idea of the general capacity for economic innovation and a useful basic social characteristic of the population.

**Students.** When talking about the developmental potential in a selected territorial unit, the number of students aged between 19 and 24 is fundamental information.

The number of **employed population** represents the population that is actually employed. This indicator is similar to the indicator of age groups (population aged between 15-64), but narrower because unemployed, students and people incapable of working are not included.

**Active population.** The number of people who have reached the working age (over 14) and are actually working, and the unemployed workers together (including first seekers of jobs). The economically active population comprises all persons over 15 years of age who furnish the supply of labour for the production of economic goods and services. The production of economic goods and services includes all production and processing of primary products, whether for the market, for barter or for own consumption, the production of all other goods and services for the market, and the corresponding for own consumption. Young people, students, old people, housekeepers and the sick are excluded from this indicator.

**Employed in agriculture.** The number of the employed in agriculture represents the number of the active population engaged in agriculture. If the number is high, then agriculture is of high importance, yet the high number of the employed in agriculture is usually a sign of a more rural area with not completely modernized production. The employed in agriculture are an important factor that is reshaping the spatial structure of the countryside.

**Employed in industry.** Industrialization is one of the most important modern transformers of the space. A high number of the employed in this sector shows the high importance of industry in the region; however, there is a high probability that the industry is still in its traditional form and organization. This can lead to further deindustrialization.

**Employed in services.** In the most developed regions the number of the employed in service activities exceeds the number of employed in agriculture and industry together. The employed in service activities need specialized infrastructure (informational) and are important users of space for housing, trade, tourism, and recreation.

**Qualification structure of employed** shows how well the labour is educated and skilled: how many of the employed have low (primary school or lower) or high qualifications

(high school or higher). As such, it is one of the most important indicators for describing socio-economic characteristics of population.

**Daily migration** describes the difference between the number of employed residents and the number of jobs available in a selected territorial unit. If the place of residence and place of work are not in the same territorial unit, daily commuting occurs. Usually it describes the flow of labour from suburban and rural areas to urban areas and back. There are problems with rush-hour congestion, which affects the traffic infrastructure. Some workers commute from urban areas to their place of work in suburban areas.

**Unemployment** (standard definition according to the United Nations Statistics Division) includes all persons who during a specified reference period (e.g. one week) are either: (i) without work, i.e. not in paid employment or self-employment; (ii) currently available for work, i.e. available for paid employment or self-employment during the reference period; or (iii) seeking work, i.e. taking specific steps (registration at a public or private employment exchange; application for job vacancies; checking at worksites, farms, factory gates, market or other assembly places; placing or answering newspaper advertisements; seeking assistance of friends or relatives; looking for land, building machinery or equipment to establish their own enterprise; arranging financial resources; applying for permits and licenses; etc.). Persons without work and currently available for work, who had already made arrangements to take up paid employment or undertake self-employment activity at a date subsequent to the reference period, are to be considered unemployed, irrespective of whether or not they continue seeking work. Also considered as the unemployed are persons temporarily absent from their jobs with no formal job attachment, who are currently available for work and seeking work. Age and sex specific unemployment rates relate the unemployed persons to a specific age or sex group, as wells as to the economically active population or labour force of the same age group.

One of the fundamental needs of people is to be able to participate in the economic and social processes of society. No group should be excluded from this. High unemployment in a region indicates that it does not make efficient use of its human capital. Furthermore, unemployment is a key contributor to the creation of poverty. The indicator is presented through the number of the unemployed.

**Unemployed (women).** Comparing the number of unemployed women in the active female population with the number of unemployed in the overall unemployed population provides an indication of the equality of opportunity offered to men and women, and an indicator of the degree of integration in the working world. The indicator is presented through the number of the unemployed.

**Unemployed (youth unemployment).** Being out of a job produces dissatisfaction especially among young people under the age of 25. This dissatisfaction can be expressed in the form of aggression and readiness to engage in violence. The chasm between working and unemployed young people leads to conflicts and undermining of social cohesion. The indicator is presented through the number of the unemployed.

**Unemployed (long-term unemployment).** Inhabitants, who have been out of job for at least 12 months are included in the category of the long-term unemployed. As the period of unemployment extends, social integration tends to decline. Re-entry into the working

market also becomes increasingly difficult and the state thus normally bears an additional financial burden. The indicator is presented through the number of long-term unemployed.

**Depressed, underdeveloped areas.** Problematic areas are not only a spatial category but also a socio-economic one. In problematic areas there is a higher number of unemployed population and the GDP is smaller than in developed regions. In regions with industrial decline it often comes to a higher percentage of derelict/degraded land. All place specific policies, including spatial policy, try to overcome economic difficulties and change the current trends to a more balanced development. The extent of the territory and the number of population living in problematic areas are the best indicators for the severity of developmental problems. However, there is a problem of how to define depressed and underdeveloped areas since there is no common definition. The best solution to this problem is that every CONSPACE partner use its own measures for defining problematic areas, which are usually defined according to the official national (planning) authority and should be reported in square kilometres and the number of population living in those areas.

- **Settlement structure**
- analysis of the urbanization and suburbanization processes;
- measuring changes in urban land use;
- describing the urban system and urban-rural connectivity.

Marinović-Uzelac (2001) in his book Prostorno planiranje (Spatial planning) describes themes that are discussed in spatial planning. He states urbanization as the most important content of spatial planning. Settlement structure is always the most important topic because inside this concept the spatial organization of the society can be seen and planned.

**Urban areas.** There is no common definition of urban areas. In Urban Indicators Guidelines (2004) urban agglomeration is defined as the city proper along with the suburban fringe and any built-up, thickly settled areas lying outside of, but adjacent to, the city boundaries. An area may be classified also as urban according to its role as a central place for tributary area, providing a range of service activities. A high density of population may also be used as a criterion for identifying urban areas. In different states there are different measures. In Japan an urban area has to contain at least 30,000 people. Geographers use other criteria in an attempt to distinguish between urban and rural areas. Some of these features include function, occupations, service provision, land use and various social factors. Since there is no common definition, the urban areas (extent of the territory and number of population living in urban areas) in CONSPACE partners should be defined by the official national (planning) authority and should be reported in square kilometres and the number of population living in those areas.

**Functional urban areas (FUA)** is another description of the spatial dimension of the urbanization process used also as an indicator in Espon. Most European counties have definitions of FUAs or similar concepts, such as travel-to-work areas, commuting catchment areas, commuting zones, and functional urban regions. One way of defining FUAs is as population over 50,000 inhabitants and an urban core (agglomeration) with

more than 15,000 inhabitants (i.e. excluding those artificially large urban areas with a minor urban core). Such a definition enables further analysis of urban areas through typology and strength of FUAs.

**Population in densely populated settlements.** One possible definition of urban areas, where the population density exceeds 500 inhabitants per square kilometre. The number of inhabitants in those settlements should be reported.

**Suburban areas** are areas marked with physical expansion of urban area in neighbouring rural areas. This was facilitated by the growth of public transportation system and personal motorization, which enabled daily commuting in urban areas, and decentralization forces within cities. The process of sub-urbanisation is the most important process in developed countries. Sub-urbanization is also a social process. Sub-urban areas are becoming larger and accommodate more and more people. Suburban areas in CONSPACE partners should be defined by the official national (planning) authority and should be reported in square kilometres and the number of population living in those areas.

**Rural areas** are areas that are not urban. In rural areas density of population is low and agricultural land use prevails over other kinds of land use. Specific socio-economic conditions are characteristic features of the rural areas, which should, in the CONSPACE partners, be defined by the official national (planning) authority and should be reported in square kilometres and size of population living in those areas.

**Central place relationship.** Central functions of urban settlements define their position in the settlement hierarchy. There are different levels of centrality. According to the models created by Christaller and Lösch the appropriate distribution of central settlements is important in order to ensure suitable provision of population living in catchment areas of each central town with basic needs (trade, nursing care, etc.). Central place relationship might be studied through the number of central settlements with different functions and their distribution.

**Strength of urban-rural migration flows.** Usually it is studied within the concept of suburbanization, i.e. emigration from the urban areas to the suburban and rural areas.

**Strength of rural-urban migration flows.** Usually it is studied through the quantity of daily commuters from the rural to urban areas (travelling to work, shops and other social institutions) and through the migratory balance between the urban and rural areas.

During the draft of the new Regional Spatial Coordination Plan (P.T.R.C.), Veneto Region aimed at defining reference data for spatial development, to produce an instrument able to collect data from different sectors of analysis and support planning activities on all institutional levels (European, national, local). The main objective of the pilot action is therefore to experiment with new methodologies for spatial monitoring using a "territorial" approach, to build the reference setting for the new Spatial Coordination Plan that will define future spatial development.

The analysis aimed at comparing urban areas and the 'open space' to identify the functions that free areas can still host.

Two indicators have been defined:

- dimensions and characters of 'urbanized territory';

- dimensions and characters of 'usable territory'.

The overlay of these two maps has produced a third map, which will be used as "base map" for all the project action. The relationship between these two layers, in the opinion of the regional spatial planners, will be useful to define parameters for evaluating the sustainability of future development.

The work has been carried out through the following steps:

1. analysis of the urban settlement system, with particular regard to the process of sprawl and concentration of the urban areas;
2. identification of the urbanized terrain;
3. identification of the 'not-urbanizable' terrain; areas that for reasons of morphology or of protection cannot be built on have been identified using a new territorial indicator called "land care index" (LCI);
4. comparison and evaluation of the results.

The identification of the development areas and the evaluation of the direction of development are important to support future planning, defining the limits for changes in the urban settlements.

The most valuable result of the pilot action was the creation of two new indicators, namely Urban density and Land care index, which were incorporated into the proposed system of indicators for monitoring regional (economic, social and spatial) development of the CONSPACE project region. Both indicators are fully referenced in the methodology sheets.

- **Countryside**
- measuring the extent of rural areas with special characteristics;
- describing basic characteristics of agriculture;
- analysing the importance of non-agricultural activities in the countryside.

Rural areas (or countryside) cover the majority of regions and states. Agriculture is a key occupation in rural areas according to its spatial extension. Goals of spatial development of the countryside are not limited only to preservation of population in rural areas, but also to preservation of cultural heritage, which is of key importance in identifying the population. The central questions of preserving life in rural areas are connected with ensuring a minimum infrastructure and helping farmers. Modern farming follows the principles of sustainable development.

**Areas with low population density.** Rural areas are characterized by lower density of population. Yet there are also areas with extremely low population density (less than 10 inhabitants per square kilometre). For those areas special actions have to be taken to provide the population with basic commodities and infrastructure. This indicator is also used in the common regional policy of the European Union to define less developed regions (Target 1).

**Mountainous and hilly areas** are another example of areas with special and problematic spatial structure. Mountainous and hilly areas are usually defined as areas with an

elevation of over 600 meters. It is possible to use the definition of the national official (planning) authority.

**Active rural population (age structure).** One of the most severe problems in agriculture is the age structure of the family farm holders. They tend to be very old and without an heir. Farms owned by a younger population (aged under 40) are usually more open to modernization and the market. They usually follow the principles of sustainable farming.

**Active rural population (qualification structure).** More educated farmers (with secondary or higher education) can operate in the market, and are more likely to receive help from the European agricultural funds, and can thus perform sustainable farming.

**Full-time farmers** are farmers that are employed on their own farms. They are more open to improvement of farming within the modern principles of agriculture.

**Number of farms** and **farm size** (number of farms with more than 10 ha of agricultural land) are the key indicators that present the vitality of agriculture.

**Biological farming** is becoming more and more important for two reasons: there are favourable opportunities to sell financially more highly valued biological products on the market, and sustainable development in agriculture is gaining importance. The indicator is defined through the number of farms engaged in ecological farming.

**Supplementary activities in farms** are important for improved prosperity of farm-holders. Other farm activities on farms are one of the elements that are transforming rural areas into a poly-functional space. The indicator is defined through the number of farms with supplementary activities.

**Employment in other activities.** Agriculture is only one of the activities in the countryside with a relatively low number of the employed, yet with a huge spatial distribution. There are some other activities as well as services, some industry, mining, etc. The countryside can be vital only if it is poly-functional. The indicator is defined through the number of jobs in the rural area and the number of jobs in rural area activities other than agricultural ones.

- **Quality of life**
- measuring key indicators presenting quality of life;
- describing the welfare of the population.

The answer to the question "Why do we plan?" is strongly linked with ensuring maximum quality of life for the population. The analysis of spatial planning goals in general shows that the main aim of planning is to increase the welfare of the population. Welfare of the population and quality of life are strongly intertwined.

Although it is difficult to define, the quality of life refers to certain accepted standards of human development and progress and our satisfaction with those standards as they affect us. The quality of life is comprised of factors that are important to all of us—our family life, the air we breathe, and the satisfaction of basic needs, physiological, psychological, sociological, and political. When we say that we have a good quality of life, we mean that we have the opportunity to fulfil most of our basic needs and to reach our full potential as human beings. And, in looking to the future, we may infer the sustainability of this quality of life for future generations.

When we speak of a "community" quality of life, we are speaking of those factors that affect everyone in the community in a general way. Each factor may have a differing degree of impact on each of us, yet most would agree that these factors are important and that the community has a role in maintaining these factors.

Some components of a good quality of life may be taken for granted. Freedom from war has an important impact on our quality of life. As such, this is an important factor at the national and international level. A nation at peace sets the stage for stable family life. Other personal freedoms are also an integral part of our life in a democracy. We accept these as "givens". When these freedoms are not granted equally to all persons, we call this discrimination. At a community level, discrimination can have a strong influence on the quality of life.

The various parts of the community quality of life are interwoven and interdependent. In our society, however, we have come to rely almost exclusively on economic indicators as measures of human progress. We hear a lot about the gross domestic product (GDP), as if it were the ultimate measure of progress. In actuality, it is only an economic indicator, and a very blunt instrument at that. GDP is a measure of development based on per capita production (Chambers, 1994).

Quality of life can be measured through amount of living space per citizen, number of poor citizens, safety, societal participation, and integration.

**New apartments** and **living standard** (number of persons per room, used floor space per person, number of inhabitants living in one-dwelling buildings) present the personal quality of life.

**Health indicator.** Public health is closely related to sustainability. The simplest and most-used indicator of the society's health level is life expectancy at birth. In modern society, however, the use of various life-extending measures has proved increasingly controversial. Thus, an indicator should reflect the quality of a person's life as well as its length. However, the pertinent information on this subject is hardly available at the regional level. The problem can be mitigated somewhat by substituting the following indicator for life expectancy: number of prematurely lost years of life (= 65 – age at death for all deaths before age 65). Although this indicator might seem slightly arbitrary, no one could dispute on ethical grounds that the death of a 10-year-old child impairs sustainability more the death of an 80-year-old. The advantage of this indicator is that it effectively rolls many of the sub-indicators often used – infant mortality, suicide rate, accident frequency, etc. – into one.

**Safety indicator.** The need for safety is a basic human need. People cannot develop their talents to their full extent in a violent environment. If the individuals in society cannot live and act without anxiety, then society is not socially sustainable. An appropriate indicator here is the number of violent crimes per year.

**Societal participation and integration.** The sustainable development of a region depends on the interest and active participation of the general public. This sort of interest may be expressed, for example, in membership in political parties or citizen groups, or ecological or development pressure groups. Precisely with regard to the sustainable development, Local Agenda 21 has an important role to play. The number

of communities, institutions, and private individuals engaged within the framework of Local Agenda 21 thus appears to be the appropriate indicator of the extent of participation.

- **Infrastructure**
- measuring infrastructure structure;
- describing the use of different means of transport;
- analyzing accessibility.

Infrastructure is the name given to road, rail and air links, sewage and telephone systems, and other basic utilities that provide a network in the space benefiting business and the community. Infrastructure is seen as an important location factor for business and housing in theories of regional development. Arranging infrastructure networks is, according to Marinović-Uzelac (2001), one of the main occupations of spatial planning.

Another question in spatial planning closely related to the infrastructure is the question of accessibility to central functions of towns and the public transport system.

Infrastructure is a broad topic; there are different infrastructure networks such as roads, rails, air, sea and rivers, communication, energy, and environmental networks.

**Number of passengers** is an indicator defining the quantity of journeys. The number of passengers is one of the indicators of regional activity and vitality. Large quantities of journeys results in a strong need for an appropriate infrastructure network. Other indicators showing the burden on the existent infrastructure network are also **freight transport** (net tonne kilometres) and **road-loading**. The latter presents the number of freight and personal vehicles recorded by automatic stations for counting traffic. The indicators number of passengers, amount of travelling and freight transport need to be subdivided according to the means of transport (road transport, railways, rivers and sea, air).

**Linear connections** try to describe the number of public transport connections in municipalities, school buses being excluded. This information is of high importance, since the appropriate public transport connections are essential for loosening road-loading. Using buses or trains is more sustainable.

**Traffic expenditure** is a figure which defines how much each household must expend for traffic. This number should be reported in the total amount and in EUR, so that the indicator can be established for the whole region.

**Indicators of accessibility (centre, highway, stopping place)** are used to describe how close are some infrastructure commodities to their users. Accessibility to infrastructure is one of the most important elements of personal welfare and also one of the most important location factors for the development of economy.

The highway system is the backbone of the entire road network. It enables fast and high quality linkage to the work place, residence, recreation centres, etc. Living close to a highway is an advantage.

The distance from the city centre (municipal or regional centre) is also of high importance since good access to the city centre also means good access to all central functions provided by each settlement with central functions.

Using public transport is the most sustainable way to travel. It is more convenient that the stopping places of buses, trains, or trams are not out-of-the-way from its users, because the remoteness certainly does not encourage the use of public transport.

Accessibility indexes should be reported through the number of people inside a 30 (20) minutes isochrone from the selected starting-point.

**State, regional, local roads (density)** measures the length of roads (in km) per square kilometre. A high number shows how well the road system is developed. Each CONSPACE partner can use its definition of roads.

**State, regional, local roads (new construction)** reports the length of newly constructed state, regional and local roads. Building new roads in space is one of the fundamental tasks of spatial planning. The indicator is expressed in kilometres.

**Railway network (density)** measures the length of railways (in km) per square kilometre. Although the era of the densest railway network is probably finished, the railway network is still one of the most important factors for the sustainable development of economy and makes daily commuting from the suburban and rural areas to the urban areas much easier. New policies on infrastructure development are giving an even more prominent place to the railways in the whole infrastructure system, as the roads are experiencing their maximum, still permitted, burden. **New construction** in the railway network is encouraged even on the part of the European Union. The latter indicator is expressed in kilometres.

**Telephone connections** are the basic modern communication infrastructure and an important factor of personal welfare. The telephone system is usually the basis for the development of the Internet. Recently, the **mobile telephony** is becoming the most important tool designed to connect people. The number of subscribers to mobile telephone is increasing rapidly. The indicator for each phenomenon is expressed in numbers.

**Households with access to Internet.** Internet connections are the information infrastructure of modern times and are needed for gathering information, for work and leisure time. Good **public access to Internet** should be developed to achieve equal opportunities for the population unable to afford their own computers and Internet connection. Public Internet points are usually well used by students and tourists, too. **Cable connections** are important for achieving appropriate velocity of Internet, as they are becoming the backbone of all modern communicative technology. A well-developed information society is seen as a prerequisite for successful and faster regional development. The indicator for each phenomenon is expressed in numbers.

Energy is actually the driving force of the whole society. Energy infrastructure is needed for the modern way of life and further development of nations and regions. **Production of energy** of all kinds (from renewable resources, nuclear, oil and water energy, gas and fossil fuels) is becoming of key importance for each entity. The sustainable development paradigm influences the proportion of energy produced from renewable resources.

**Production of electric energy** is of high importance, too. Both indicators are presented in tons of oil equivalents.

**Consumption of electric energy** and **consumption of electric energy per employed** in kWh show the energetic wastefulness of the society and the economy, and energy efficiency of the industry. Energy consumption also provides important implications for the environment.

**Water supply** is a basic need for every citizen. Quantity of pumped water is an important element of sustainable water management and usually also testifies to the quality of life.

**Consumption of water.** The sustainable use of water is a major precondition for safeguarding future socio-economic and spatial development and preserving the aquatic ecosystem. Water consumption constitutes a serious burden on fresh water resources, but it must be regarded in relation to the widely varying regeneration rate. Especially in certain tourist areas in the Alpine region, seasonal water availability is a major problem. The indicator used is the total water consumption in litres per day.

Environmental infrastructure is trying to achieve more sustainable development. Indicators measuring **quantities of purified wastewater** (measuring quantities of purified wastewater in $m^3$), and the number of households/inhabitants included in the sewage system, and the number of households/inhabitants connected with a wastewater treatment plant (**sewage system**), describe how wastewater is treated and, consequently, how the environment is being protected.

**Solid waste disposal.** Waste treatment needs to be established, because improper waste treatment can threaten water sources and cause health damages. An indicator of waste treatment can be represented through the number of household included in public waste collection and/or through the quantity of deposited material ($m^3$) per year.

- **Land use**
- describing the relationship between different land use categories;
- measuring changes in the extent of different land use categories.

Land use is one of the elements used to describe spatial structure (Marinović-Uzelac, 2001), which suggests that land use is an important topic in spatial planning. Monitoring land use and land use changes is an important source of measuring human pressures on the space.

The basic land use categories – their extent and changes in recent years – are presented. Due to the fact that each CONSPACE partner probably uses different definitions of the land use categories, state specific definitions should be used in the first step of survey. The extent and change of land use categories are manifested in hectares.

**Agricultural land (extent)**

**Forests (extent)**

**Water areas (extent)**

**Built-up areas (extent)**

Some narrower agricultural land categories should be pointed out since they indirectly represent agricultural production. These categories are also very important for the protection of cultural landscape:

**Fields (extent)**

**Meadows (extent)**

**Pastureland (extent)**

- **Protected areas**
- measuring the extent of protected areas.

Spatial planning has various functions. The protection of the most important natural resources (water, agriculture land) and natural landscape (parks) are one of them; however, this does not mean that the only aim of spatial planning is protection. Spatial planning tries to make the optimal distribution of various elements in space. Protected areas have important functions (ecological, social, economic, cultural, etc.) and thus have to be incorporated into the current system of spatial planning in an appropriate way and extent.

**Protected areas.** There are many different types of protected areas: national, regional, landscape, natural parks, protected forests, and natural environment. The extent and percentage of protected areas is one of the most frequently used indicators of society's response in the context of environment protection. Protected areas should be carefully managed because of their ecological, social, economical, cultural, and aesthetic values. In the European Union protection of the environment and space plays an important role in increasing the quality of life for all citizens, and it is seen as a step toward the paradigm of sustainable development. Recently, a special network of protected areas called Natura 2000 was created. The extent of protected areas is presented in hectares.

**Protected agricultural land (extent).** Agricultural land has to be protected since it is an important natural resource and the basic element for future sustainable food supply. At the moment there is a hyper production of agricultural products in the European Union, yet with the expected climate changes, and increased fear of terrorism and military conflicts this may well change. The extent and change of protected agricultural areas are presented in hectares.

**Protected water resource areas (extent).** Water resources are environmentally very fragile. The consumption of water is expected to increase even further. Water resources should be carefully managed. Conflicts of different land use should be obstructed. Water resources are fundamental for the normal function of society and the economy. The extent and change of protected water resource areas are presented in hectares.

- **Degraded areas**
- measuring the extent of degraded areas of all kinds.

Degraded areas are one of the standard elements in all spatial development plans. They hinder spatial development, which is why spatial action for their reclamation has to be undertaken.

**Degraded industrial and mining areas (extent).** Industry and mining can cause serious degradation of land, which hinders spatial development until appropriate measures for its renewal are taken. The indicator is presented through the extent of degraded industrial and mining areas in hectares. The definition of degraded areas is defined by the official national (planning) authority.

**Damaged forests (extent).** Forests play a significant role in spatial development due to their wide range of functions. Degraded forests cause serious financial loss. The indicator is presented through the extent of damaged forests in hectares. The definition of damaged forests is defined by the official national (planning) authority.

**Polluted soils** cannot be used for production of safe and healthy food. Soil pollution is usually the result of industrial, military and agricultural activities. The indicator is presented through the extent of polluted soils in hectares. The definition of polluted soils is defined by the official national (planning) authority.

**Air pollution (extent).** Poor air quality can damage health of the population and cause high financial expenditures for renovation of cultural monuments. The indicator is presented through the extent of areas with polluted air in hectares. The definition of air polluted areas is defined by the official national (planning) authority.

**Water pollution.** Water is a very important source for the development of the economy (industry) and energy sector. Potable water is often gathered by using water from rivers and springs. An open water area has important recreational potential. Tourism develops near rivers and lakes, too. The indicator is presented through the extent of polluted rivers (in kilometres), and lake and wetland surfaces. The definition of water pollution limit is defined by the official national (planning) authority.

**Underground water pollution.** Underground water is an extremely important source of potable water and for irrigation. The indicator is presented through the extent of the polluted underground water surface expressed in hectares. The definition of the polluted underground water surface is defined by the official national (planning) authority.

- **Areas with natural hazards**
- measuring the extent of areas where spatial development is hindered due to natural processes causing potential financial and human costs.

Areas with natural hazards (flooding, landslides, erosion, and avalanches) are a restricting element in spatial development. They are usually a result of natural processes, yet they cause loss of human lives and high renovation expenses. Spatial policy has to take action against natural disasters by restricting the number of people living in those areas, preventing conflict of different land uses, and proposing solutions for the reduction of potential damage.

**Flood-prone areas.** Settling is a very aggressive process usually placed near water areas. It is often the case that precautions have not been taken with respect to natural flooding, which occurs because of inappropriate and poorly integrated interventions in water bodies, leading to enormous financial and material costs. Morevoer, there can also be human casualties. The indicator is presented through the extent of flood-prone areas in hectares. The definition of flood-prone areas is defined by the official national (planning) authority.

**Landslide and erosion areas.** They are usually the result of natural processes; however, they can also occur as a result of inappropriate interventions in space. The indicator is presented through extent of areas affected by landslides and erosion in hectares. The definition of landslide and erosion areas is defined by the official national (planning) authority.

**Avalanche areas** are specific for mountainous regions. Spatial development tends to be hindered in the avalanche areas. The indicator is presented through the extent of avalanche areas in hectares. The definition of avalanche areas is presented by the official national (planning) authority.

**Estimated costs of natural disasters.** All natural disasters cost money. The indicator is presented through financial costs caused by natural disasters in million EUR per year.

The proposed list of indicators comprises 10 groups of indicators with altogether 104 indicators. Each group of indicators consist of a number of indicators, of which 24 are key, 18 core and 62 research indicators.

*Table 18: The list of indicators for monitoring regional development*

| Group of indicators | Indicators |
|---|---|
| **Demographic structure** | **Number of inhabitants**, *Population density, Natural balance,* **Migratory balance**, *Migratory balance (distinction for foreign residents), Share of migration in population growth,* **Age groups (children), Age groups (old age), Age groups (working population), Number of households** |
| **Socio-economic structure** | **GDP per capita, GDP per employed**, *Structure of GDP, R&D expenditure, R&D personnel, Low qualification structure, High qualification structure,* **Students, Employed population**, *Active population,* **Employed in agriculture, Employed in industry, Employed in services**, *Qualification structure of employed, Daily migration, Unemployment,* **Unemployment (women)**, *Unemployment (youth unemployment), Unemployment (long-term unemployment),* **Depressed, underdeveloped areas** |
| **Settlement structure** | **Urban areas**, *Functional urban areas (FUA), Population in densely populated settlements, Urban density,* Suburban areas, **Rural areas**, *Central place relationship, Strength of the urban-rural migration flows, Strength of the rural-urban migration flows* |
| **Countryside** | *Areas with low population density, Mountainous and hilly areas*, Active rural population (age structure), Active rural population (qualification structure), *Full-time farmers, Number of farms, Farm size*, Biological farming, Supplementary activities in farms, Employment in other activities |
| **Quality of living** | *New apartments*, Living standards (number of rooms), *Living standards ($m^2$ per inhabitant), Living standards (one-dwelling buildings), Health indicator, Safety indicator, Societal participation and integration* |
| **Infrastructure** | *Number of passengers, Freight transport, Roads loading, Liner connections, Traffic expenditure, Accessibility index (centre), Accessibility index (highway), Accessibility index (stopping place),* **State, regional, local roads (density), State, regional, local roads (new construction), Railway network (density)**, Railway network (new construction), **Telephone connections**, Mobile telephone, *Households with access to Internet, Public access to Internet*, Cable connections, *Production of energy, Production of electric energy*, Consumption of electric energy, Consumption of electric energy per employed, *Water supply*, Consumption of water, *Quantities of purified wastewater, Sewage system, Solid waste disposal* |
| **Land use** | Agricultural land (extent), Fields (extent), Meadows (extent), Forests (extent), Pastureland (extent), *Water areas (extent), Build-up area (extent)* |
| **Protected areas** | **Protected areas (national, regional, landscape, natural parks, protected forest, natural environment, cultural heritage)**, *Protected areas (Natura 2000), Protected agricultural land (extent), Protected water resource areas (extent), Land care index* |

| | |
|---|---|
| **Degraded areas** | *Degraded industrial and mining areas (extent)*, Damaged forests (extent), *Polluted soils (extent), Air polluted areas (extent), Water pollution, Underground water pollution* |
| **Endangered areas** | *Flood-prone areas, Landslide and erosion areas, Avalanche areas, Estimated costs of natural disasters* |

*Notes:* **key**, core, *research indicators.*

*Source: Černe et al, 2004b; Nordio, 2005.*

## 5.2. Indicators for measuring spatial potential

In this group of indicators we focus just on spatial potential, not on other types of potential that are vital to the regional development. In this connection, the term potential denotes a stock or capital of a vital asset, which can grow or depreciate, and must be maintained in a good state in order to contribute its share to the regional development. So we are not considering, for example: individual, organizational, production potential. Individual potential describes the potential for competent individual action as produced by-and producing-the possibilities for individual development. It is the accumulated result of tradition and culture as well as socio-political and economic conditions. Organizational potential, as manifest in the know-how and performance standards of government, administration, business and management, is vital for effective resource use (natural and human) for the benefit of the total system. Production potential of the economic system includes the stock of production, distribution and marketing facilities. It provides the means for all economic activity.

The proposed group of forecast indicators for measuring development potential serves as a tool for measuring spatial development potential of regions in order to be able to discover existing spatial potential and future spatial potential which are already planned, proposed or projected. Knowing future spatial structure of the project region is a very important step in finding future endogenous sources for development and in evaluating possible spatial and regional problems in the future that can endanger successful and sustainable development. Evaluation of future potential is therefore an important step in preparing any development strategy.

References used in the process of the selection of indicators for measuring spatial potential are important documents from the European Union (ESDP, ESPON), macro-regional documents (Alpine Adriatic Working Community, Baltic Sea Region) and scientific literature (Urban Indicators Guidelines). The selective determination of a proposed group of forecast indicators for measuring development potential was derived from an understanding of basic characteristics of spatial structure and just some of the spatial dimensions of development, although we are aware that this is not the entire conceptual basis and practical guideline for understanding the inner meaning of development as the sustained elevation of the entire society and social system toward a "better" or "more human" life.

As in the case of indicators for monitoring regional development, for every indicator a methodology sheet was prepared, which represents basic characteristics of each

indicator (unit, calculation, criteria for its selection, classification and argumentation), its connectedness with ESDP goals and a clear scientific argumentation for its selection in the system of indicators for measuring spatial potential.

Some indicators (indicators of urban networks, infrastructure for tourism and recreation) need to have a clear standard which would make their categorization clear according to their size. The standard needs to be defined in the future.

In argumentation and explanation of selected forecast indicators we focused on spatial development potential derived from urban structure, transport infrastructure and research and development potential and their significance in regional development.

The proposed set of 24 indicators can be grouped into 6 categories of which only the last one is not strictly space-based, but represents a very important social basis for future spatial development. Those 6 groups of indicators are:

- transport networks;
- economic zones/development sites;
- urban networks;
- infrastructure for tourism and recreation;
- landscape areas and areas of natural and cultural heritage;
- social infrastructure.

Each group of indicators contains a number of indicators which are presented in the forthcoming table. But first there is their argumentation.

- **Urban structure**

Development is inscribed in space also through the uneven development of the qualities of urban places. Urban places should be understand as internally heterogeneous, dialectical and dynamic configurations of relative "permanence" within the overall spatial development and dynamics of economic and socio-ecological processes. Urban places are relatively permanent physical and social structures. Excess capital can be exported from one place – city, region, nation – to build another place within the existing spatial pattern and space relation. Spatial relations may be developed through technological and organizational shifts. Such development alters relations between urban places, after an internalized process of spatial development, sustenance, and dissolution. New networks of urban places arise, are constituted as fixed capital embedded in the land and configurations of organized economic and social relations, institutions, etc. A new territorial division of labour concentrations of people and labour power arises, new resource extraction activities and markets form. The geographical space that results is not evenly developed but highly differentiated. Difference and "otherness" are produced in space through the simple logic of uneven development. There is an increasing segmentation of reproductive activities and the rise of spatially ordered social distinctions. The inevitable tension arises between investment in urban development and the geographical mobility of different forms of capital. The spatial structure developed through the activities of contemporary capital is characterized by much faster movement

across space relative to producers who have necessarily to tie themselves down in urban place for at least a time, and investors in physical infrastructures and properties whose commitments are even longer lasting. Those who have invested in the physical qualities of an urban place have to ensure that activities arise which render their investments profitable by ensuring the permanence of the urban place. Coalitions of entrepreneurs actively try to shape activities in the urban place for this purpose. Hence the significance of the local "growth machine" politics developed and class alliance to promote and sustain economic development in the urban place. But such conditions cannot always succeed. Competition between urban places produces winners and losers.

The tension between urban place localization and spatial mobility of capital erupts into crisis, however, when the spatial structure shaped in relation to a certain phase of development becomes a barrier to further accumulation. The spatial configuration of places must then be redeveloped and reshaped around new transport and communications systems and physical infrastructure, new centres and locations of production and consumption, new agglomerations of labour power, and modified social infrastructure (for example, systems of governance and regulation of place). Old areas have to be devalued, destroyed, and redeveloped while new areas are created. The cathedral city becomes a heritage centre, the mining community becomes a ghost town, the old industrial centre is de-industrialized, speculative boom towns or gentrified neighbourhoods arise on the frontier of urban development or out of the ashes of de-industrialized communities. Development is then punctuated by intensive phases of spatial reorganization.

This powerful surge of such reorganization is creating considerable insecurity within and between urban places. The effect has not been to eliminate the significance of urban place altogether. But it does mean that the significance of urban place has changed in spatial, economic and social life and in certain respects the effect has been to make urban place more rather than less important. While there are all sorts of reasons behind this, an immediate consideration should be mentioned.

Space-time relations have been radically restructured since around 1970 and this has altered the relative locations of urban places within the global patterning of development. Urban places that once held a secure status find themselves vulnerable and inhabitants find themselves forced to ask, what kind of an actions should be taken to help "survive" with the new spatial development pattern. We worry about the significance of urban place in general and of our place in particular when the security of actual urban settlements becomes generally threatened.

When transport costs were high and communications difficult, places were protected from competition by friction of distance. But diminishing transport costs have made production, marketing, and particularly finance capital much more geographically mobile than before. The functional power inherent in urban places is much reduced. This allows much freer choice of location which in turn permits investors to take more rather than less advantage of small differences in resource qualities, quantities, costs and amenities between urban and other places. Multinational capital, for example, has become much more sensitive to the qualities of urban places and other localities in its search for more profitable accumulation. The particular dialectics of attraction and repulsion that capital accumulation exhibits for different places within the web of urbanization varies spatially

as well as with the friction of capital concerned. Capital has different needs as well as radically different ways in which to explore the possibilities of exploiting the spatial structure, and especially the urban structure, for their purposes. Tensions arise also between factions of capital because they each have quite different capabilities for and interest in geographical movement.

Those who reside in an urban place (or who hold the fixed assets in an urban place) become actually aware that they are in competition with other urban places for highly mobile capital. The particular mix of physical and social infrastructures, of labour qualities, of social and political regulation, of cultural and social life on offer (all of which are open to construction) can be more or less attractive to, for example, investors and external capital. Residents worry about things they can offer which will bring development while satisfying their own wants and needs. People in urban centres therefore try to differentiate their settlement from other settlements and become more competitive (and perhaps antagonistic and exclusionary with respect to each other) in order to attract and capture new investments or retain a certain degree of development.

Profitable spatial development projects to absorb investments have been hard to find, and a considerable proportion of surplus capital has found its way into speculative investments. The selling of places and the highlighting of their particular qualities (retirement or tourist resorts, communities with new styles, urban culture, etc.) becomes even more frenetic.

The upshot has been to render the coercive power of competition between urban places for development more rather than less emphatic, and so provide less leeway for development projects that lie outside investors' norms. The concern donates to preserve a good business environment for highly mobile capital or to realize a quick profit from speculative development. Competition between urban places is not simply about attracting production, however. It is also about attracting consumers (particularly affluent) through the creation of amenities such as cultural centres, a pleasing urban or regional landscape, and the like. Investment in consumption spectacles, the selling of image of urban places, competition over the definition of cultural and symbolic capital, the revival of vernacular traditions associated with urban places as a consumer attraction, all become conflated in competition between places. The realm of architecture and urban design is precisely about the selling of an urban place as part and parcel of and ever-depending community culture. The result is that urban places that seek to differentiate themselves as marketable entities end up creating a kind of serial replication homogeneity.

- **Transport infrastructure**

There has always been a close relationship between transportation and economic development. It is a popular perception that investment in transportation will result in economic growth, but reality may be quite different. If region has an advanced, uncongested transportation system and a high level of connectivity, this virtually ensures that it also has a high level of accessibility. Network additions (new links) to such a system will do little to stimulate economic growth. If the existing system has a high level of connectivity, but is congested, than it is possible that investments in the system will lead to positive economic benefits.

Many if not all of the major spatial developments that have shaped the spatial structure since the sixteenth century have been built around development in transport and communications – the canals, bridges, and turnpikes of the early nineteenth century; the mass transit systems of the late-nineteenth century; the automobile the radio and telephone of the early-twentieth century; the jet aircraft and television of the 1950s and 1960s; and most recently the revolution in telecommunications. Each bundle of development has allowed a radical shift in the way that spatial development is organized and therefore opened up radically new possibilities for the development process.

Each time of development breaking the barriers of space and time has provided new possibilities. The steam engine, for example, liberated the energy supply of cities from relatively inefficient and highly localized constraints, at the same time as it freed local hinterlands from a chronic conflict over whether to use the land for food or firewood. The steam engine accomplishes its role to the degree that it was in turn applied to the field of transport and communications: the coal had to be transported around. The total bundle of development and synergism is really crucial in opening up new possibilities. And this can create possibilities for spatial development and urban growth.

Since the mid-1960s we have witnessed a reorganization in spatial development under yet another intense round in the reduction of spatial barriers and speedup in turnover time. Containerization, jet-cargo systems, roll-on-roll-off ferries, truck design, and, just as important, highway design to support greater weights, have all helped to reduce the cost and time of moving goods over space, while automatic information processing, optimization, and control systems, satellite communication, cellular phones, and computer technologies, all facilitate the almost instantaneous communication, collation, and analysis of information, making the micro-chip as important as the satellite in understanding the forces that now shape spatial development.

Air transportation, for example, is not only a major industry in its own right but is also of considerable significance as an input into rapidly growing regional, national, international and global economies. It is now estimated that some 30-40% of world trade by value goes by air transportation. Air transportation is an essential factor for the success of tourism in many countries and subregions; indeed, in markets outside of Europe it is the primary mode. It is also an important input into the successful development of many, non-leisure-based industries where interpersonal communications are important. It is not only passenger air transportation that is vital to these latter industries: many such firms also rely on a range of air freight services to provide quality service to customers and to operate just-in-time production within modern chain-management frameworks.

Airports have at least four potential impacts on the development in the region: primary effects, income multiplier effects, tertiary effects and perpetuity effects.

Primary effects are the benefits accruing to the region from the construction or expansion of the facility – the design of facility, the building of the runways, the construction of terminals and hangars, the installation of air traffic navigation systems, etc. The direct effects of this involve the local employment required in the construction process and the work done by local contractors. Indirect effects include the benefits to the region of the wages and other incomes that these workers and companies subsequently spend in the region. These are clear gains to the local economy, but they are short-term, once-

for-all, and may be rather small. Also, airport construction involves a degree of special skill, personnel, and equipment that not be available locally, and this leads to leakage. In general, while airport development can have beneficial primary effects, save in case where there is a policy imperative to create jobs in the very short term, these are really the key concerns.

Income multiplier effects are long-term and are associated with the local economic benefits of running and operating the airport – the employment in maintaining the facility, in handling the aircraft and passengers, in transporting people and goods to and from the terminal, etc. Again there are direct effects stemming from the immediate jobs that are created at the airport and immediately associated with it. There are also indirect effects due to the ongoing flow income that the airport's operation puts into the local economy. These secondary effects can be extremely important to a local economy in terms of employment, income and for local government, taxation revenue.

Tertiary effects stem from the stimulus enjoyed by the local economy as the result of organizations and individuals having an extensive system of direct air transport services at their disposal. Typical hub city air services offer: more frequent flights, more direct flights, more opportunities for same-day flights, greater likelihood of international flights, services geared to local market needs, the ability to send packages on scheduled passenger services on flights leaving after the major courier services have finished their daily pick-ups, and residents of hub cities the same opportunities of linking to the other major hubs of those living in non-hubs. These may be seen as important features for business travellers.

Perpetuity effects reflect the idea of "new growth theory" that economic growth, once started in a region, becomes self-sustaining and may accelerate. Linked to this, there is empirical evidence that infrastructure investment can act as a catalyst for higher economic growth in region; essentially it can act as a kick-start mechanism. This type of dynamic economic impact of an airport is the most abstract and the most difficult to qualify. It is, nevertheless, potentially a very real and important benefit that may be enjoyed by a region with high-quality air services. The construction of a new airport may set in progress a large and long-term development process in a region. These perpetuity effects are in addition to the tertiary effects that relate to immediate migration of firms to an area with good air transport services. It is long-term and affects the dynamics of region. By initially attracting undertakings in sufficient numbers, airport development can lead to the crossing of important thresholds in terms of economies of scale, scope and density. In particular, in the context of the "new economy", high-technology activities, a region can acquire a vital knowledge base that forces local research and development and makes the region quasi-independent of others.

- **R&D infrastructure**

An adequate regional R&D infrastructure is fundamental for spatial/regional development. The focus is on the provision of public sector or academic research facilities, or on developing facilities to stimulate private sector activities and infrastructure for private-public-partnership research initiatives such as centres of competence. The presence of universities with a strong research base and active links to local firms provides a focus

for promoting innovation in many successful regions. The development of science parks, technology parks and incubation facilities enable the development of spin-off businesses and connections to be made between research activities and innovative firms. In stimulating R&D capacity, high-speed communications networks and connections between universities, research institutes and firms have also a role to play.

The capacity of regions to undertake R&D is an important consideration if a region is to succeed in its aim of becoming part of the knowledge-based economy. The capacity of regions to undertake R&D is a crucial factor for supporting economic growth and the creation of employment. Evidence from research studies reinforces the importance of the territorial dimension to levels of R&D and innovation. R&D institutions have a very important role in stimulating the generation of new knowledge and its exploitation by firms. This has implications for both the prosperity of regions and for the overall competitiveness of the economy. Levels of R&D in a region have long-term and cumulative effects on regional prosperity. To stimulate research and innovation at a regional level is crucial, for it is at this scale that the dynamic relationship between firms, universities and intermediary bodies can be most effectively mobilized. Links between businesses, universities, research institutes and public sector intermediaries have all proved successful. And linkages outside of the region provide an important means of bringing new knowledge and capabilities into the region.

A region's capacity to develop and absorb knowledge is influenced by the skills of the labour force, the capabilities of local firms, the availability and strength of knowledge-based infrastructures - such as universities and research institutes – and access to investment capital. Education has a crucial role in strengthening regional potential for R&D. Education is a basic objective of development; it is an important end in itself. Education is essential for a satisfying and rewarding life; it is fundamental to the broader notion of expanded human capabilities that lie at the heart of the meaning of development. Education plays a key role in the ability of region to absorb modern technology and to develop the capacity for self-sustaining growth and development. Education can also be seen as a vital component of growth and development – as inputs to the aggregate production functions. As input and output, education has central importance in economic development. The availability of skilled, flexible and motivated workers is of fundamental importance to a region's capacity to undertake R&D. Regions that can attract the best talent are able to cumulatively enhance their capabilities. The prevailing social and institutional context also plays a role. The extent, and depth, of interactions between universities, firms and governance authorities are particularly important. Universities and research institutes have strong links with their local regional economic base. The potential that these linkages offer is increasingly being recognized within policy circles.

Measuring future spatial trends and structure is of great importance in spatial planning to measure spatial potential for future development. Inputs for the elaboration of forecast indicators for measuring development potential of the CONSPACE project region are the results from all pilot actions and work packages carried out in the CONSPACE project, proposals sent by partners and some additional scientific literature. Indicators are used for measuring existing spatial potential and for the identification of future (planned, proposed, projected) spatial potential. They are arranged into 6 groups with altogether 29 indicators.

*Table 19: The list of indicators for measuring (spatial) development potential*

| Group of indicators | Indicators |
|---|---|
| **Transportation networks** | Transportation connections (existent, planned), Transportation junctions (existent, planned), Stations (existent, planned), Transportation multimodal nodes (existent, planned), Passenger and freight traffic (existent, planned), Passenger and freight traffic: multimodal nodes (existent, planned) |
| **Economic zones/ development sites** | Industrial and service sector share of GDP, Employed in industrial and service sector, Economic zones/development sites (existent, planned), Commercial zones (existent, planned), Industrial sites (existent, planned), Commercial/industrial zones (existent, planned), Technological and industrial parks (existent, planned), R&D parks (existent, planned), Warehouse/storehouse (existent, planned), Other specialized areas (existent, planned) |
| **Urban networks** | Urban networks (existent, planned) |
| **Infrastructure for tourism and recreation** | Tourism sector share in GDP, Centres of tourism and recreation (existent, planned), Areas for tourism and recreation (existent, planned), Infrastructure for winter and summer tourism and recreation (existent, planned) |
| **Landscape areas and areas of natural and cultural heritage** | Landscape areas and areas of natural and cultural heritage (existent, planned) |
| **Social infrastructure** | Universities (existent, planned), Educational and qualification structure (existent, planned) |

*Source: Černe et al, 2004c.*

## 5.3. Indicators of spatial development

Indicators of spatial development are the result of the CONSPACE pilot action Indicators of spatial development prepared by Lenarčič (2005).

Spatial development and planning indicators should follow the attempts to re-establish the system of spatial planning and the basic principles of spatial development; therefore, besides the basic indicators concerning spatially significant attributes of the systems (settlement system, infrastructure system, environmental and landscape system) also the group of derived indicators for evaluation of spatial development and of relations between the individual parts of the systems should be included, too.

The aim of the proposed list of indicators for measuring spatial efficiency of the system is to achieve more diverse living environments, better territorial organization, improved public and private transportation services, less land absorption, lower energy consumption, reduced constructional, operational and maintenance costs of settlement, transportation, and other infrastructural networks. In the proposed set of indicators information about the efficiency of these systems are viewed as possible input, status and output variables and feedbacks concerning former, formerly planned, current and currently planned

attributes of different parts of systems networks and their spatial relationships at various levels of spatial resolution: national, macroregional, regional, subregional and local. The criteria for evaluating and controlling input and output variables are therefore ecological, economic, social and other environment-shaping criteria, but criteria for evaluating and controlling status variables are explicitly spatially conceptualized.

Spatial planning indicators for measuring systems spatial efficiency (ISSE) are conceptualized as ratios between the observed and the desired values of their basic indicators. The newly derived indicators measure the spatial efficiency of:

(a) delineation of administrative and other planning areas;

(b) location and spatial distribution of the area's nearest neighbour settlement, transportation and other infrastructure networks;

(c) spatial relations between the nearest neighbour settlement and transportation networks;

(d) spatial attributes of settlement and transportation nodes.

However, in the specific case, the ultimate aim of the proposed indicators is the evaluation of building, operating and maintenance costs and the benefits of territorial, settlement, transportation and other infrastructural networks at the national, macroregional and regional level (NUTS 1-3).

Indicators measuring spatial efficiency:

(a) concerning delineation of administrative and other planning area are: ISSE Index I1 measuring regions' area size, ISSE Index I2 measuring regions' area shape; ISSE Index I3´ measuring regions' landscape territorial formation; ISSE Index I3˝ measuring regions' landscape space-time formation and their combined ISSE Index I3 measuring regions' landscape territorial and space-time formation;

(b) among attributes, location and spatial distribution of regions' areas and their nearest neighbour settlement networks are: ISSE Index I4´ measuring territorial distribution of primary settlement network, ISSE Index I4˝ measuring space-time distribution of primary settlement networks with their combined ISSE Index I4 measuring territorial and space-time distribution of primary settlement network and ISSE Index I5´ measuring territorial distribution of secondary settlement network, ISSE Index I5˝ measuring space-time distribution of secondary settlement network with their combined ISSE Index I5 measuring territorial and space-time distribution of secondary settlement networks;

(c) among attributes, location and spatial distribution of regions' areas and their nearest neighbour transportation and other infrastructure networks are: ISSE Index I6´ measuring territorial distribution of primary transportation networks, ISSE Index I6˝ measuring space-time distribution of primary transportation networks with their combined ISSE Index I6 measuring territorial and space-time distribution of primary transportation network and ISSE Index I7´ measuring territorial distribution of secondary transportation networks, ISSE Index I7˝ measuring space-time distribution of secondary transportation networks and the combined ISSE Index I7 measuring territorial and space-time distribution of secondary transportation network;

(d) among transportation networks and their nearest neighbour settlement networks are ISSE Index I8′ measuring territorial relations between primary settlement and transportation networks, ISSE Index I8″ measuring space-time relations between primary settlement and transportation networks with their combined ISSE Index I8 measuring territorial and space-time relations between primary settlement and transportation networks; ISSE Index I9′ measuring territorial relations between secondary settlement and transportation networks, ISSE Index I9″ measuring space-time relations between secondary settlement and transportation networks with their combined ISSE Index I9 measuring territorial and space-time relations between secondary settlement and transportation network;

(e) spatially significantly attributes of settlement and transportation nodes are ISSE Index Is01 measuring functional attributes of systems settlement nodes; Index ISSE It01 measuring functional attributes of systems transportation nodes and their combined ISSE Index I01 measuring functional attributes of systems settlement and transportation nodes; ISSE Index Is02 measuring physical attributes of systems settlement nodes; ISSE Index It02 measuring physical attributes of systems transportation nodes and their combined Index I02 measuring physical attributes of systems settlement and transportation nodes.

The proposed indicators are conceived as a system of disjunctively related spatial planning indicators for measuring systems' spatial efficiency together with a group of possible variant concepts of spatial development for setting up the proposed indicators and a planning model in which these indicators can be presented as a set of input, status and output variables and relations describing a certain state of systems' spatial efficiency.

Theoretically, the proposed system of indicators transcends different sectors of development in space. The proposed indicators measure spatially significant attributes and spatial relations within and between different parts of systems' nearest neighbour territorial, settlement, transportation and other infrastructural networks. An integral approach to territorial, settlement, transportation and other spatially significant networks is a generally desired but scarcely attained objective.

Practically, however, regarding the effects of spatial development on other attributes of systems: ecological, economic, social, etc. the purpose of the proposed indicators is to make spatial planning more transparent and so help us to reduce costs of construction, operation and maintenance of settlement, transportation and other infrastructure networks; increase demand for public transport journeys; reduce adverse environmental impacts of systems; facilitate cross-border spatial planning co-operation and pursue other objectives set up in the European Spatial Development Perspective. The possibilities to attain these objectives were identified and exactly located in space.

In the ESDP it is stated that a polycentric settlement structure across the whole territory of the EU with a graduated city-ranking must be the goal. What's more, the concept of polycentric development has been given its missing spatial, spatially structured dimension. That is innovative. Also, in the ESDP it is proposed that the European Commission and the member States agree upon reliable criteria and indicators in order to be able to effectively support sustainable development of regions and cities. Criteria and indicators for measuring the attainment of a chosen concept of spatial

development of territorial, settlement, transportation and other infrastructural systems networks have been defined and applied. That is innovative as well. The results could be a possible contribution to corresponding activities involving the exchange of innovative experience to promote the use and transfer of knowledge in the area of spatial and economic development.

On the basis of this approach we can measure and monitor the efficiency of the existing and the newly proposed territorial, settlement, transportation and other infrastructure networks within and around their respected regions. However, taking into account the wider European context, they can measure and monitor the efficiency of these networks within and around the region as well.

Given the required input variables concerning position, rank and size of a certain part of a system network, output variables measuring spatial efficiency of the observed part of network, should be the same. Estimating them is simple, but as the number of variables is usually high the process of computing becomes more difficult. Computing becomes even more difficult if in that process the necessary weighting factors are taken into account. The solution to that problem is obvious. Namely, if translated into a computer language and based on the available information system (GIS), the proposed set of indicators could be estimated and presented graphically, on maps and textually in tables almost instantly. The process of evaluating the existing state, the generation of new possible states and the evaluation of new planning states of spatial development could be performed more efficiently. The process of analyzing, synthesizing and analyzing the newly synthesized possibilities of spatial development could be made experimental and more transparent. Analyzing various states of spatial development would be more rational. The intuitive process of synthesizing new possible states of spatial development could be even more creative.

This set of spatial indicators is presented in 5 groups of indicators with altogether 29 indicators.

*Table 20: List of indicators of spatial development*

| Group of indicators | Indicators |
|---|---|
| **Territorial networks** | ISSE Index I1 measuring regions' area size, ISSE Index I2 measuring regions' area shape, ISSE Index I3 measuring regions landscape territorial formation, ISSE Index I3 measuring regions' landscape space-time formation, ISSE Index I3 measuring territorial and space-time landscape formation of regions |
| **Settlement networks** | ISSE Index I4 measuring territorial distribution of primary settlement networks, ISSE Index I4 measuring space-time distribution of primary settlement networks, ISSE Index I4 measuring territorial and space-time distribution of primary settlement networks, ISSE Index I5 measuring territorial distribution of secondary settlement networks, ISSE Index I5 measuring space-time distribution of secondary settlement networks, ISSE Index I5 measuring territorial and space-time distribution of secondary settlement networks |
| **Transportation networks** | ISSE Index I6 measuring territorial distribution of primary transportation networks, ISSE Index I6 measuring space-time distribution of primary transportation networks, ISSE Index I6 measuring territorial and space-time distribution of primary transportation networks, ISSE Index I7 measuring territorial distribution of secondary transportation networks, ISSE Index I7 measuring space-time distribution of secondary transportation networks, ISSE Index I7 measuring territorial and space-time distribution of secondary transportation networks |
| **Settlement and transport network** | ISSE Index I8 measuring territorial relations between primary settlement and transportation networks, ISSE Index I8 measuring space-time relations between primary settlement and transportation networks, ISSE Index I8 measuring territorial and space-time relations between primary settlement and transportation networks, ISSE Index I9 measuring territorial relations between secondary settlement and transportation networks, ISSE Index I9 measuring space-time relations between secondary settlement and transportation networks, ISSE Index I9 measuring territorial and space-time relations between secondary settlement and transportation networks |
| **Other combined index** | ISSE Index I1 measuring functional attributes of systems settlement nodes, ISSE Index I1 measuring functional attributes of systems transportation nodes, ISSE Index I1 measuring functional attributes of systems settlement and transportation nodes, ISSE Index I2 measuring physical attributes of systems settlement nodes, ISSE Index I2 measuring physical attributes of systems transportation nodes, ISSE Index I2 measuring physical attributes of systems settlement and transportation nodes |

*Source: Lenarčič, 2005.*

The practical application of the proposed group of indicators revealed many problems concerning the spatial development of settlement, transportation and other infrastructural

networks in Slovenia. It also revealed many opportunities for solving these problems as well. To the degree that many of the input variables are hypothetical, all the above-stated results are still tentative. Nevertheless, they show that according to certain rules, the proposed indicators can describe all possible states of systems' spatial relationships quantitatively. Given the criteria for setting the above rules, they can measure systems' spatial efficiency as well.

The proposed system of indicators could and should be able to describe and measure spatial efficiency of the present state of spatial development. It should be able to describe and measure spatial efficiency of future states of spatial development of systems in the same area put forward in various recommendations.

## 5.4. Environmental indicators

Sustainability is a dynamic concept. Societies and their environments change, technologies and cultures change, values and aspirations change, and a sustainable society must allow and sustain such change, i.e., it must allow continuous, viable and vigorous development, which is what we mean by sustainable development. The result of such adaptation as a result of selection from a wide range of possibilities cannot be foretold. Even though the factors constraining the development process and the processes driving it are known, the path of sustainable development is still the unpredictable result of an evolutionary process. The shape and form of a sustainable society must allow perpetual change in order to be sustainable; it can neither be planned nor predicted.

There is probably only one alternative to sustainability: unsustainability. But unstainability involves a time dimension: unsustainability now rarely implies an immediate existential threat. Existence is threatened only in the distant future, perhaps too far away to be properly recognized. Even if threats are understood, they may not cause much concern now: there still seems to be enough time for them to disappear, or for finding solutions. In the past, the sustainability of human society was not really at stake: the slow change of its environment left plenty of time for adaptive response and evasion.

Sustainability is now threatened by two factors: the dynamics of technology, economy and population accelerate the environmental and social rates of change, while a growing structural inertia reduces the ability to respond in time. Response time lengthens while respite time - the time available for adequate response - shortens: the sustainability of human society becomes an urgent concern. Sustainability in an evolving world can only mean sustainable development. In previous times, sustainability of humankind was taken for granted and did not appear as an explicit goal. It certainly was an implicit goal: no human society has ever consciously promoted its own unsustainability.

Global developments now focus attention on sustainability as an explicit goal. But the concept has to be translated into the practical dimensions of the real world to make it operational. We must be able to recognize the presence or absence of sustainability, or of threats to sustainability, in the systems under our stewardship. We need proper indicators to provide this information, to tell us where we stand with respect to the goal of sustainability. To sustain means "to maintain; keep in existence; keep going; prolong." If applied only in this sense, sustainability does not make much sense for human

society. Human society cannot be maintained in the same state, whatever it should be. Human society is a complex adaptive system embedded in another complex adaptive system - the natural environment—on which it depends for support. These systems co-evolve in mutual interaction, and they each consist of a myriad of subsystems that co-evolve in mutual interaction. There is permanent change and evolution. Moreover, this ability for change and evolution must be maintained if the systems are to remain viable (able to cope with their changing system environment) and sustainable. The sustainability goal translates more accurately into a goal of sustainable development (Bosel, H. 1999).

One of the most commonly cited definitions stresses the economic aspects by defining sustainable development as "economic development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs." Another takes a broader view by defining sustainable development as "the kind of human activity that nourishes and perpetuates the historical fulfilment of the whole community of life on earth."

There are many ways of securing sustainability, with very different consequences for the participants. Nature has successfully demonstrated sustainable development for a few billion years, with blind disregard of the fate of individuals and even species. The principle of survival of the fittest with its effectiveness and dynamics, but also its cruelty and hardship, would not be accepted as a principle for sustainable development by the majority of humankind.

Some human societies have been sustainable in their environment over long periods of time by institutionalizing systems of exploitation, injustice, and class privilege that would be equally unacceptable today for most of humankind.

If we were to achieve environmental sustainability coupled with a continuation of present trends, where a small minority lives in luxury, partly at the expense of an underprivileged majority, this would be socially unsustainable in the long run because of the stresses caused by the institutionalized injustice. And an equitable, environmentally and physically sustainable society that exploits the environment at the maximum sustainable rate would still be psychologically and culturally unsustainable.

Sustainable development of human society has spatial, environmental, material, ecological, social, economic, legal, cultural, political and psychological dimensions that require attention: some forms of sustainable development can be expected to be much more acceptable to humans. A just and fair society, for example, is likely to be more securely sustainable than a materially sustainable brutal dictatorship.

The sustainability concept we adopt has consequences: our interpretation of the concept directs our focus to certain indicators at the neglect of others. Conversely, if we rely on a given set of indicators, we can only see the information transmitted by these indicators, and this defines and limits both the system and the problems we can perceive, and the kind of sustainable development we can achieve (Sustainable development in Switzerland, 2004).

In connection with the United Nations conference on the environment and development (UNCED) that was held in Rio de Janeiro in 1992, Agenda 21 constitutes the most important reference document for creation of environmental indicators. It proposes measures

concerning social and economic development, management of natural resources and strengthening solidarity, as well as setting out an action plan. It invites various countries to draw up action plans themselves to promote sustainable development. The Rio + 10 Summit, which took place in Johannesburg in September 2002, underlined the strategy set out in Agenda 21 with the adoption of a declaration and an action plan. The importance of monitoring development had already been recognised at the 1992 conference. The final chapter of Agenda 21 accordingly proposes setting up a system of pertinent and internationally coordinated indicators. The United Nations Commission on Sustainable Development (UN-CSD) has therefore drawn up a list of indicators in order to facilitate a coordinated evaluation of sustainable development at an international and national level. Numerous countries have also started to devise systems of indicators adapted to their own particular situation and their local needs. Sustainability emphasizes the integrated nature of human activities and therefore the need to coordinate decisions among different areas sectors, groups and jurisdictions. Sustainability planning considers society's overall, long-term goals.

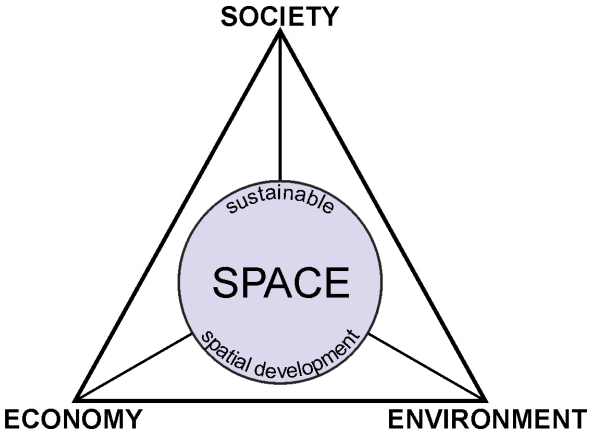
An aggregate indicator that makes physical sense is the Ecological Footprint or the almost equivalent Sustainable Progress Index (SPI). It measures the total land area that is required to maintain the food, water, energy and waste-disposal demands per person, per product or per city. This is an excellent summary indicator of the major environmental impacts of economic activity, but it does not-and is not meant to-capture the social dimensions of sustainable development, for example.

In an attempt to be more systematic, the pressure—state-response (PSR - pressure, state, response) and PSIR (pressure, state, impact, response) frameworks have been introduced and are widely applied especially to sustainable development problems. Under this approach, isolated chains of cause and effect are identified for a particular environmental problem and corresponding indicators are monitored. The most serious objection to this approach is that it neglects the systemic and dynamic nature of the processes, and their embedding in a larger total system containing many feedback loops. Representation of impact chains by isolated PSIR-chains will usually not be permissible, and will often not even be an adequate approximation. Impacts in one causal chain can be pressures, and in another can be states, and vice versa. Multiple pressures and impacts are not considered. The real, usually nonlinear relationships between the different components of a chain cannot be accounted for. States, and rates of change (stocks and flows) are treated inconsistently. For example, a PSIR chain of the $CO_2$ emissions problem would not account for the facts that $CO_2$ concentration is only partially caused by human emissions, that global temperature is only partially determined by $CO_2$ emissions, that a carbon tax may be introduced for other reasons, and that this tax has many other (economic and social) repercussions besides affecting $CO_2$ emissions.

The decision to incorporate environmental indicators in the system of indicators for assessing regional structure, potential and development was therefore a logical answer to the global tendencies to achieve sustainable development and is based above all on the concept of sustainable development as an integration of economic, social and environmental aspects stated in ESDP through basic goals of economic and social cohesion, sustainable development and balanced competitiveness of the European territory. The spatial approach not only confirms the absolute necessity of these basic

goals, but should also be seen as a way to assist sustainable development. Spatial development which concentrates only on one of these basic objectives would be unsuccessful in promoting effective, balanced and harmonious (sustainable) spatial development.

*Figure 3: The concept of sustainable spatial development as seen in ESDP.*




*Source: ESDP, 1999.*

The proposed list of environmental indicators consists of 10 groups of indicators with altogether 37 indicators.

*Table 21: The proposed list of environmental indicators*

| Group of indicators | Indicators |
|---|---|
| **Agriculture** | Area under organic farming, Gross nutrient balance |
| **Air pollution and ozone depletion** | Emissions of acidifying substances, Emissions of ozone precursors, Emissions of primary particles and secondary particulate precursors, Exceedance of air quality limit values in urban areas, Exposure of ecosystems to acidification, eutrophication and ozone, Production and consumption of ozone depleting substances |
| **Biodiversity** | Designated areas, Species diversity, Threatened and protected species |
| **Climate change** | Atmospheric greenhouse gas concentrations, Global and European temperature, Greenhouse gas emissions and removals, Projections of greenhouse gas emissions and removals |
| **Energy** | Final energy consumption by sector, Renewable electricity, Renewable energy consumption, Total energy consumption by each fuel, Total energy intensity |
| **Fisheries** | Aquaculture production, Fishing fleet capacity, Status of marine fish stocks |
| **Terrestrial** | Land take, Progress in management of contaminated sites |
| **Transport** | Freight transport demand, Passenger transport demand, Use of cleaner and alternative fuels |
| **Waste** | Generation and recycling of packaging waste, Municipal waste generation |
| **Water** | Bathing water quality, Chlorophyll in transitional, coastal and marine waters, Nutrients in freshwater, Nutrients in transitional, coastal and marine waters, Oxygen consuming substances in rivers, Urban wastewater treatment, Use of freshwater resources |

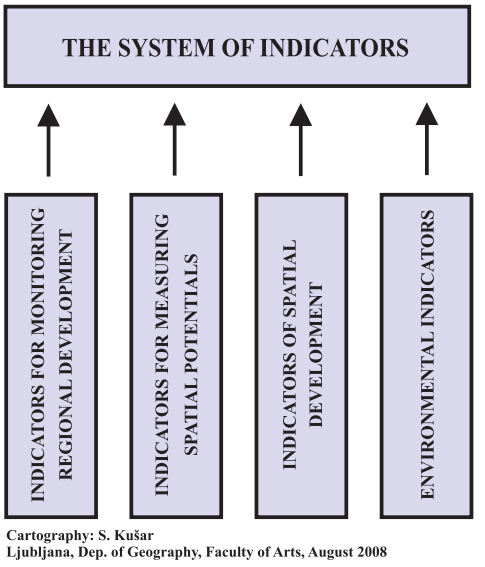
*Source: Černe et al, 2006.*

## 5.5. The system of indicators for regional development, structure and potential - lessons to learn

Regional development is a complex adaptive system composed of a multitude of systems that interact in various ways. While each has a certain measure of autonomy, each also depends on the functions of other systems, and plays a part in supporting other systems and the functioning of the total system.

When we speak of regional development, we clearly have to include spatial, economic, technological, social, political, environmental aspects. The corresponding systems are linked in various and often crucial ways in one complex total system.

*Figure 4: The system of indicators for regional development, structure and potential*




A deeper look at regional development reveals many relationships and components that are important, even though they are not immediately obvious.

The crucial part is identifying the essential relationships in regional development. This requires a process of aggregation and condensation of available information, and the directed search for missing information needed for a comprehensive description of regional development. This process is guided by the particular task, and the knowledge and experience of the analysts. It requires choice and selection at every stage. A circumspect and self-critical approach by analysts is essential. It should be coupled with independent analysis by others with different points of view, representing in particular the interests of those who may be affected by policy decisions.

The process of condensing large amounts of information to a recognizable pattern of a few indicators is not unique to regional development process. It is actually accomplished continuously by each of us. It is only in this way that we can comprehend events around us and respond appropriately. Indicators facilitate orientation in a complex world.

The more complex the regional structure is the more indicators we have to watch. If we want to assess how we are doing as individuals or as society, we have to look at indicators that provide relevant information about current and possible future developments. Indicators summarize complex information of value to the observer.

They condense enormous complexity to a manageable amount of meaningful information, to a small subset of observations informing our decisions and directing our actions. If we have learned to watch the relevant indicators, we can understand and cope with our dynamic environment. If we follow the wrong signals, we get confused or misled, responding inappropriately, against our intrinsic interests and intentions, going in a direction in which we don't want to go.

Indicators represent valuable information. In the course of growing up, in our formal education, and in learning to cope with our specific personal and professional environment we have learned the meaning and significance of the indicators we use in our daily lives. The indicators we watch mean something to us; they are of value to us because they tell us something that is in some way important to us. They help us to construct a picture of the state of our environment on which we can base intelligent decisions to protect and promote what we care about. Indicators, therefore, are also an expression of values.

Being fully informed means watching relevant indicators for all important aspects of regional development. Essential indicators are not always obvious. Learning to handle a complex process of regional development means learning to recognize a specific set of indicators, and to assess what their current state means. Often this learning of indicators is intuitive, informal, subconscious. Intuitive learning is not sufficient for handling many of the complex processes of regional development. In fact, regional development requires specific instruments providing indicator information. Essential indicators are often not obvious or intuitive. Sometimes they are eventually revealed by trial and error.

Indicators are determined by two distinct requirements: (1) they have to provide information providing a picture about the current state of regional development; and (2) they have to provide sufficient information about the contribution to the performance of regional development. We need indicators not only to inform us of the state of regional development, but also relevant indicators to successfully intervene and correct regional development in accordance with given objectives, and to determine the relative success of this intervention.

For regional development we need comprehensive sets of indicators providing essential information about (1) the state of the regional structure and processes effecting it and (2) about its position with respect to regional development goals. The latter point means that values and goals figure prominently in the definition of indicators of regional development, and in the attention focused on each of the indicators.

Despite the uncertainty of the direction of regional development, it is necessary to identify the essential components and to define indicators that can provide essential and reliable information.

Indicators provide comprehensive information about regional development. A number of requirements follow for finding indicators of regional development:

- indicators of regional development are needed to guide policies and decisions at all levels of society: village, town, city, county, state, region, nation, continent and world;
- these indicators must represent all important concerns: an ad hoc collection of indicators that just seem relevant is not adequate. A more systematic approach must look at the interaction of systems and their environment;
- the number of indicators should be as small as possible, but not smaller than necessary. That is, the indicator set must be comprehensive and compact, covering all relevant aspects;

- the process of finding an indicator set must be participatory to ensure that the set encompasses the visions and values of the community or region for which it is developed;
- indicators must be clearly defined, reproducible, unambiguous, understandable and practical. They must reflect the interests and views of different stakeholders.
- from a look at these indicators, it must be possible to deduce current developments, and to compare them with alternative development paths;
- a framework, a process and criteria for finding an adequate set of indicators of regional development are needed.

# 6. Application of the system of indicators - the case study of Slovenia

Based on the system of indicators, we tried to examine and evaluate some of the indicators in the case of the spatial and regional structure of Slovenia. We determined the central place relationship as an example of settlement structure, transport networks as an example of spatial potential and settlement and transport network relationship as a spatial indicator.

## 6.1. Settlement structure - Central place relationship

The distribution of settlements is the result of a long and complex interplay of forces. Any study that proposes to explain the origins of such patterns must take into account these major factors:

- the economic and social conditions which permit and/or encourage concentrations of economic activities in a settlement;
- the spatial or geographical conditions which influence the spacing and size of settlements;
- the fact that such development takes place gradually over time;
- recognition that there is an element of uncertainty or indeterminacy in all behaviour.

The spatial analysis of distribution of settlements comprises three aspects. Central place theory asks how large an area is necessary to support urban settlements, what is an efficient spacing of settlements, and whether there is a hierarchy of settlements. Central place activities can be considered as those that serve a local market. The underlying assumption is that man makes some effort at organizing his activities over space in an efficient manner. Central place theory seeks to ascertain what is the most efficient division of space. In contrast, industrial location theory treats spatial distribution of activities that serve regional or national markets and which depend on a complex of resources, transport connections, labour supplies etc. These are nevertheless of even greater importance than central place activities as support for urban populations. A realistic model of urbanization cannot ignore one or the other. One example of their mutual dependence is the emergence of an irregular central place network upon a mining industrial complex or an agricultural base. These spatial processes of central place location, industrial location, rural land use, and migration give rise to the observed distribution of settlement - a scattering of cities, a few larger ones, many smaller ones, and a transportation network linking the cities. Together they specify the spatial dimension of urbanization.

Our understanding of the growth and evolution of urban settlements systems largely rests upon the edifice of central place theory and its elaboration and empirical testing through spatial statistics. The urban system is based on urban nodes, that is, on spatial

concentrations of people and activities within the region or nation, but it also includes the relationships of the nodes to their surrounding areas and particularly the linkages among nodes.

In the ESPON project (2003) the urban system is defined, within the context of Functional Urban Areas (FUAs) at the level of EU27 + 2 (EU27 + Norway and Switzerland): there are 1,595 FUAs in EU27+2.

Most European counties have definitions of FUAs or similar concepts, such as travel-to-work areas, commuting catchment areas, commuting zones, and functional urban regions. Germany, Luxemburg, Belgium, the Czech Republic, Bulgaria and, to some extent, Spain and Portugal, lack an official definition:

- FUA population over 50,000 inhabitants and urban core (agglomeration) with more than 15,000 inhabitants (i.e. excluding those artificially large urban areas with minor urban core);
- or FUA population more than 0.5% of national population and urban core (agglomeration) with more than 15,000 inhabitants (i.e. in less populated countries smaller FUAs were taken into account);
- smaller FUAs were also included if they had at least local importance in transport, knowledge or decision-making functions or regional importance in administrative, tourist or industrial functions.

Typology of FUAs has been elaborated according to their functional importance in the European context:

- population: over 50,000 inhabitants;
- transport: airport with frequency of more than 50,000 passengers, or port with more than 20,000 TEU container traffic in 2001;
- tourism: number of beds in hotels or similar establishment in 2001;
- industry: gross value added in industry in 2000;
- knowledge: main location of universities and the number of students;
- decision-making: number of headquarters of top European firms;
- administration: based on the national administrative systems, cities that represent the administrative seat on different levels; national, provincial and regional centres, capitals, etc.

According to this we distinguish:

- metropolitan European Growth Areas (MEGAs): global city, European engine, Strong MEGA, Potential MEGA, Weak MEGA;
- transnational/national FUAs;
- regional/local FUAs.

The strength of the MEGAs are then analyzed on the basis of their:

- size (population and GDP);
- competitiveness (GDP per capita, headquarters of top European companies);

- connectivity (air transport, accessibility);
- knowledge basis (education level, R&D personnel share of total employment).

The urban agglomeration is according to the United Nation (1998) defined as the built-up area containing the city proper; suburbs and continuously settled commuter areas. This may be smaller or larger than the metropolitan area. Another similar UN definition views urban agglomeration as comprising a city or town proper and suburban fringe or densely settled territory lying outside, but adjacent to, its boundaries. A single large urban agglomeration may comprise several cities or towns, as well as their suburban fringe. The metropolitan area is a set of formal local government areas, which are normally taken to comprise the urban area as a whole and its primary commuter areas. The city proper is the single political jurisdiction, which contains the historical city centre. This kind of definition presents a problem of defining the urban agglomeration's boundaries: on the basis of different administrative boundaries, maps of the census divisions, maps representing the built-up areas, other technical maps used for the city. The criteria may include the following:

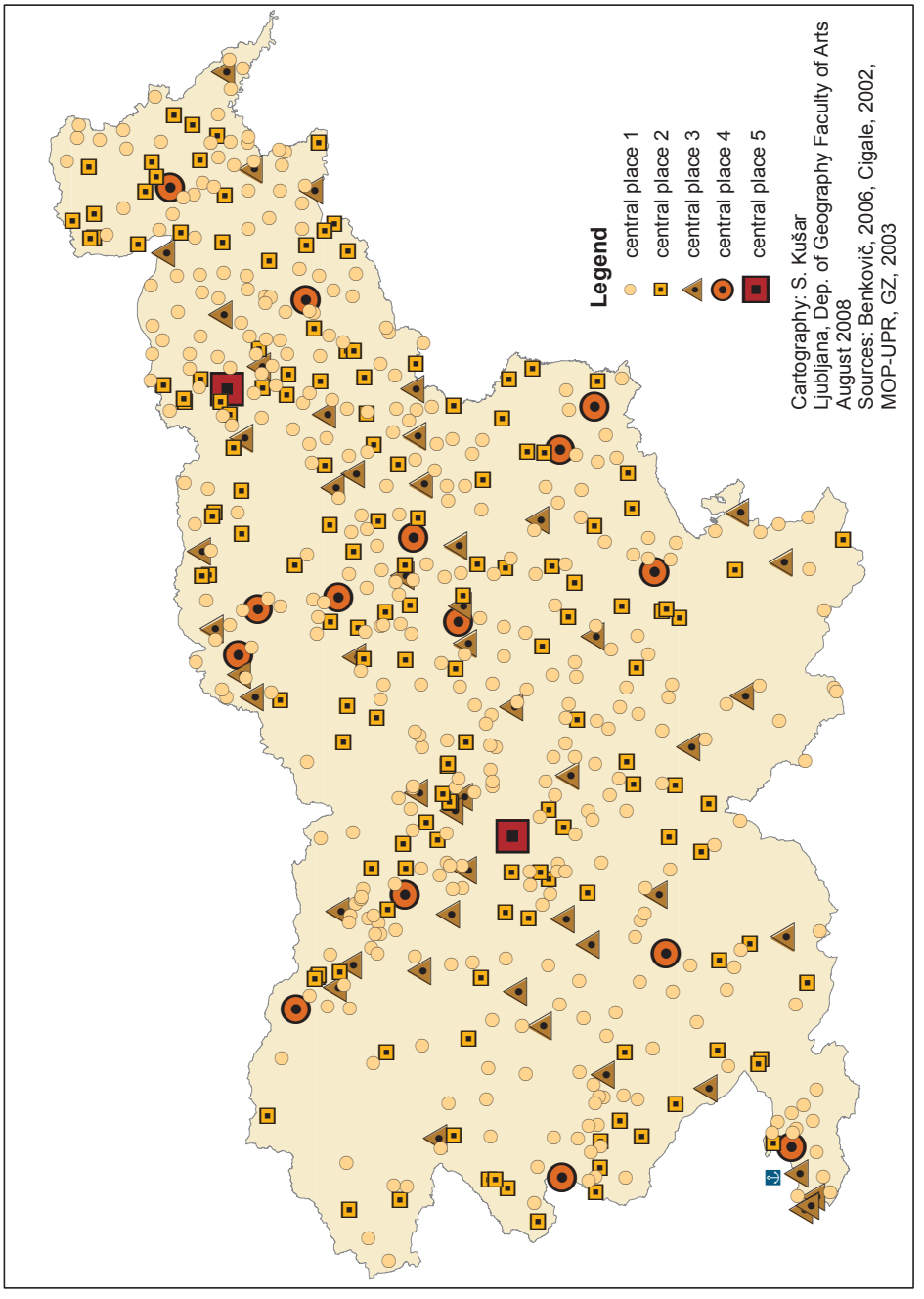
- minimum density to be considered as a built-up area;
- minimum size of the urban land and the distance between urban lands to be considered as part of the same continuous settlement. A rule recommended by UN and used by a number of member states is that the areas of urban land that extend 20 or more hectares, and that are less than 200 meters apart, are linked to form a continuous urban area;
- minimum functional relations of urban land to the city. Some free-standing settlements may lie outside the urban area together with the tracts of surrounding rural land. However, they may functionally depend on the urban areas in terms of employment and services. Also, they may be well connected by a good road and transportation system to the main urban area because of its functional relation.

At this stage of the research we suggest that, due to the difficulties in describing and defining some of the spatial indicators, the planner experts use their official national definition or their own judgment in order to define some of the problematic indicators and their data and, consequently, determine the best criteria for them.

More than forty years of scientific and practical efforts to determine the significance of settlements within the network of approximately 6,000 settlements in Slovenia is also closely connected with the basic principles of central place theory. Settlements are within this concept determined according to the hierarchical structure of central places. This structure is usually determined on the selection of central place activities and according to this on the basis of determination of functional significance of central places within the network of all settlements through their gravitational influences. Special attention was given to the determination of significance of central activities for urban structure and formation of urban functions within the hierarchical structure of central places.

The basic recognition, based on the research analysis of central places, can provide us with a good methodological and analytical foundation for further determination of indicators for the functional significance of settlements. A comparison of the number of central places in 1987, 1994 in 2005, despite some conceptual and methodological difficulties, indicates that in the system of 6,000 settlements only 10 % of the settlements have some

*Figure 5: Central places in Slovenia in 2005*




*Source: Černe et al., 2007.*

role from the aspect of distribution of central place activities. It can be understood that about 500 – 600 central places in Slovenia perform different central functions at different spatial levels of organization of service and other supply activities. These settlements are an important framework for economic, social and spatial structure and structure of functional areas. According to this we took this structure as an analytical origin for the categorization of settlements.

*Table 22: Central places in Slovenia in 1987, 1994 and 2005*

| Degree of central place | 1987 | 1994 | 2005 |
|---|---|---|---|
| **Local centres** | 392 | 384 | 358 |
| **Rural or industrial centres** | 151 | 168 | 132 |
| **Communal or municipal centres** | 42 | 47 | 47 |
| **District centres** | 7 | 9 | 9 |
| **Cantonal centres** | 6 | 6 | 6 |
| **Provincial centres** | 1 | 1 | 1 |
| **Republican centre** | 1 | 1 | 1 |
| | 600 | 612 | 554 |

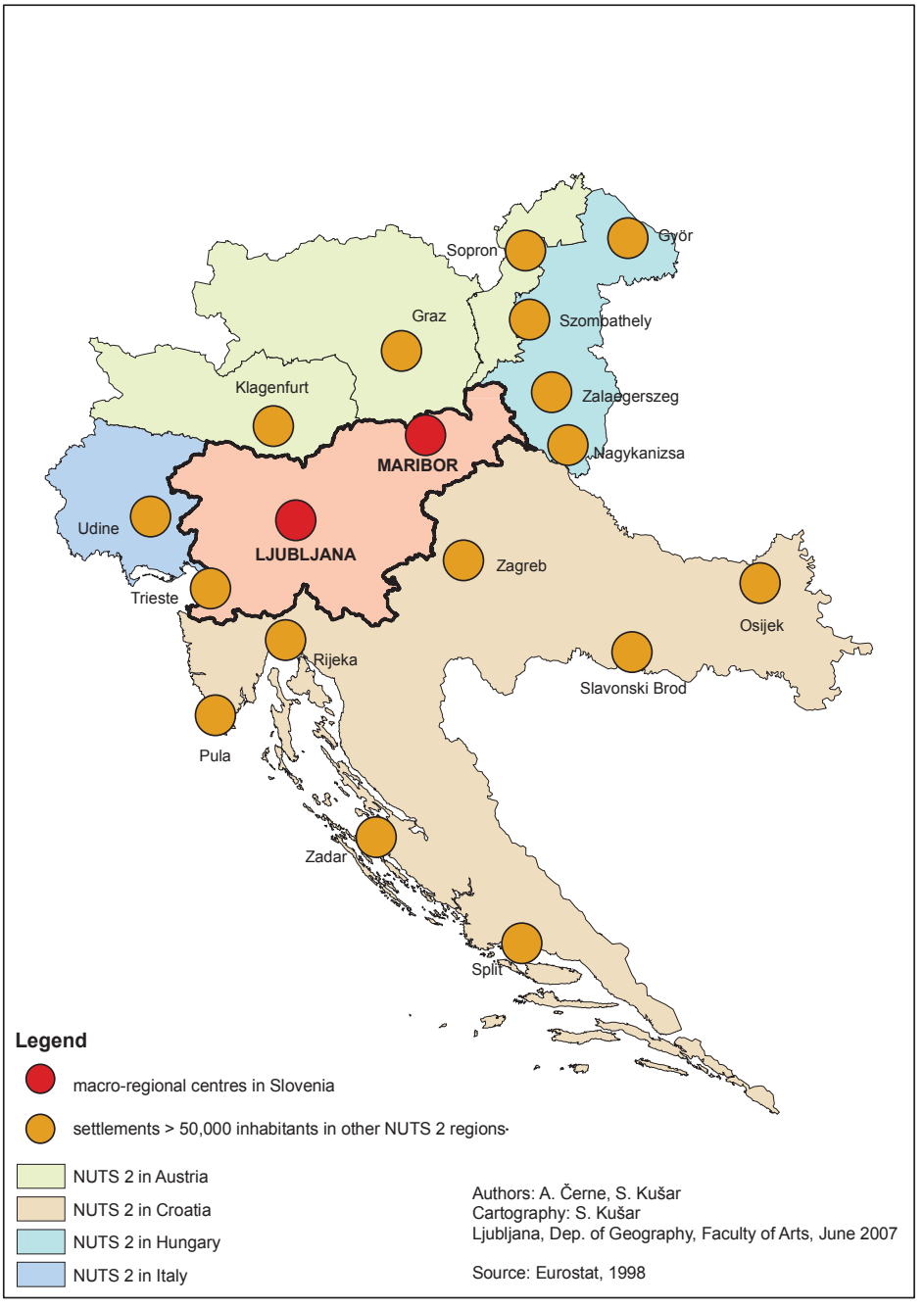
*Source: Benkovič-Krašovec, 2006.*

We must be aware of course that the function of settlements according to the location of central activities is just one of the basic indicators of complex significance of settlements. Functional significance of settlement is of course dependent also of other factors (size, geographical position, economic power, transport location) which may, in great deal, determine the significance of settlement in the system of settlements. For the categorization of settlements within the system of settlements we must take into consideration not just the degree of provision of settlement with different central place activities, but also those elements and processes with which we can determine the factual relations between settlements within the system of settlements and their relations towards spatial development. That is why we determined the categorization of settlements according to four indicators:

- degree of centrality of settlements;
- number of inhabitants;
- number of working active population (place of working);
- percentage of working active population (place of residence).

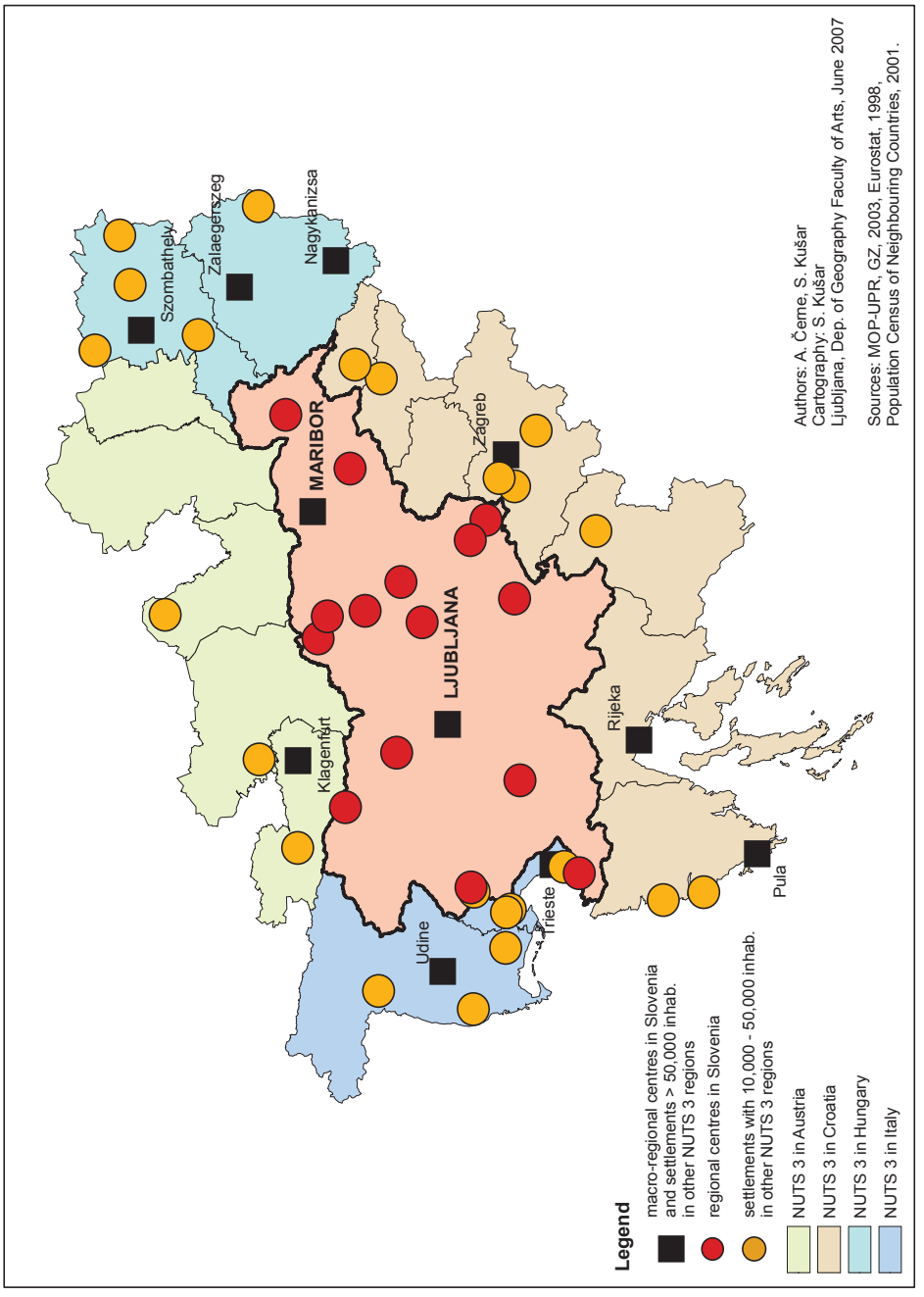
Selection of settlements is based on their size, functional determination (degree of centrality or provision of settlements with central activities) and economic significance of settlement (number of jobs in the settlement). The analysis comprises 590 central places in Slovenia and an additional 206 settlements which are not central places, but have more than 100 jobs, so altogether 796 settlements are analyzed. Each of these settlements was classified into six classes because of the transformation of indicators into the alternative

*Figure 6: Categorization of settlements: macro-regional centres in Slovenia*



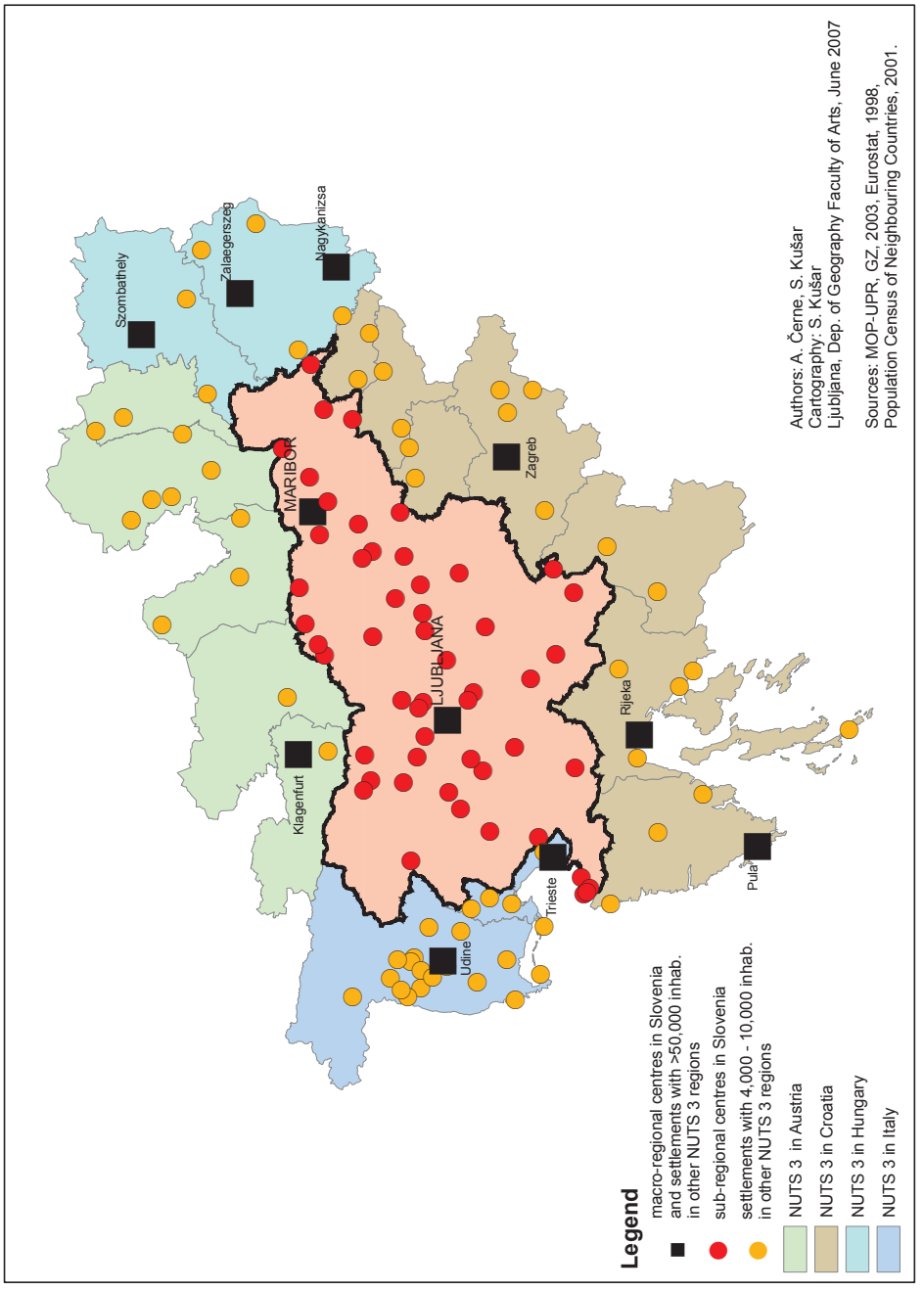

*Source: Černe et al., 2007.*

*Figure 7: Categorization of settlements: regional centres in Slovenia*



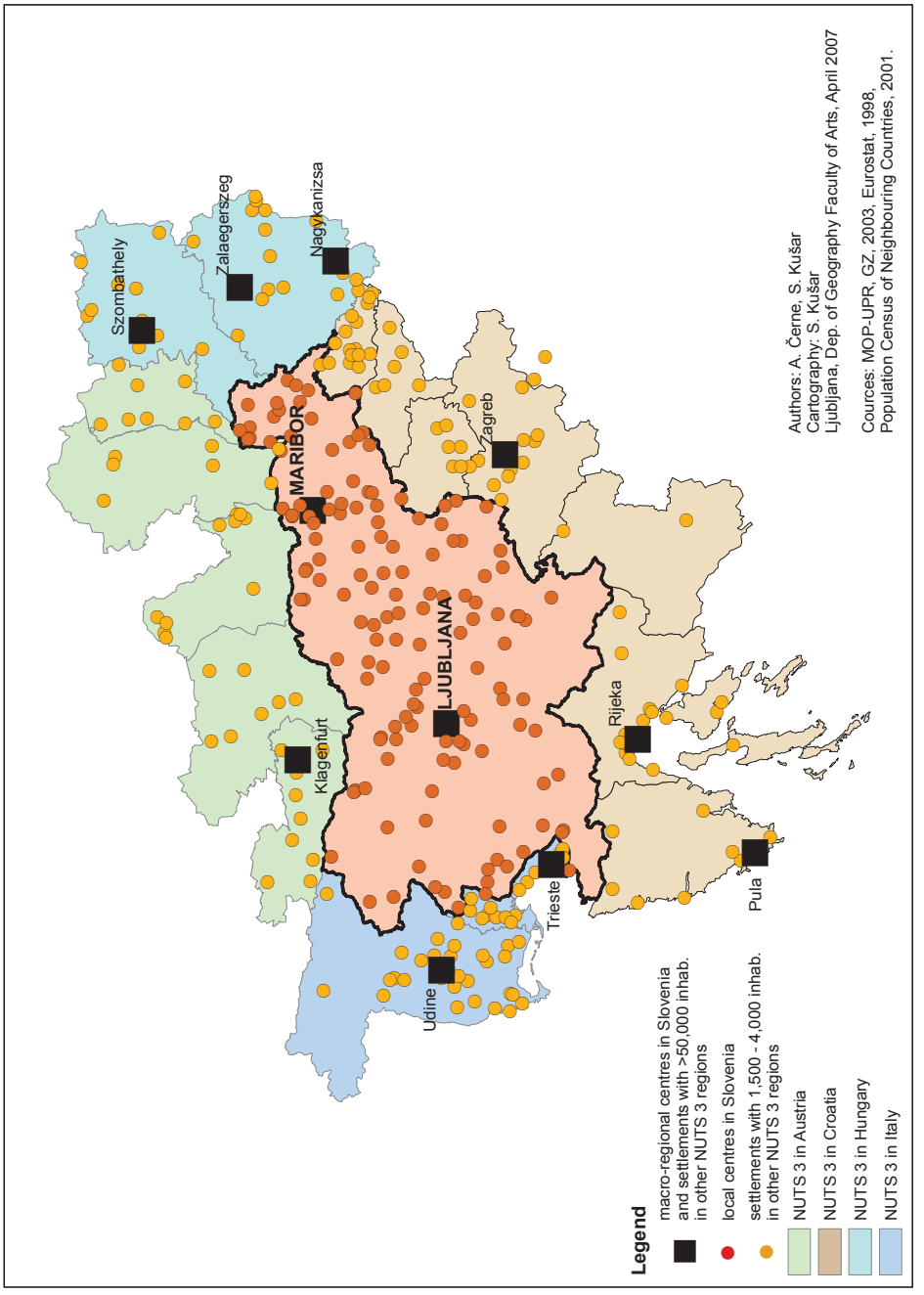

*Source: Černe et al., 2007.*

*Figure 8: Categorization of settlements: sub-regional centres in Slovenia*



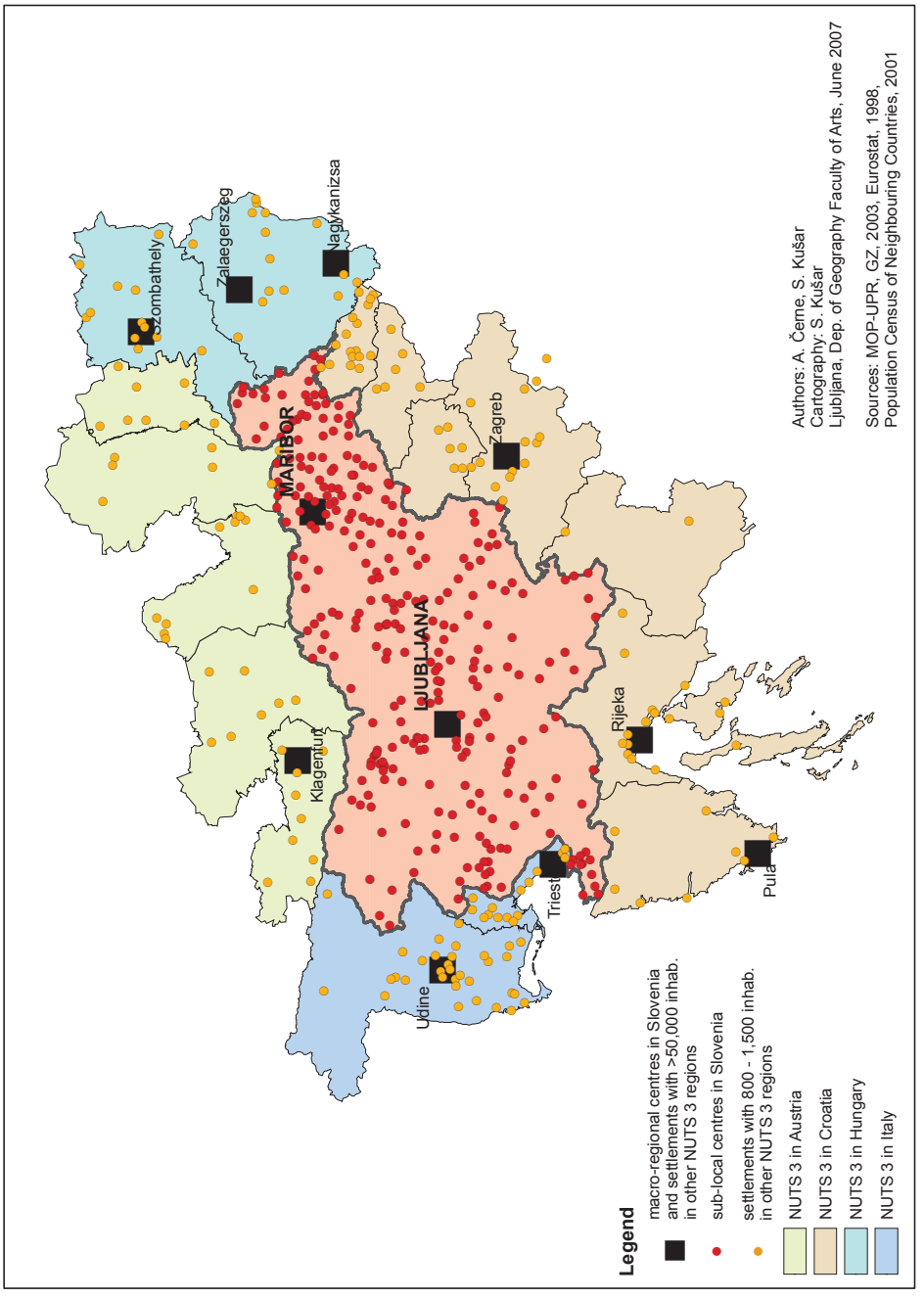

*Source: Černe et al., 2007.*

*Figure 9: Categorization of settlements: local centres in Slovenia*



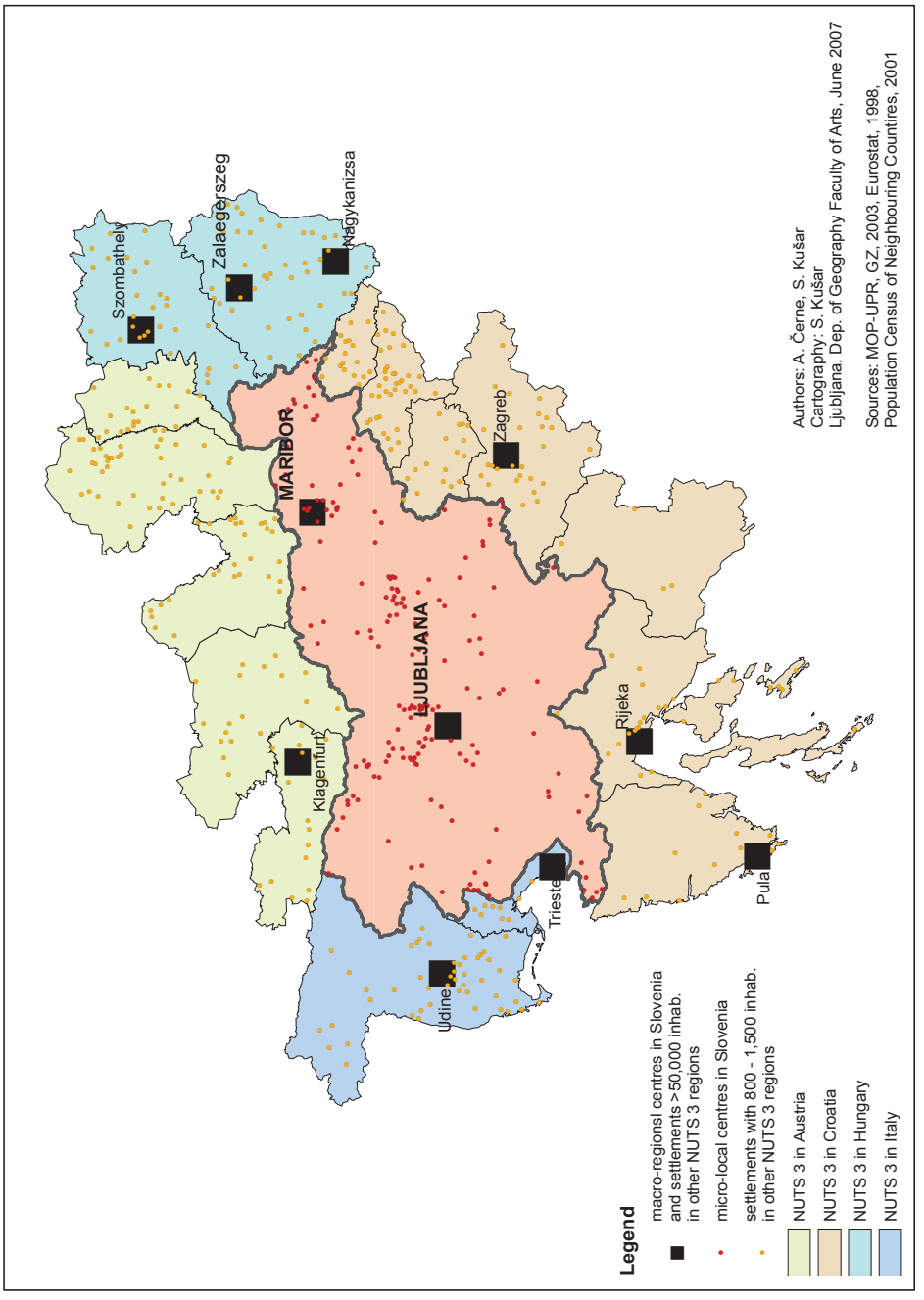

*Source: Černe et al., 2007.*

*Figure 10: Categorization of settlements: sub-local centres in Slovenia*




*Source: Černe et al., 2007.*

*Figure 11: Categorization of settlements: micro-local centres in Slovenia*




*Source: Černe et al., 2007.*

form. With this procedure we wanted to simplify relatively variegated units and at the some time make the analysis a little bit easier. Typification of settlements is based on the combination of all four indicators and is the basis for the six-grade categorization of settlements into 2 macro-regional, 15 regional, 52 sub-regional, 142 local, 299 sub-local and 286 micro-local centres.

The spatial pattern of this hierarchical settlement structure was the basis for the comparison of this structure with the hierarchical categorization of transport nodes.

## 6.2. Transportation networks - Transportation connections and junctions (existed, planned)

The Slovenian national transport system consists of the road, railroad and bicycle path system, airports and ports.

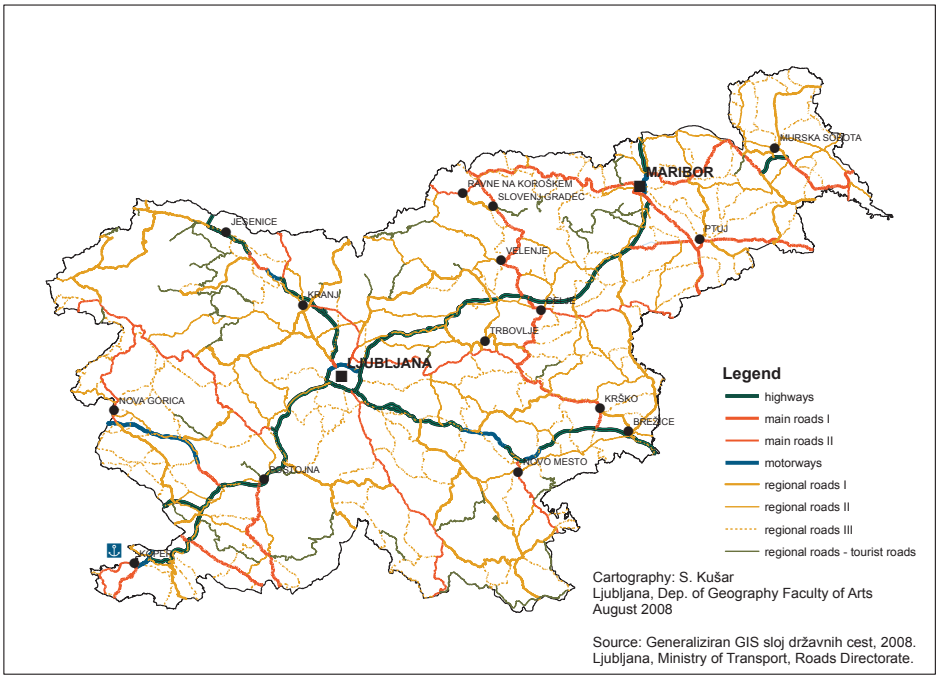
Categorization of the **road network** into seven categories of state roads and municipal local roads and public roads is specified in the law (Zakon o javnih cestah/Public Roads Act, UL RS, 29/97) based on an administrative categorization, which in turn is based on functional categorization. A state road according to the law is a public road designed to connect regions and major settlements, Slovenia with neighbouring countries, and to connect regions within the state and their important settlements. Roads are categorized according to function into roads designed for the long-distance transport, roads connecting regions, and roads connecting municipalities. Long-distance roads are motorways and state high-speed roads. These roads connect the country with neighbouring countries. The state high-speed roads also connect the most important regional centres.

The motorway system, together with the state high-speed road network, represents so called transport cross of Slovenia which intersects in Ljubljana. Ljubljana is thus very well connected with neighbouring states. At the same time, Ljubljana is well connected with important regional centres (Koper, Nova Gorica, Bled, Jesenice, Radovljica, Kranj, Celje, Maribor, Krško, Brežice and Novo mesto). Within this network, some important regional centres have somewhat poorer road connections: Ravne na Koroškem, Dravograd, Slovenj Gradec, Ptuj, Murska Sobota and Zagorje, Trbovlje, Hrastnik.

The network of interregional roads consists of the category I and II main roads. This network is designed to connect important regional and other centres. Roads within regions are designed to connect the centres of local communities and are Category I, II and III regional roads. Category I regional roads are designed to connect important local community centres, municipal centres. Category II regional roads are designed to connect these centres with other local centres. Category III regional roads are designed to connect local centres with areas of tourism and broader areas.

There are 6,333 km of state roads in Slovenia, which consist of 2,683 transport intersections or nodes on 2,816 sections. The hierarchy of roads according their length has a pyramidal, which is logical and corresponds their functions.

*Figure 12: The road system in Slovenia*




*Source: Direkcija za ceste RS, 2008.*

*Table 23: The Slovenian national road network (2005)*

| Categorization | Number of nodes | Number of sections | Length of sections (km) | Basic speed (km/h) | Capacity per an hour (number of vehicles) |
|---|---|---|---|---|---|
| **Long-distance roads** | 742 | 980 | 565 | 100-130 | 2,750-3,500 |
| **Interregional roads** | 384 | 528 | 998 | 60-90 | 1,250 |
| **Roads within regions** | 1,497 | 1,308 | 4,770 | 50-80 | 900 |
| **Total** | 2,623 | 2,816 | 6,333 | | |

*Source: Černe et al., 2007.*

**Public bus transport** is divided into international routes, intercity routes, and city routes. International passenger transport is categorized into international public transport, special transport and periodic transport of passengers. The first consists of public passenger transport between Slovenia and other countries. Buses can stop in Slovenia only at bus

stations and major stops. The second consists of transport for specific populations of passengers (workers and pupils) and excludes other passengers. It runs on the basis of contracts between the carrier and the body commissioning the transport. Passenger transport between towns and cities is subdivided into direct routes, express routes and passenger transport.

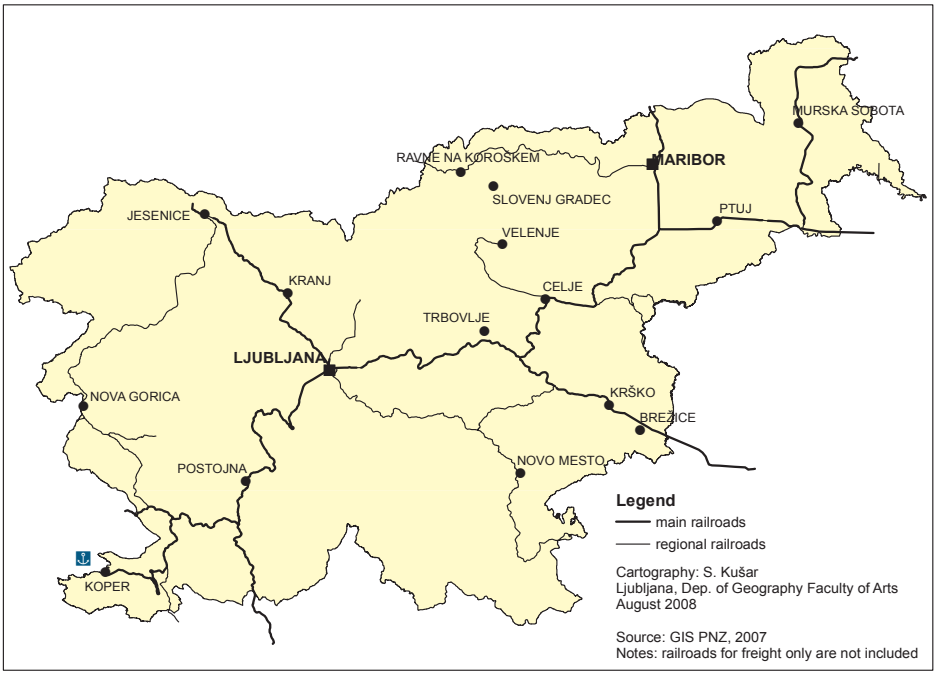
International passenger transport connects neighbouring states and important regional centres (Ljubljana, Jesenice, Kranj, Nova Gorica, Koper, Slovenj Gradec, Maribor, Murska Sobota, Ptuj, Celje, Hrastnik, Novo mesto, Krško). Transport between towns and cities connects all places, express transport just important and other regional centres, passenger transport all local and regional centres and the national capital.

In Slovenia we have 1,700 bus routes between places and 4,245 bus stations, with which all important centres are relatively well provided.

Administrative categorization of **railroads** is also determined by the law (Zakon o varnosti železniškega prometa/Safety of Railway Transport Act, UL RS, 85/00) according to the size of transport, economic importance and transport connection significance. The railway lines are categorized into main and regional lines.

The main lines represent the most important international connections, connecting national centres and important regional centres. Regional lines are all other lines which connect other regional and local centres with the main lines. According to the type of trains, we have international trains (EC-EuroCity, EN-EuroNight, IC-InterCity),

*Figure 13: Railways in Slovenia*




*Source: Slovenske železnice/Slovenian Railways, 2005.*

high speed domestic trains (ICS-InterCity Slovenia) and regional trains. International trains stop only in national centres and some of the important regional centres and railway interconnections. A high-speed domestic train connects Ljubljana with Maribor. Regional trains stop at all other stops. International and high-speed domestic trains run only on the main railway lines, regional trains run on all railway lines.

*Table 24: Railway network in Slovenia (2005)*

| Category | Number of sections | Length of sections (km) | Number of stations |
|---|---|---|---|
| **Main line** | 153 | 663 | 110 |
| **Regional line** | 168 | 519 | 164 |
| **Total** | 321 | 1,182 | 274 |

*Source: Černe et al., 2007.*

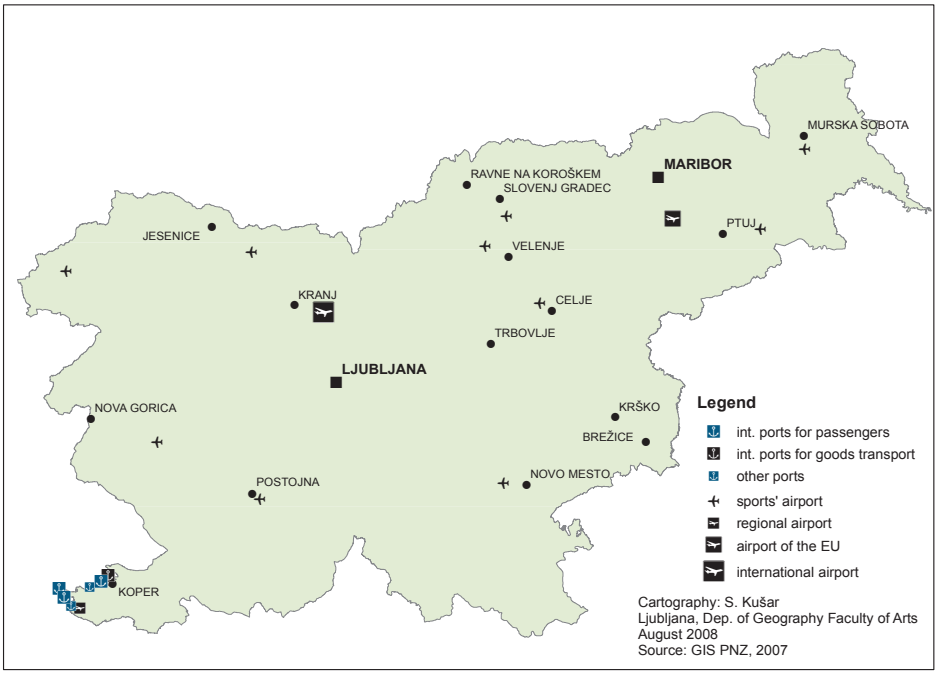
In Slovenia we have 1,182 km of railway lines, mostly along the main line, with 274 railway stations.

Air transport and **airports** are also regulated by the law (Pravilnik o razvrščanju letališč/ Rules on Airport Classification, UL RS, 18/01) Airports are categorized according to the reference code (the length of runway, span of wing), category (according to the provision of airport), purposes (according to the spatial determination of passengers) and according to the traffic flows. Slovenian airports are categorized into: international airport, airport of the European Union, regional airports and sport airports. The main airport in Slovenia is Jože Pučnik Airport Ljubljana in Brnik, which is classified as an international airport, although it is not suitable for large international aircraft. The airport in Maribor can be classified as an airport of the European Union, but it has no important role so far. Portorož Airport in Sečovlje is a regional airport designed for smaller aircraft for the purposes of tourism. Apart from that we have several sport airports in Lesce, Bovec, Ajdovščina, Postojna, Slovenj Gradec, Velenje, Celje, Murska Sobota, Ptuj, and Novo mesto (Prečna).

Sea transport is also regulated according to the law (Pomorski zakonik (PZ-UPBZ)/ Maritime Code of the Republic of Slovenia, UL RS, 120/06). According to this code we have ports for public transport, for special purpose and military **ports**. International public transport is performed by ports in Koper, Izola and Piran. Ports are categorized into international ports for public transport and ports for special purposes (sports, tourism, local and other ports). Apart from this we have in Koper the only port for goods transport. International ports for passengers are in Koper, Izola and Piran. Other smaller ports are located along the Slovenian coast.

The **transport node** is defined as the sum of the transport nodes of different transport modes intersections and not just one. Only the synergy of different transport modes and more nodes or transport terminals indicate the degree of connection between transport and the centrality of the settlement. The hierarchy of transport nodes is determined

*Figure 14: Airports and sea ports in Slovenia*




*Source: Černe et al., 2007.*

according to the weighted values of hierarchical transportation lines: roads and railways, number of bus lines, airports and ports.

It is evident that based on transport provision, Ljubljana and Maribor are exception amog other centres. Koper is also an exception, but is only on the eighth place. It is evident that Koper as an important port has weak road, railway and bus connections. On the other hand many centres have a good position in terms of transport provision: Celje, Novo Mesto, Murska Sobota and Kranj. Because of a weak bus connection, Nova Gorica ranks relatively low. The worst transport provision is found in Dravograd and Hrastnik.

According to this hierarchy of transport nodes, a six-grade categorization of 211 transport nodes was determined, with 4 macro-regional, 12 regional, 26 sub-regional, 54 local, 87 sub-local, 28 micro-local transport nodes. They are presented in the next section.

*Table 25: Hierarchy of important transport nodes as a function of transport connections*

| | roads | | | | railway | | airports | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Regional centres** | **Re-mote** | **Inter- regio-nal** | **In regions** | **Bus lines** | **Main** | **Regio-nal** | **Inter-natio-nal** | **EU** | **Regio-nal** | **Har-bour** | **Port** | **Points** | **Rank** |
| **Ljubljana** | 4 | 3 | 4 | 74 | 3 | 2 | 1 | | | | | 127.5 | 1 |
| **Maribor** | 2 | 3 | 3 | 66 | 2 | 1 | | 1 | | | | 100.0 | 2 |
| **Koper** | 1 | 2 | - | 16 | 1 | - | | | 1 | 1 | 1 | 42.0 | 8 |
| **Nova Gorica** | 2 | 1 | 2 | 15 | - | 2 | | | | | | 31.5 | 9 |
| **Kranj** | 2 | 1 | 4 | 38 | 2 | - | | | | | | 64.5 | 6 |
| **Dravograd** | - | 2 | 3 | 4 | - | 2 | | | | | | 14.0 | 11 |
| **Celje** | 2 | 3 | 1 | 50 | 2 | 1 | | | | | | 79.0 | 3 |
| **Murska Sobota** | - | 2 | 3 | 48 | 2 | - | | | | | | 66.0 | 5 |
| **Novo Mesto** | 2 | 1 | 4 | 58 | - | 3 | | | | | | 77.5 | 4 |
| **Krško** | 2 | 1 | 2 | 24 | 2 | - | | | | | | 48.5 | 7 |
| **Hrastnik** | - | 2 | 3 | 4 | 2 | - | | | | | | 22.0 | 10 |

*Source: Černe et al., 2007.*

## 6.3. Settlement and transport network

The results of a six-grade categorization of settlement structure and a six-grade categorization of transportation nodes can be seen from the following table and maps.

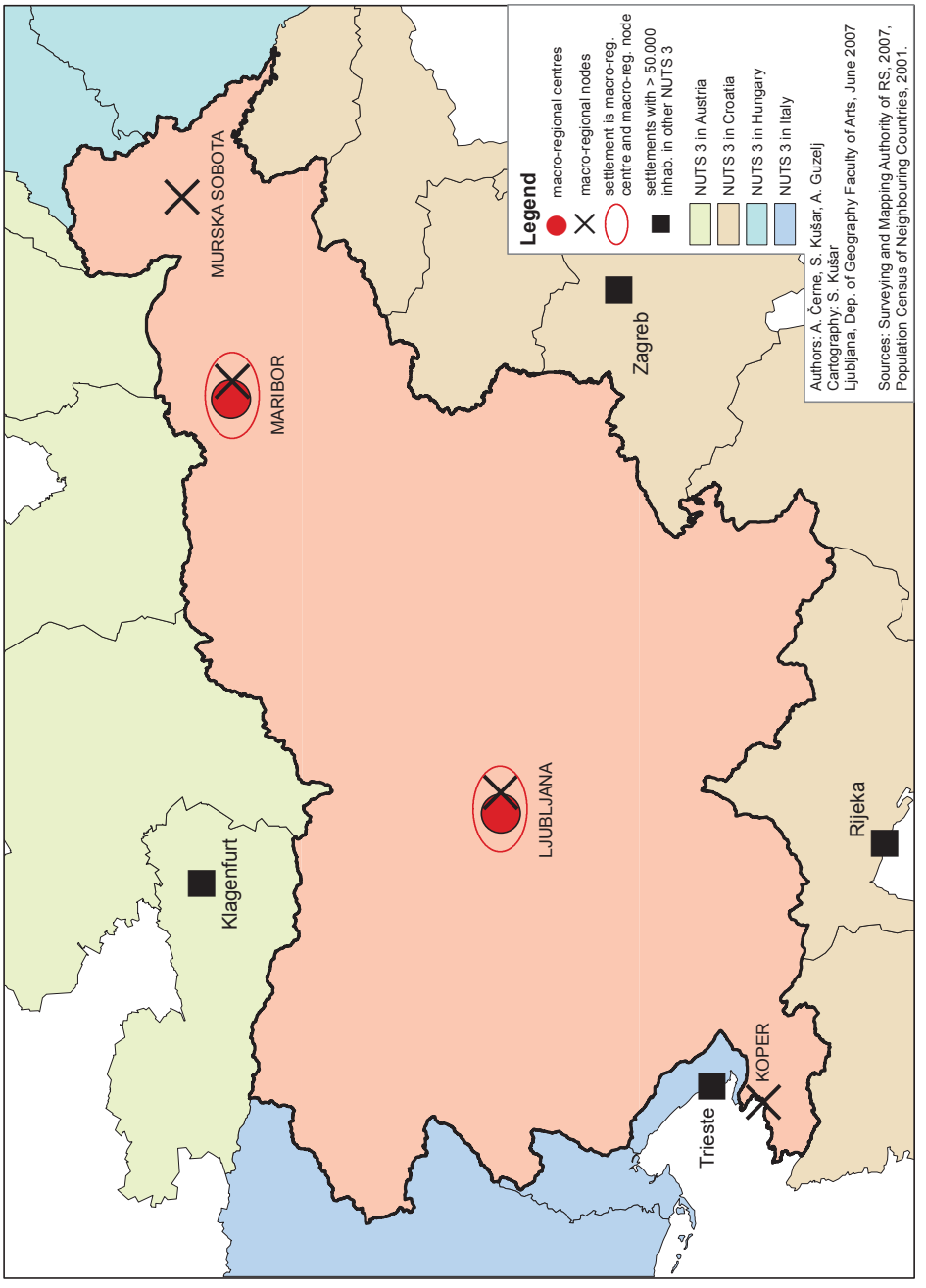
*Table 26: Categorization of settlements and transport nodes in Slovenia*

| Categories | Number of settlements | Number of transport nodes |
|---|---|---|
| **Macro-regional** | 2 | 4 |
| **Regional** | 15 | 12 |
| **Sub-regional** | 52 | 26 |
| **Local** | 142 | 54 |
| **Sub-local** | 299 | 87 |
| **Micro-local** | 286 | 28 |
| **Total** | 796 | 211 |

*Source: Černe et al., 2007.*

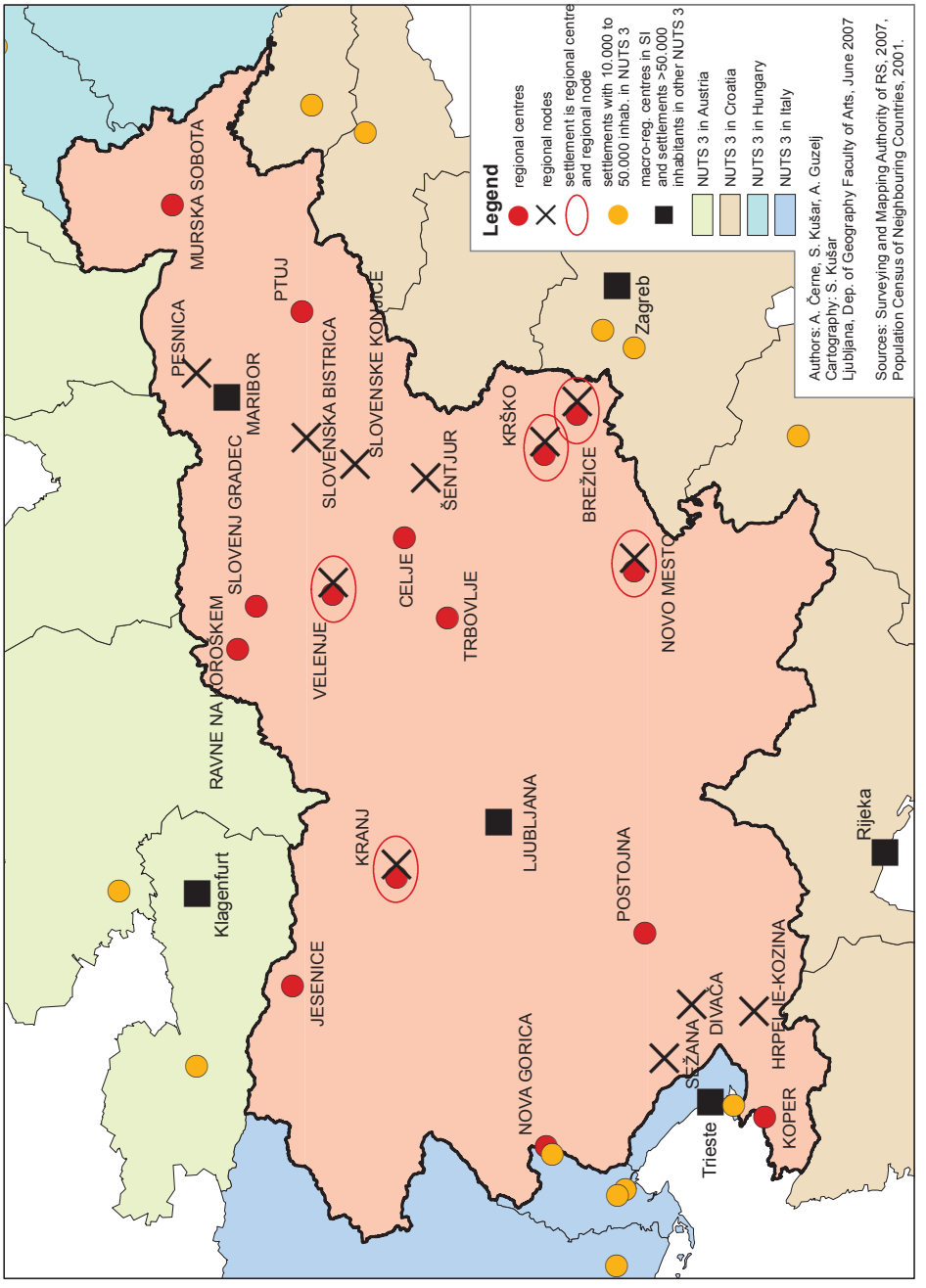
From the spatial distribution of the six-grade hierarchical settlement structure and six-grade hierarchical structure of transport nodes it is evident that only at the higher hierarchical level is this structure identical. At the regional level, regional centres are not also the location of regional transport nodes. Just five regional centres among 15 coincide with the regional transport nodes (marked with red circles on the map). In the case of the sub-regional centres and sub-regional transport nodes the ratio is even lower: the spatial distribution of 52 centres and 26 transport nodes is identical just in eleven cases. This spatial characteristic of both structures is emphasized for the centres and transport nodes at the local, sub-local and micro-local levels. According to this we can conclude that the spatial structure of the urban system and transport infrastructure, as far as the spatial distribution of its hierarchical elements is concerned, is relatively weak, mostly at lower levels.

*Figure 15: Categorization of settlements and transportation nodes in Slovenia: macro-regional centres and macro-regional transportation nodes*



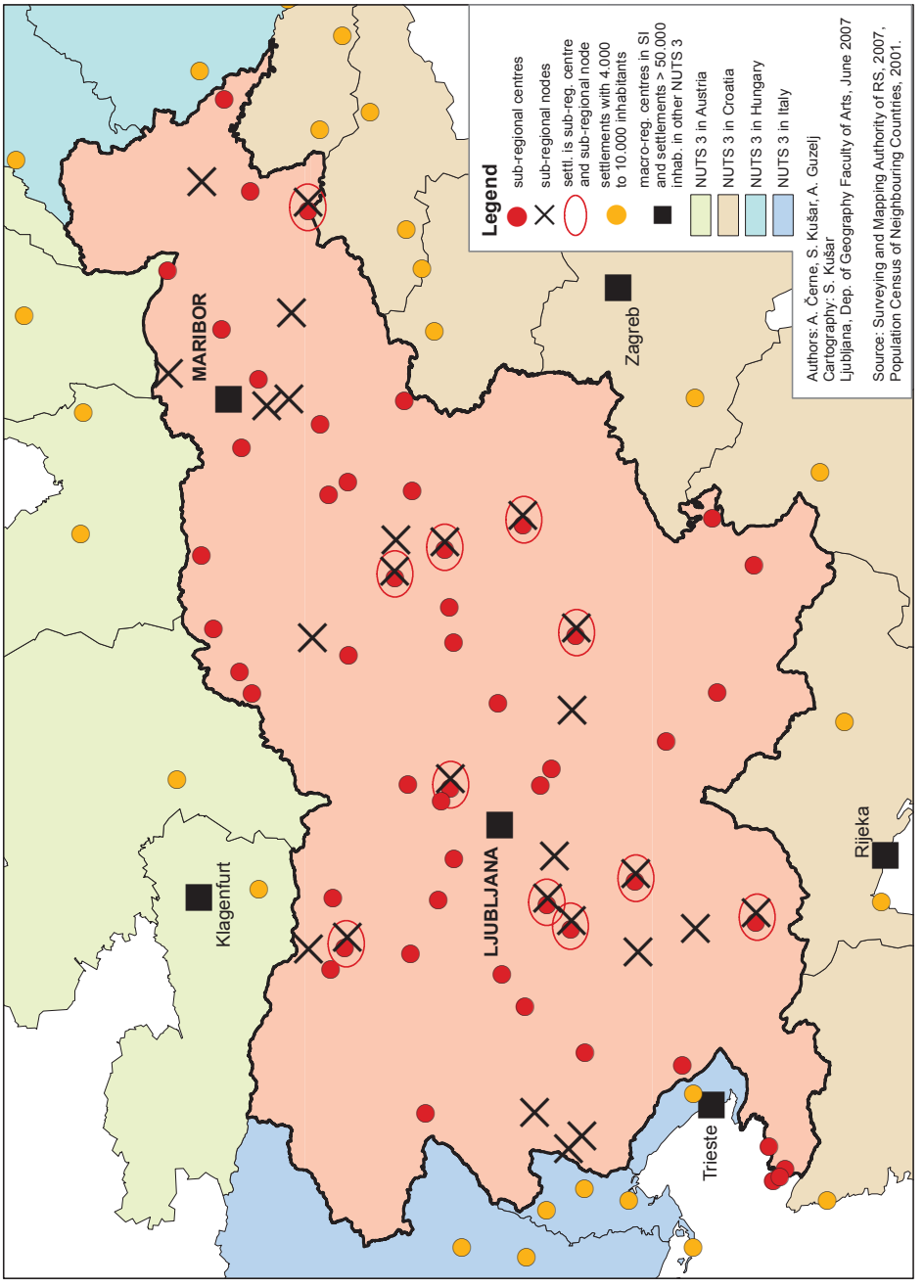

*Source: Černe et al., 2007.*

*Figure 16: Categorization of settlements and transportation nodes in Slovenia: regional centres and regional transportation nodes*



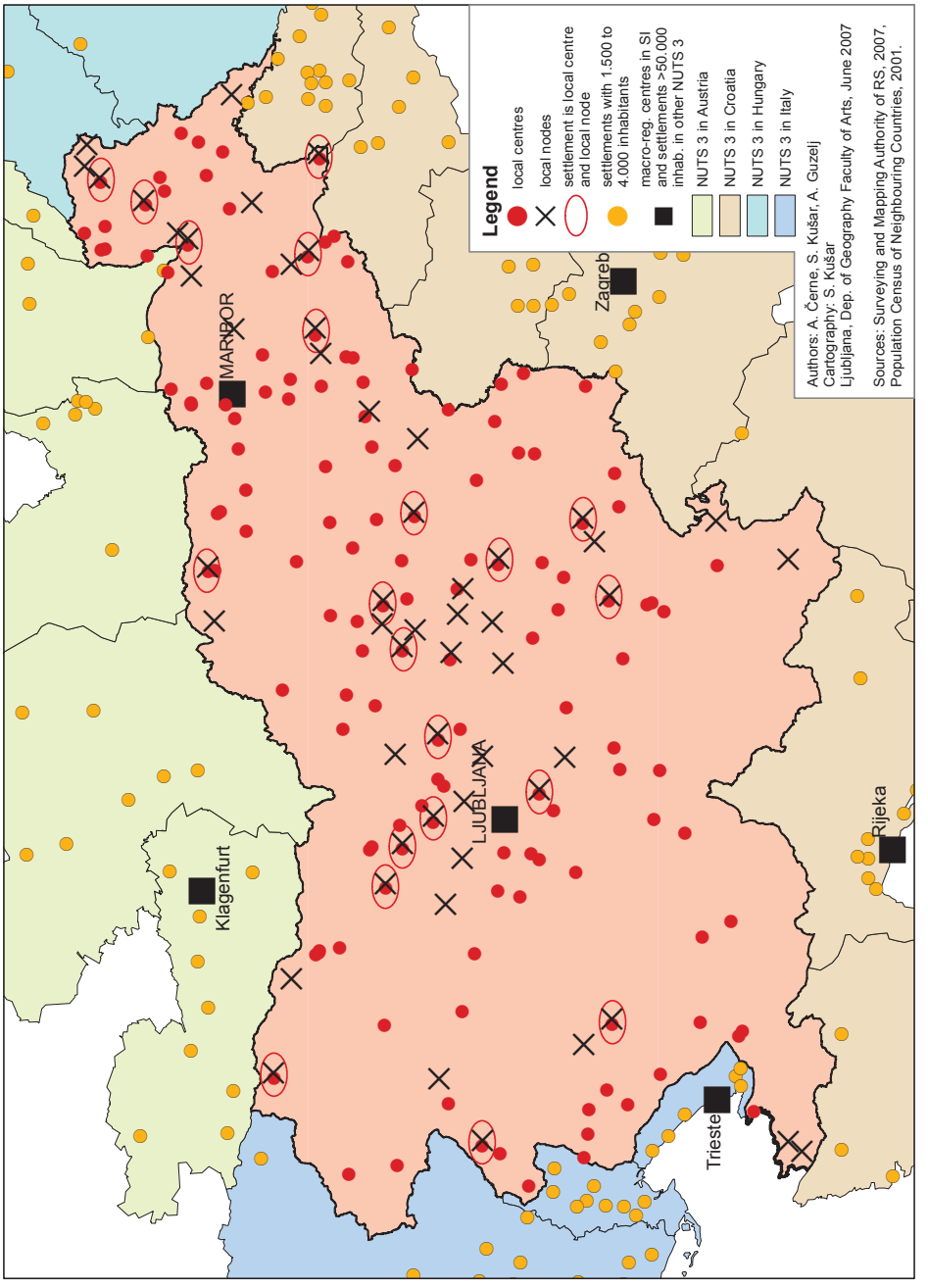

*Source: Černe et al., 2007.*

*Figure 17: Categorization of settlements and transportation nodes in Slovenia: sub-regional centres and sub-regional transportation nodes*



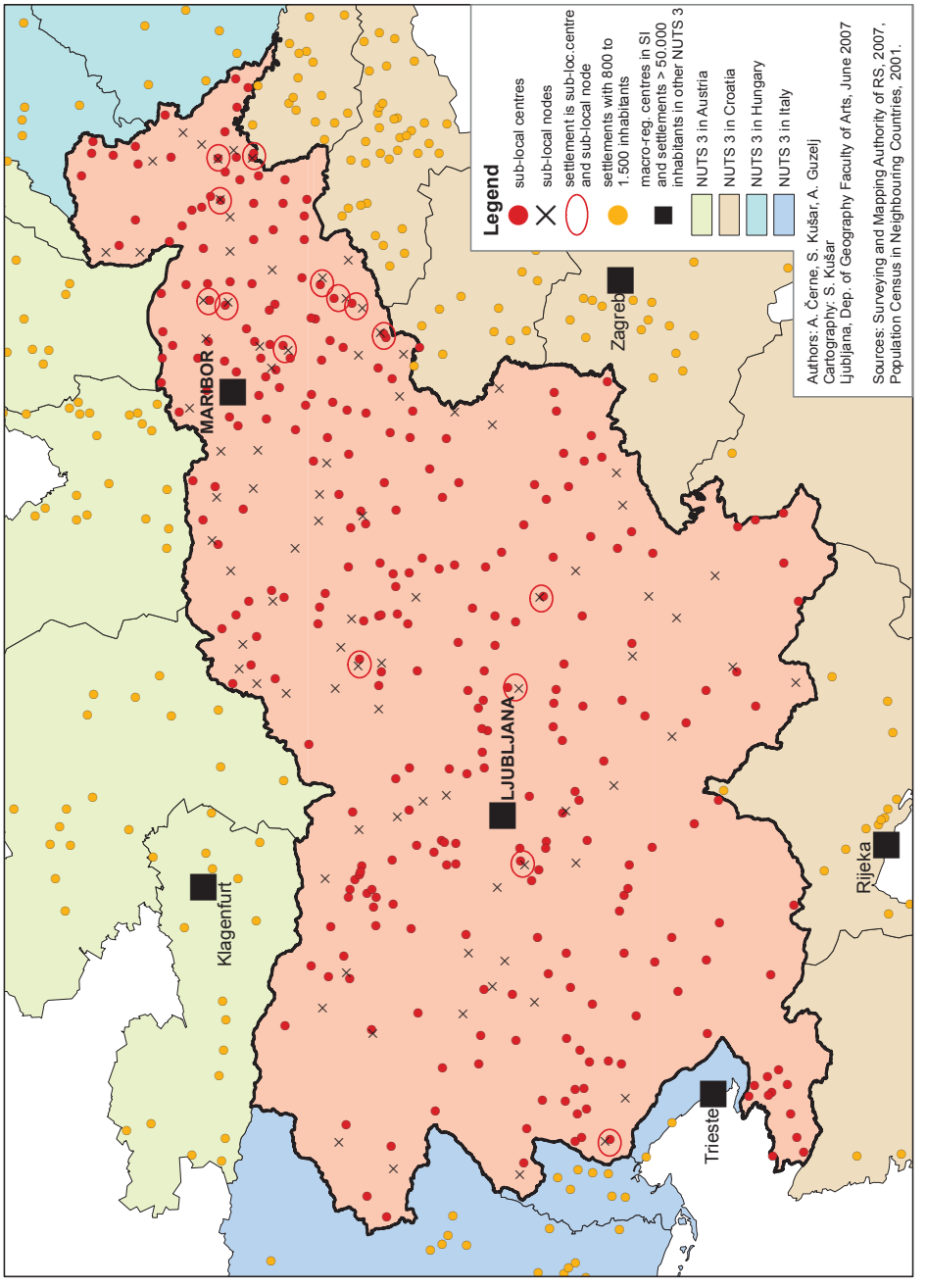

*Source: Černe et al., 2007.*

*Figure 18: Categorization of settlements and transportation nodes in Slovenia: local centres and local transportation nodes*



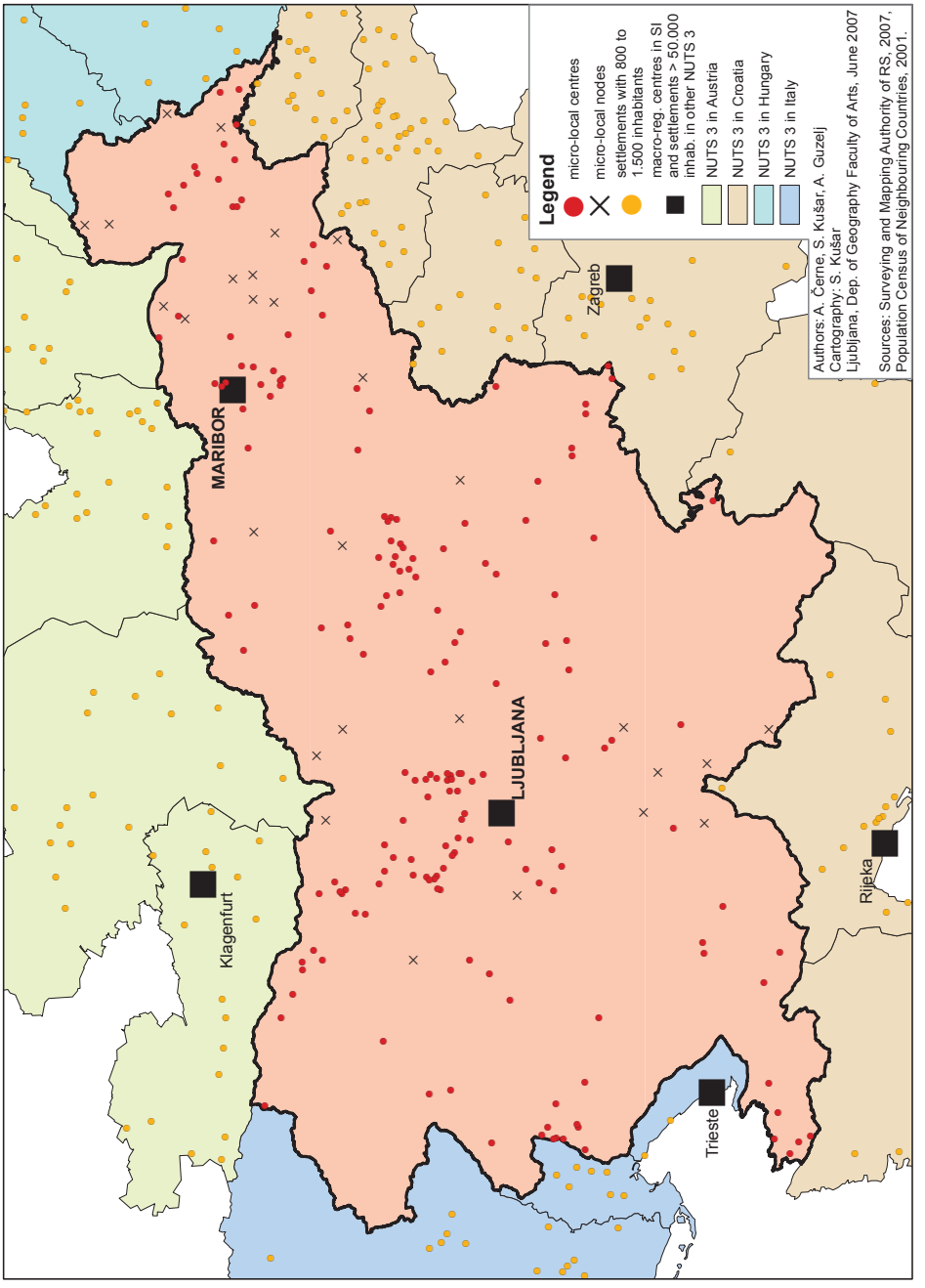

*Source: Černe et al., 2007.*

*Figure 19: Categorization of settlements and transportation nodes in Slovenia: sub-local centres and sub-local transportation nodes*




*Source: Černe et al., 2007.*

*Figure 20: Categorization of settlements and transportation nodes in Slovenia: micro-local centres and micro-local transportation nodes*




*Source: Černe et al., 2007.*

# 7. Conclusions

Indicators are signs or signals of complex regional development. They are bits of information pointing to characteristics of regional development or highlighting what is happening with it. Indicators are used to simplify information about complex phenomena of regional development, in order to make communication easier and quantification possible. An indicator can be a variable or a function of variables. An indicator can be a qualitative variable, a ranking variable, or a quantitative variable. Though quantitative indicators are the most widespread, qualitative indicators are also important when the issue to be measured is nonquantifiable, when the information is based on opinion surveys, when quantitative information is not available (data are missing) or when high costs prohibit the use of quantitative indicators or when a simple signal, such as a red light on an instrument panel or dashboard, is sufficient to initiate action.

In practice indicators can be distinguished as system indicators or performance indicators. System indicators summarize sets of individual measurements for different issues characteristic of the regional development, and communicate the most relevant information to decision-makers. System indicators are based on technical and scientific insights whenever possible. However, due to the uncertainties within the nature of regional development this is not always possible. Both science and the policy process determine the standards and benchmarks to which indicators are related. Indicators are a product of a compromise between scientific accuracy and the needs of decision making, and urgency of action. Performance indicators are tools for comparison, incorporating a descriptive indicator and a reference value or a policy target. They provide decision makers with information on how they are doing with regard to policy goals. Another type of indicator, presenting highly condensed information obtained by aggregating data, is called an index. Decision-makers often ask for a very limited number of indices that are easy to understand and use. To develop an index, the different indicators contained in the index need to be weighted according to their relative importance. However, when considering regional development, this becomes a major problem since many components can contribute in a different way to different aspects of regional development. Indices are also limited in their analytical power since they simplify the link between the index and the real world.

Developing an indicator involves a process that moves from the general to the specific and then back.

There is no golden standard for the preparation of quality development reports, but there are some general rules of thumb that can provide help in the preparation and presentation of indicators and reports. Clarity of communication is a basic requirement for the presentation of indicators. They should be presented graphically, accompanied by brief explanations, using non-technical language. Simple symbols can be used, for example, to link the particular indicator to the overall life quality framework or to identify the direction of change. Text, symbols and charts are the basic building blocks, accompanied by appropriate references and if necessary background numbers, usually in an appendix.

Although indicators and their accompanying analysis may appear on separate 'indicator sheets', it is particularly important to point out that most of them represent processes and phenomena that are strongly linked. Beyond pointing this out in general, it is even more important that every indicator is linked to other indicators, policies and the web of regional, spatial, environmental and socio-economic matters that have a direct or indirect influence on it.

One of the basic functions of indicators is to provide a comparison. This comparison can be based either on targets, benchmarks, or performance in the past. In fact, it can be based on all of this. The indicator chart should be based on time series data, thus providing an opportunity for comparing development and dynamics over time. If an accepted target value is known it should be added to the chart so that readers can make an assessment of progress, the direction of current change and distance from the target. In addition, comparable trends from either other jurisdictions or other scales or locations can be added to provide a third layer of comparability. This may be either figures from the national or global scale or examples from other cities that are well known by the public.

Paraphrasing Albert Einstein, indicator sets should be as simple as possible, but not simpler. The simplest solution would be to agree on a single indicator. Would that work?

For ages people have been judged by a single indicator: their wealth. But that single magic figure of x million dollars, or y hundred hectares of land, or z head of cattle implicitly expressed much more than property: it expressed the ability to buy sufficient food, to build a comfortable house, to feed even a large family, to live in luxury, to educate children, to pay for health care, and to support oneself in old age. And it implied that under these circumstances one could be reasonably happy. In other words, under prevailing conditions, wealth could be used as an aggregate indicator for completely different dimensions of life contributing to general happiness. But we usually need more than one indicator to capture all important aspects of a situation.

A single indicator like GDP cannot capture all vital aspects of regional development. The fascination with a single indicator has carried over to economics and national development, with a rather bizarre twist: economists have not focused on per capita wealth (of financial assets, land or resources), but - in addition to watching inflation and unemployment rates - devote most of their attention to an indicator that essentially measures the rate at which natural resource wealth is being depleted - the faster, the better. This is the GDP indicator - gross domestic product - the total money value of the annual flow of goods and services produced in an economy. This includes all goods and services, irrespective of their contribution to national development: social goods (such as education, food and housing) as well as social bads (such as cost of crime, pollution, car accidents, disability and poor health). Since, with current technology, each of these goods and services is associated with significant consumption of non-renewable resources and generation of environmental pollution, GDP is now mainly a measure of how fast resources are squandered and converted into money flows, irrespective of their effect on society. Hardly an indicator of national wealth and well-being! Aggregate indexes are an improvement, but aggregation can conceal serious deficits In response to these obvious shortcomings of the popular GDP, various groups have sought to define aggregate indicators that present a more accurate picture of material well-being. In the

Index of Sustainable Economic Welfare (ISEW— later evolved into the Genuine Progress Indicator, GPI7), GDP is corrected by subtracting (rather than adding) social bads (like the cost of pollution clean up or car accidents), and adding (rather than ignoring) the value of unpaid services (e.g., in households and communities). Other aggregate indicators include concerns beyond money flows. The UNDP's Human Development Indicator (HDI), for example, includes literacy and life expectancy.

These are important improvements but they cannot remove a fundamental deficiency of aggregate indicators: aggregation may hide serious deficits in some sectors, which actually threaten the overall health of the system. And aggregate indicators become even more questionable when they require adding apples and oranges (as in the HDI), i.e., items that cannot be measured in the same units (such as money flows).

The prime objective of the system of indicators is therefore to set up an operational system of indicators of regional development. It should facilitate the measurement, documentation and description of the state and progress in region as well as its position in relation to other regions, from the point of view of the spatial, socio-economic and environmental aspects of sustainable development. It is an instrument by which we measure and evaluate regional and spatial structure, its changes and development, and progress toward regional development goals and objectives.

The multi-dimensional framework of measuring, monitoring and evaluating regional development cause many theoretical, methodological and practical problems in the elaboration of the system of indicators, with which it would be possible to evaluate regional structure, potential and development.

If we want to achieve that the system of indicators is transparent, open and evolutionary, the system should fulfil the following requirements:

- it should be constructed around a systematic framework (methodological sheets);
- indicators should be included in the methodological sheets according to a transparent and duly documented selection procedure;
- it should be possible to identify sub-groups;
- it should present indicators in an attractive way;
- it should indicate whether a region is on the right path for achieving development goals and objectives within the principles of sustainable development.

We need a system of indicators that (1) provide all essential information about the state of regional development and its rate of change, and (2) indicate the contribution of different regional development factors to the overall objective (e.g., of regional development). There is a general awareness of these shortcomings in the research community, and it has led to the formulation of the Bellagio Principles as "guidelines for practical assessment of progress toward sustainable development".

Realizing the inadequacy of current approaches to indicators of regional development, we must analyze the entire complex of problems and tasks more carefully. This requires a reasonably detailed approach of the regional development and its components. There are three separate tasks:

- to identify the regional developments that are relevant in the context of sustainable development;
- to develop an approach for identifying indicators of regional development;
- to think about how to use this information for assessing regional development at different levels of societal organization.

The system of indicators hasn't been tested yet, since there is a lack of appropriate data on the regional and subregional level. The analysis of regional development, structure and potential of regions, its subregions and comparative analysis between regions and average of the European Union is therefore a future scientific task.

# Povzetek

## Sistem kazalcev regionalnega razvoja, strukture in regionalnih potencialov

Knjiga vsebuje teoretične, metodološke in praktične vidike uporabe regionalnih, prostorskih in okoljskih podatkov, kazalcev in meril za ocenjevanje regionalnega razvoja, regionalne strukture in regionalnih potencialov v regionalnem in prostorskem planiranju.

Sistem regionalnih, prostorskih in okoljskih kazalcev je namenjen opredeljevanju značilnosti regionalne strukture. Skupaj z drugimi kazalci, ki jih lahko uporablja posamezna država ali regija, zagotavlja kakovostno primerjalno podlago za analizo in vrednotenje regionalnega in prostorskega razvoja ter omogoča spremljanje razvoja pri doseganju ciljev regionalnega in prostorskega planiranja.

Kazalci so del empirične oziroma pozitivistične tradicije, ki se kaže v različnih načinih opredeljevanja indikatorjev. Vsako opredeljevanje indikatorjev predstavlja določen vidik značaja in namena indikatorjev. Kazalci so lahko namreč rezultat posameznih abstraktnih konceptov razvojnih problemov in pomenijo neke vrste vodila za obravnavo posameznih vprašanj in njihovo strukturiranje v kontekstu regionalnih in prostorskih sprememb. Z vidika normativnih pristopov so kazalci uporabljeni kot merila za vrednotenje razvojnih teženj in doseganje razvojnih ciljev. Kazalci kot instrument razvojne politike so lahko predmet politične interpretacije in s tem tudi podlaga za izbiro določenih indikatorjev, podatkov in metod. Strokovne razprave o kazalcih pa so več ali manj namenjene razreševanju dvojnega značaja samega predmeta proučevanja: teoretičnega oziroma empiričnega ter znanstvenega in vrednostnega.

Znanost še ni sposobna oblikovati objektivne metode na podlagi katere bi lahko opredeljevala primerne kazalce za kompleksen regionalni in prostorski sistem. Razlog je preprost: število možnih kazalcev za prikazovanje regionalnega in prostorskega sistema je neskončno. Zato moramo biti pri opredeljevanju kazalcev selektivni. Poleg tega nimamo na voljo vsega znanja in vedenja o regionalnih in prostorskih vprašanjih in nimamo nekega zagotovila, da bomo med številnimi možnimi kazalci izbrali prav tiste, ki so temeljnega pomena za opis in vrednotenje stanja in razvojnih teženj v regionalnem in prostorskem razvoju. Zato je potrebno zasnovati nedvoumen postopek oziroma metodo, na podlagi katere bomo lahko opredelili tako imenovane ključne kazalce regionalnega in prostorskega razvoja. Največ, kar lahko naredimo, je, da sprejmemo strokovno odločitev, ki bo zasnovana na sistematičnem znanstvenem pristopu, ki zahteva transparentnost samega postopka, celovit in sistematičen pristop, stvarne rezultate in njihovo primerljivost. Nabor oziroma izbor kazalcev mora temeljiti torej na trdni teoretični podlagi, ki je podkrepljena z empiričnimi dokazi. Samo na ta način lahko oblikujemo sistematičen postopek za opredeljevanje kazalcev, njihovo analizo in vrednotenje ter stvarne rezultate.

Sistem kazalcev, ki je prikazan v tej knjigi, je rezultat Interregovega IIIB Cadses projekta CONSPACE (Common Strategy Network for Spatial Development and Implementation). Pri projektu so sodelovale formalne planerske organizacije iz Italije (regiji Veneto

in Furlanija Julijska krajina, provinca Gorica), Avstrije (deželi Koroška in Štajerska), Slovenije, Madžarske (Južna Prekodonavska razvojna regija) in Hrvaške (Istrska in Primorsko-goranska županija), ki so poskušale preseči omejitve prostorskega planiranja na nacionalnih ravneh z boljšim razumevanjem planerskih pristopov v posameznih partnericah, harmonizacijo orodij prostorskega planiranja ter izdelavo skupne razvojne strategije, s katero bi lahko tekmovale z najbolj razvitimi deli Evropske unije. Sistem kazalcev je bil zasnovan z namenom harmonizacije orodij za vrednotenje regionalne in prostorske strukture CONSPACE regije, kasneje pa se je izkazalo, da bi bili potrebni tudi kazalci, s katerimi bi se merili sedanji in prihodnji (načrtovani, predvideni) prostorski potenciali. Le na podlagi podatkov zbranih s pomočjo vseh teh kazalcev bi bilo namreč mogoče ustrezno oblikovati skupno razvojno strategijo. V skladu z načeli trajnostnega prostorskega razvoja, ki ga zagovarjajo Evropske prostorske razvojne perspektive (ESDP), so bili v sistem kazalcev za spremljanje regionalnega razvoja, prostorskih kazalcev in kazalcev za merjenje prostorskih potencialov vključeni še okoljski kazalci.

Namen izdelave sistema kazalcev regionalnega razvoja, regionalne strukture in regionalnih potencialov je oblikovanje logičnega sistema kazalcev za potrebe analize, spremljanja in vrednotenja regionalnega in prostorskega razvoja. Kazalci naj bi omogočali analizo, opisovanje, merjenje, vrednotenje in spremljanje stanja regionalnega razvoja in napredka v regiji. Na tej podlagi je mogoče vrednotiti položaj regije v razmerju do drugih regij in v razmerju do nacionalnih ozemelj, in sicer z vidika prostorskih, socialnoekonomskih in okoljskih vidikov trajnostnega razvoja. Kazalci so instrument, s katerim merimo in vrednotimo regionalno in prostorsko strukturo, njene spremembe in razvoj, pa tudi doseganje razvojnih ciljev opredeljenih v različnih dokumentih in planih. Kazalci so ključnega pomena za poseganje v razvojni proces. Kazalci lahko prispevajo k zagotavljanju enakosti, učinkovitosti in trajnosti; kazalci so torej orodje za spremljanje in vrednotenje regionalnih in prostorskih sprememb ter preverjanje doseganja trajnostnega razvoja.

Sistem kazalcev za merjenje, spremljanje in vrednotenje regionalnega in prostorskega razvoja se srečuje z več teoretičnimi, metodološkimi in praktičnimi omejitvami, ki vplivajo na oblikovanje sistema kazalcev, s katerimi bi bilo mogoče vrednotiti regionalno strukturo, potenciale in razvoj.

Med najpomembnejšimi vprašanji, ki vplivajo na oblikovanje meril za izbor kazalcev, so:

- **utemeljenost:** ali kazalec meri dejavnik, ki se neposredno nanaša na kakovosten prostorski razvoj, ali je kazalec pravi odraz dejstev, ali je omogočeno znanstveno preverjanje vrednosti kazalca;
- **dostopnost:** ali je mogoče zbrati podatke za kazalec za vsako leto, ali so podatki primerne kakovosti, ali je mogoče vzpostaviti primeren sistem spremljanja;
- **zanesljivost in stabilnost:** ali je način zbiranja podatkov (statistika) zanesljiv in ali temelji na jasni standardizirani metodi (zagotavljanje primerljivosti zbranih podatkov v časovni vrsti);
- **odzivnost:** ali kazalec lahko odraža regionalne spremembe oziroma spremembe v prostorski strukturi ter regionalnih in prostorskih politikah;
- **razumljivost:** ali je kazalec dovolj enostaven, da ga je mogoče enostavno opredeliti in predstaviti;

- **pomen kazalcev:** za primeren opis prostorske strukture je potrebno uporabiti večje število kazalcev, zato je potrebno zagotoviti objektivno merilo, s katerim je možno opredeliti najpomembnejše kazalce;
- **ustreznost za vrednotenje politik:** ali se kazalci nanašajo na doseganje razvojnih odločitev - kazalci so planerska orodja, ki so namenjena sprejemanju odločitev glede regionalne in prostorske politike ter usmerjanju regionalnega in prostorskega razvoja;
- **reprezentativnost:** ali kazalci v zadostnem obsegu prikazujejo najpomembnejše razsežnosti proučevanih elementov;
- **občutljivost:** ali so kazalci občutljivi na regionalne spremembe in spremembe v prostoru in na najpomembnejše razvojne dejavnike, ki jih je potrebno upoštevati pri vrednotenju regionalnega in prostorskega razvoja.

Metodološka izhodišča za selektivno opredeljevanje sistema kazalcev morajo upoštevati naslednje temeljne zahteve:

- oblikovan mora biti na podlagi sistematičnega ogrodja (na primer z uporabo metodoloških listov);
- kazalci naj bodo vključeni v metodološke liste na podlagi dokumentiranega in transparentnega postopka;
- dopustiti mora oblikovanje podskupin kazalcev;
- kazalec mora biti predstavljen v obliki, ki odgovarja uporabnikovim potrebam;
- na podlagi analize kazalca mora biti razvidno, ali je regija na pravi poti za dosego zastavljenih razvojnih ciljev v okviru načel trajnostnega razvoja;
- skupno število kazalcev naj bo omejeno, pri čemer naj bi se osredotočalo na ključne vidike regionalnega in prostorskega razvoja;
- kazalci naj bodo oblikovani tako, da lahko raziskovalci razumejo njihov pomen;
- za vse kazalce naj bo dostopna osnovna statistika.

Kazalci regionalnega razvoja, regionalne strukture in regionalnih potencialov so opredeljeni na podlagi selektivnega pristopa, ki je zgrajen iz naslednjih korakov:

- zasnova izdelave sistema kazalcev: opredelitev potrebnih kazalcev in podatkov;
- zbiranje in pregled obstoječih informacijskih sistemov in kazalcev, ki so jih uporabljale sodelujoče planerske organizacije, zbiranje podatkov;
- opredelitev idealnih/optimalnih kazalcev za spremljanje regionalnega razvoja;
- opredelitev kazalcev za merjenje prostorskih potencialov;
- opredelitev prostorskih in okoljskih kazalcev;
- priprava metodoloških listov, v katerih so bile opisane osnovne značilnosti kazalcev ter strokovna utemeljitev izbora vsakega kazalca v sistem kazalcev za regionalni razvoj, strukturo in potenciale;
- končni predlog sistema kazalcev.

Pri sistemu kazalcev smo uporabili holistični pristop, ki se naslanja na integracijo regionalnih, prostorskih in okoljskih kazalcev na podlagi zasnove tako imenovanih metodoloških listov. Vsak kazalec, ki je ključen v sistem kazalcev regionalnega razvoja, regionalne strukture in regionalnih potencialov, je opisan torej v **metodoloških listih**. To je metoda, ki omogoča prikaz meta podatkov za vsak kazalec posebej: osnovne lastnosti kazalca, merila za izbor, njihova klasifikacija v sistemu kazalcev za regionalni in prostorski razvoj, strukturo in potenciale ter znanstvena utemeljitev za njihovo vključitev v sistem kazalcev. Metoda je torej namenjena poenotenju izrazoslovja ter opredeljevanju povezanosti kazalcev s planerskimi cilji. Vsi metodološki listi skupaj predstavljajo sistem kazalcev, ki so temeljnega pomena za kakovostno analizo in vrednotenje regionalnega razvoja, strukture in potencialov.

Med osnovnimi lastnostmi kazalca so predstavljeni njegovo ime, enota, s katerim je prikazan kazalec, izračun kazalca, opredeljena pa je tudi možnost zamenjave kazalca z drugim, sorodnim kazalcem.

Metodološki listi vsebujejo tudi merila, ki so uporabljena za izbor vsakega kazalca v sistem kazalcev za regionalni razvoj, strukturo in potenciale. Ta so povezana z obstojem morebitnih standardov, pogostostjo zbiranja podatkov, primernostjo kazalca za interpretacijo, možnostmi za nadnacionalno uporabo kazalca, povezanostjo s planerskimi cilji (na primer cilji Evropskih prostorskih razvojnih perspektiv - ESDP), dostopnostjo podatkov, prostorsko ravnjo, za katero je mogoče pridobiti podatke, prikazane pa so tudi možnosti za medsebojno primerjavo kazalcev med različnimi prostorskimi ravnmi.

Vsak kazalec je vključen v sistem kazalcev za regionalni razvoj, strukturo in potenciale na podlagi znanstvene utemeljitve, opredeljene pa so tudi reference oziroma projekti, ki podpirajo njihovo uporabo (na primer ali je kazalec vključen v sistem kazalcev za pripravo kohezijskega poročila, se uporablja v ESPON projektu ali drugih nadnacionalnih poročilih). Za vsak kazalec je opredeljena tudi organizacija, ki zbira podatke, pa tudi prostorska raven, za katero naj bi podatke zbirali. Na koncu je prostor tudi za morebitne pripombe.

Ko so kazalci izbrani, je potrebno:

- opredeliti metodo izračuna;
- opredeliti časovno obdobje, za katerega bodo podatki zbrani;
- zbrati in preveriti podatke;
- izračunati vrednosti kazalcev;
- razrešiti težave z manjkajočimi podatki.

Zbiranje podatkov in izračun vrednosti kazalcev je ključnega pomena za nadaljno verodostojnost sistema kazalcev. Če se prvo zbiranje podatkov izvede natančno in na podlagi dokumentiranih korakov, potem je naslednje zbiranje podatkov veliko enostavnejše.

Sistem kazalcev za regionalni razvoj, strukturo in potenciale je zgrajen iz štirih skupin kazalcev:

1. kazalci za spremljanje regionalnega razvoja;
2. kazalci za merjenje prostorskih potencialov;

3. kazalci prostorskega razvoja;
4. okoljski kazalci.

**Kazalci za spremljanje regionalnega razvoja** so oblikovani na podlagi obstoječega sistema za spremljanje in vrednotenje prostorskega/regionalnega razvoja v CONSPACE partnericah. Vsaka planerska organizacija, ki je sodelovala pri projektu, uporablja svoje kazalce, s katerimi preverja izvajanje prostorskih in regionalno razvojnih strategij ter ugotavlja stanje in težnje v prostoru. Obstoječi sistemi kazalcev so bili uporabljeni zato, ker bi to lahko poenostavilo uporabo harmoniziranega oziroma poenotenega sistema kazalcev za spremljanje regionalnega razvoja. S pomočjo analize planerskih sistemov je bilo opredeljenih 180 kazalcev, ki so prikazovali temeljne dejavnike, ki vplivajo na prostorski razvoj, strukturo naselij, infrastrukturno opremljenost prostora, socialnoekonomsko strukturo podeželja, rabo zemljišč, zavarovana in ogrožena območja, delovanje sistema prostorskega planiranja ter na izobraževanje in raziskave. Nekateri kazalci so se uporabljali le v omejenem številu sodelujočih planerskih organizacij.

Osnovni nabor kazalcev, ki se je uporabljal v večjem številu projektnih partneric, je bil dopolnjen s kazalci, ki se uporabljajo za vrednotenje prostorskega razvoja v Evropski uniji (ESPON – The European Spatial Planning Observation Network), doseganje trajnostnega razvoja v Alpah (MARS - Monitoring the Alpine Region's Sustainability) in doseganje razvojne kohezije v Evropski uniji (A New Partnership for Cohesion).

V nadaljevanju so bili kazalci razdeljeni v tri skupine kazalcev, in sicer na:

- ključne (key) kazalce;
- osrednje (core) kazalce;
- raziskovalne (research) kazalce.

Merilo za uvrstitev v skupino je bila dostopnost kazalcev. Med ključne kazalce so se uvrstili tisti, za katere bi bilo mogoče takoj zbrati podatke za vse v CONSPACE projekt vključene prostorske enote, medtem ko za osrednje kazalce velja, da bi bilo mogoče zbrati podatke za večino partneric. Za tako imenovane raziskovalne kazalce bi bilo potrebno posebno zbiranje podatkov ali pa bi bile potrebne celo dodatne raziskave.

Kazalci za spremljanje regionalnega razvoja vključujejo 104 kazalce (24 ključnih - k, 18 osrednjih - o, 62 raziskovalnih - r), ki so razdeljeni v 10 skupin (demografska struktura, socioekonomska struktura, poselitvena struktura, podeželje, kakovost bivanja, infrastruktura, raba zemljišč, zavarovana območja, degradirana območja, nevarna območja). Vsaka skupina vsebuje različno število kazalcev:

- demografska struktura: število prebivalcev (k), gostota prebivalstva (r), naravni prirastek (r), migracijski prirastek (k), migracijski prirastek (ločeno za tuje državljane) (r), delež migrantov pri rasti števila prebivalcev (r), starostne skupine - otroci (k), starostne skupine - starejši (k), starostne skupine - delovna doba (k), število gospodinjstev (k);
- socioekonomska struktura: BDP/prebivalca (k), BDP/zaposlenega (k), struktura BDP (r), izdatki za raziskave in razvoj (r), zaposleni na področju raziskav in razvoja (r), nizka kvalifikacijska struktura (r), visoka kvalifikacijska struktura (r), študenti (k), zaposleno prebivalstvo (k), aktivno prebivalstvo (r), zaposleni v kmetijstvu (k), zaposleni v

industriji (k), zaposleni v storitvah (k), kvalifikacijska struktura zaposlenih (r), dnevna migracija (r), brezposelnost (r), brezposelnost - ženske (k), brezposelnost - mladi (r), brezposelnost - dolgotrajna (r), manj razvita območja (k);

- poselitvena struktura: urbana območja (k), funkcionalna urbana območja - FUA - functional urban areas - (r), prebivalstvo v gosto poseljenih naseljih (r), urbana gostota (r), suburbana območja (o), ruralna območja (k), centralna naselja (r), moč urbano-ruralnih migracij (r), moč ruralno-urbanih migracij (r);
- podeželje: območja z nizko gostoto prebivalcev (r), gorska in hribovita območja (r), starostna struktura aktivnega podeželjskega prebivalstva (o), kvalifikacijska struktura aktivnega podeželjskega prebivalstva (o), čisti kmetje (r), število kmetij (r), velikost kmetij (r), biološko kmetovanje (o), dopolnilne dejavnosti na kmetijah (o), zaposlenost v drugih dejavnostih (o);
- kakovost bivanja: nova stanovanja (r), življenjski standard - število sob (o), življenjski standard - $m^2$/prebivalca (r), življenjski standard - enodružinske hiše (r), indikator zdravja (r), indikator varnosti (r), socialna participacija in integracija (r);
- infrastruktura: število potnikov (r), tovorni promet (r), obremenitve cest (r), linijske povezave (r), stroški za prevoz (r), dostopnost do središča mesta (r), dostopnost do avtoceste (r), dostopnost do postajališča (r), gostota državnih, regionalnih, lokalnih cest (k), novogradnje državnih, regionalnih, lokalnih cest (k), gostota železniških prog (k), novozgrajene železniške proge (o), telefonske povezave (k), mobilna telefonija (o), gospodinjstva z dostopom do svetovnega spleta (r), javni dostop do svetovnega spleta (r), kabelski dostop (o), proizvodnja energije (r), proizvodnja električne energije (r), poraba električne energije (k), poraba električne energije na zaposlenega (o), vodovodni sistem (r), poraba vode (o), količina prečiščene odpadne vode (r), kanalizacijski siste (r), odlaganje trdnih odpadkov (r);
- raba zemljišč: kmetijska zemljišča (o), njive (o), travniki (o), gozdovi (o), pašniki (o), vodne površine (r), pozidane površine (r);
- zavarovana območja: zavarovana območja - nacionalni, regionalni, krajinski, naravni parki, zavarovani gozd, naravno okolje, kulturna dediščina (k), Natura 2000 (r), zavarovana kmetijska zemljišča (r), zavarovana vodovarstvena območja (r), »Land care index« (r);
- degradirana območja: degradirana industrijska in rudarska območja (r), poškodovan gozd (o), onesnažena prst (r), onesnažen zrak (r), onesnaženost voda (r), onesnaženost podzemnih voda (r);
- nevarna območja: poplavna območja (r), erozijska območja in območja zemeljskih plazov (r), območja snežnih plazov (r), finančna škoda zaradi naravnih nesreč (r).

**Kazalci za merjenje prostorskih potencialov** se nanašajo predvsem na pomembnejše regionalne pojave, procese in dejavnike ter prostorske kategorije, ki lahko pomembno prispevajo k regionalnemu razvoju. Predlagani kazalci za merjenje prostorskih potencialov so torej orodje, s katerim lahko merimo prostorske potenciale regij z namenom opredelitve obstoječih potencialov ter prihodnjih potencialov, ki so že načrtovani ali predlagani. Poznavanje prihodnje prostorske strukture je eden izmed ključnih korakov za opredelitev

prihodnjih endogenih potencialov za razvoj, hkrati pa omogočajo tudi opredelitev prostorskih in regionalnih problemov, ki bi lahko ogrozili doseganje trajnostnega razvoja regije. Vrednotenje prostorskih potencialov je zato zelo pomemben korak pri pripravi trajnostne razvojne strategije.

Kazalci za merjenje prostorskih potencialov so bili izbrani na podlagi ugotovitev pilotnih akcij v okviru projekta CONSPACE, na njihovo oblikovanje pa so vplivali tudi pomembni dokumenti na ravni Evropske unije (Evropske prostorske razvojne perspektive, ESPON), ravni Združenih narodov (HBITAT), makroregionalni dokumenti (delovna skupnost Alpe - Adria) in strokovna literatura (Urban Indicators Guidelines). V sistem kazalcev za regionalni razvoj, strukturo in potenciale so vključeni kazalci, ki opredeljujejo prometno mrežo, gospodarske cone, urbano mrežo, infrastrukturo za turizem in rekreacijo, območja naravne in kulturne dediščine ter socialno infrastrukturo. Kazalci naj bi prikazovali sedanje in načrtovano stanje, kot je opredeljeno v prostorskih planih. Za nekatere kazalce bi bilo potrebno določiti standard, ki bi omogočal njihovo lažje vrednotenje in kategorizacijo zbranih podatkov. Kazalci za merjenje prostorskih potencialov vsebujejo 24 kazalcev razdeljenih v 6 skupin:

- prometna mreža: prometne povezave, križišča, postaje, multimodalna središča, potniški in tovorni promet, potniški in tovorni promet: multimodalna središča;
- gospodarske cone: delež industrije in storitvenih dejavnosti v BDP, zaposleni v industriji in storitvah, ekonomske cone, komercialne cone, industrijske cone, komercialne/industrijske cone, tehnološki in industrijski parki, R&D parki, območja skladišč, druga specializirana območja;
- urbana mreža: mreža urbanih naselij;
- infrastruktura za turizem in rekreacijo: delež turizma v BDP, turistična in rekreacijska središča, območja za turizem in rekreacijo, infrastruktura za poletni in zimski turizem;
- območja naravne in kulturne dediščine: območja naravne in kulturne dediščine;
- socialna infrastruktura: univerze, izobrazbena in kvalifikacijska struktura.

**Kazalci prostorskega razvoja** so bili oblikovani z namenom merjenja učinkovitosti delovanja prostorskega sistema. Učinkovitost delovanja prostorskega sistema merimo s pomočjo kazalcev, ki se nanašajo na sedanji in načrtovani prostorski sistem na različnih prostorskih ravneh: nacionalni, makroregionalni, regionalni, subregionalni in lokalni. Kazalci prostorskega razvoja, s katerimi merimo učinkovitost delovanja prostorskega sistema, prikazujejo razmerja med dejansko in željeno vrednostjo temeljnih kazalcev. Predlagani kazalci prikazujejo razvoj v prostoru, saj merijo prostorsko pomembne atribute in prostorske odnose znotraj sistema, pa tudi med proučevanim prostorskim sistemom in deli sosednjih sistemov. To pomeni, da lahko s kazalci prostorskega razvoja merimo učinkovitost delovanja prostorskega sistema v regiji in v njeni okolici (Lenarčič, 2005).

Kazalci prostorskega razvoja so predstavljeni v 5 skupinah (Lenarčič, 2005):

- prostorske mreže: merjenje velikosti, oblike, prostorske oblike in časovne razsežnosti regije;
- poselitvene mreže: merjenje prostorske razporeditve primarne mreže naselij, merjenje prostorsko-časovne razporeditve primarne mreže naselij, merjenje

prostorske in časovne razporeditve primarne mreže naselij, merjenje prostorske razporeditve sekundarne mreže naselij, merjenje prostorsko-časovne razporeditve sekundarne mreže naselij, merjenje prostorske in časovne razporeditve sekundarne mreže naselij;

- transportne mreže: merjenje prostorske razporeditve primarnih transportnih mrež, merjenje prostorsko-časovne razporeditve primarnih transportnih mrež, merjenje prostorske in časovne razporeditve primarnih transportnih mrež, merjenje prostorske razporeditve sekundarnih transportnih mrež, merjenje prostorsko-časovne razporeditve sekundarnih transportnih mrež, merjenje prostorske in časovne razporeditve sekundarnih transportnih mrež;
- poselitvene in transportne mreže: merjenje prostorskih razmerij med primarnimi poselitvenimi in transportnimi mrežami, merjenje prostorsko-časovnih razmerij med primarnimi poselitvenimi in transportnimi mrežami, merjenje prostorskih in časovnih razmerij med primarnimi poselitvenimi in transportnimi mrežami, merjenje prostorskih razmerij med sekundarnimi poselitvenimi in transportnimi mrežami, merjenje prostorsko-časovnih razmerij med sekundarnimi poselitvenimi in transportnimi mrežami, merjenje prostorskih in časovnih razmerij med sekundarnimi poselitvenimi in transportnimi mrežami;
- drugi kazalci: merjenje funkcionalnih atributov poselitvenih vozlišč sistema, merjenje funkcionalnih atributov transportnih vozlišč sistema, merjenje funkcionalnih atributov poselitvenih in transportnih vozlišč sistema, merjenje fizičnih atributov poselitvenih vozlišč sistema, merjenje fizičnih atributov transportnih vozlišč sistema, merjenje fizičnih atributov poselitvenih in transportnih vozlišč sistema.

Predlagani kazalci prostorskega razvoja omogočajo opisovanje in merjenje prostorske učinkovitosti doseženega in načrtovanega prostorskega sistema.

Odločitev za vključitev **okoljskih kazalcev** v sistem kazalcev za regionalni razvoj, strukturo in potenciale je logični odgovor na izzive, ki jih prinaša trajnostni razvoj. Trajnostni razvoj pomeni integracijo gospodarskih, socialnih in okoljskih, pa tudi prostorskih vidikov razvoja. Doseganje trajnostnega prostorskega razvoja poudarjajo tudi Evropske prostorske razvojne perspektive (ESDP) skozi temeljne cilje dokumenta, ki se nanašajo na gospodarsko in socialno kohezijo, trajnostni (prostorski) razvoj in uravnoteženo konkurenčnost celotne Evropske unije.

Okoljski kazalci so združeni v 10 skupin:

- kmetijstvo: območja z organskim kmetovanjem, bruto ravnotežje hranil;
- onesnaževanje ozračja in zmanjševanje ozona: emisije povzročiteljev zakisovanja, emisije povzročiteljev ozona, emisije primarnih delcev, preseganje dovoljenih mej onesnaženosti zraka v urbanih območjih, izpostavljenost ekosistemov zakisovanju, evtrofikaciji in ozonu, proizvodnja in poraba ozonu škodljivih snovi;
- biodiverziteta: zavarovana območja, raznolikost vrst, ogrožene in zavarovane vrste;
- podnebne spremembe: koncentracija toplogrednih plinov v atmosferi, globalna in evropska temperatura, emisije toplogrednih plinov, projekcija emisij toplogrednih plinov;

- energija: poraba končne energije po sektorjih, uporaba obnovljivih virov pri proizvodnji električne energije, poraba obnovljivih virov energije, poraba različnih goriv, skupna energetska intenziteta;
- ribištvo: proizvodnja morskih in sladkovodnih sadežev in rib, kapacitete ribiške flote, stanje zalog morskih rib;
- prst: izguba zemlje, napredek pri ravnanju s kontaminiranimi območji;
- promet: povpraševanje po tovornem prometu, povpraševanje po potniškem prometu, uporaba čistejših in alternativnih goriv;
- odpadki: ravnanje z odpadno embalažo, ravnanje s komunalnimi odpadki;
- voda: kakovost kopalnih voda, klorofil v prehodnih, obalnih in morskih vodah, hranila v pitni vodi, hranila v prehodnih, obalnih in morskih vodah, poraba kisika v rekah, ravnanje z odpadnimi vodami, raba sladkovodnih virov.

Za vsakega izmed kazalcev vključenih v sistem kazalcev za regionalni razvoj, strukturo in potenciale je pripravljen metodološki list, ki natančneje opredeljuje enoto, s katero merimo kazalec, prostorsko raven, za katero zbiramo podatke, pa tudi znanstveno argumentacijo za izbor kazalca.

Čeprav je bil sistem kazalcev za regionalni razvoj, strukturo in potenciale oblikovan za potrebe CONSPACE projektne regije, so bili zasnovani tako, da so univerzalni; to pomeni, da so uporabni za vse prostorske enote na različnih ravneh (NUTS 1-3).

Analiza sistema kazalcev regionalnega razvoja, regionalne strukture in regionalnih potencialov na ravni CONSPACE partnerjev še ni bila narejena, predvsem zaradi pomanjkanja podatkov. Zato smo samo na primeru Slovenije preverili stopnjo uporabnosti in izvedljivosti predlaganega sistema kazalcev, in sicer v obliki analize naslednjih kazalcev:

- struktura naselij - centralna naselja;
- transportne mreže - prometne povezave in vozlišča (obstoječa, načrtovana);
- poselitvena in transportna mreža.

**Struktura naselij-centralna naselja.** Razporeditev naselij v prostoru je rezultat dolgega in zapletenega odnosa med različnimi gospodarskimi, socialnimi in geografskimi dejavniki. Centralna naselja so naselja z dejavnostmi, ki služijo lokalnemu tržišču. Teorija o centralnih krajih si prizadeva odkriti, kakšna prostorska razporeditev centralnih krajev naj bi bila najustreznejša. Centralna naselja so zato lahko primerno analitično in metodološko izhodišče za opredelitev kazalcev, ki prikazujejo vlogo posameznih naselij v sistemu poselitve.

Centralnost naselij je le eden izmed dejavnikov, s katerim lahko prikazujemo vlogo naselij. Funkcijska vloga naselij je odvisna tudi od drugih dejavnikov (velikost, lega, gospodarska moč, transportna lokacija), ki natančneje opredeljujejo njihovo vlogo v strukturi oziroma sistemu naselij. Med kazalce za kategorizacijo naselij je zato poleg centralnosti potrebno upoštevati tudi število prebivalcev, število delovnih mest in delež delovnih migrantov. Na podlagi teh štirih kazalcev smo kategorizirali vsa centralna naselja (290 naselij) in naselja z več kot 100 delovnimi mesti (206 naselij) v Republiki Sloveniji. Rezultat

kategorizacije je šeststopenjski sistem naselij v Republiki Sloveniji: 2 makro-regionalni središči, 15 regionalnih in 52 subregionalnih središč, 142 lokalnih, 299 sublokalnih in 286 mikrolokalnih središč. Rezultati kategorizacije naselij so predstavljeni na slikah 6-11.

Prostorski vzorec hierarhične strukture naselij smo uporabili tudi za hierarhično kategorizacijo prometnih vozlišč.

**Transportne mreže - prometne povezave in vozlišča (obstoječa, načrtovana).** Transportni sistem je v Sloveniji sestavljen iz cest, železniških prog, sistema kolesarskih poti, letališč in pristanišč.

Ceste so z zakonom kategorizirane glede na funkcijo: ceste namenjene daljinskemu prometu, povezovanju regij in povezovanju občin. V kategorijo daljinskih cest spadajo avtoceste in hitre ceste. Avtoceste povezujejo Slovenijo s sosednjimi državami, medtem ko hitre ceste povezujejo tudi pomembnejša regionalna središča. Medregionalne ceste predstavljajo glavne ceste 1. in 2. reda. Te so namenjene prometnemu povezovanju pomembnejših središč regionalnega pomena in drugih regionalnih središč. Znotrajregionalne ceste so namenjene povezovanju središč lokalnih skupnosti (občin). Delijo se na regionalne ceste 1., 2. in 3. reda. Regionalne ceste 1. reda so namenjene povezovanju pomembnejših središč lokalnih skupnosti. Regionalne ceste 2. reda služijo povezovanju teh in drugih lokalnih (občinskih) središč, regionalne ceste 3. reda pa poleg lokalnih središč povezujejo še turistična in obmejna območja. V Sloveniji je 6.333 km državnih cest, 2.683 križišč ali vozlišč in skupaj 2.816 cestnih odsekov. Hierarhija cest ima po dolžini piramidno strukturo. Ceste, ki so na hierarhični lestvici uvrščene višje, omogočajo višje vozne hitrosti in večjo pretočnost. Sistem cest v Republiki Sloveniji je prikazan na sliki 12.

Železniške proge se delijo na glavne proge in regionalne proge. Med glavne proge se prištevajo najpomembnejše mednarodne povezave, ki hkrati tudi povezujejo državna središča in pomembnejša regionalna središča. Regionalne so vse druge proge, ki skupaj z glavnimi povezujejo druga regionalna in lokalna središča. V Sloveniji je 1.182 km železniških prog, od katerih večina predstavlja glavne proge. Na progah je 274 postaj oziroma postajališč. Železniške proge v Republiki Sloveniji so predstavljene na sliki 13.

Kategorizacija letališč prav tako temelji na zakonu. Slovenska letališča so kategorizirana na mednarodno letališče (Letališče Jožeta Pučnika Ljubljana), letališče Evropske skupnosti (Letališče Edvarda Rusjana Maribor), regionalno letališče (Letališče Portorož) in športna letališča (Lesce, Bovec, Ajdovščina, Postojna, Slovenj Gradec, Velenje, Celje, Murska Sobota, Ptuj, Novo mesto – Prečna).

Pristanišča v Sloveniji so po zakonu kategorizirana na mednarodno pristanišče za javni promet, pristanišča za posebne namene, športna pristanišča, turistična pristanišča (marine), krajevna pristanišča in druga pristanišča. Pristanišča in letališča v Republiki Sloveniji so prikazana na sliki 14.

Republiške kolesarske poti so šele v gradnji in zaenkrat še ne tvorijo sistema, ki bi ga bilo mogoče kategorizirati.

Prometno vozlišče je opredeljeno kot vsota križišč več prometnih sistemov in ne le enega, saj le sinergija več prometnih sistemov in več križišč ali terminalov kaže na povezanost med njimi in stopnjo centralnosti naselij.

Hierarhijo in kategorizacijo prometnih vozlišč smo določili na podlagi obtežene vrednosti števila prometnih povezav: cest in železniških prog ter števila avtobusnih linij, letališč in pristanišč. V kategorizacijo smo vključili 211 prometnih vozlišč. Razdeljena so na 4 makroregionalna vozlišča, 12 regionalnih, 26 subregionalnih, 54 lokalnih, 87 sublokalnih in 28 mikrolokalnih prometnih vozlišč.

Primerjava kategorizirane poselitvene in transportne mreže kaže, da so hierarhične ravni naselij in vozlišč identične le na najvišji ravni. Regionalna središča večinoma niso tudi regionalna vozlišča, saj je le 5 regionalnih središč hkrati tudi regionalnih vozlišč. Na primeru subregionalne ravni je razmerje še slabše, saj je le 11 subregionalnih središč tudi subregionalno prometno vozlišče. Podobno razmerje velja tudi na nižjih prostorskih ravneh. To pomeni, da je povezava prostorske strukture mreže naselij in prometnih vozlišč relativno nizka, posebno na nižjih hierarhičnih ravneh. Primerjava kategoriziranih središč in prometnih vozlišč je prikazana na slikah 15-20.

## References


1. A new partnership for cohesion. Convergence, Competitiveness, Cooperation. Third report on economic and social cohesion. 2004. Luxemburg, European Commission, Office for Official Publication of the European Communities.
2. Agenda 21. 1992. New York, UNICED.
3. Barke, M., 1986. Transport and Trade. Edinburgh, Oliver and Boyd.
4. Benkovič Krašovec, M., 2006. Vloga centralnih naselij prve in druge stopnje pri razvoju slovenskega podeželja: doktorska disertacija. Ljubljana, University of Ljubljana, Faculty of Arts, Department of Geography.
5. Blackman, T., 1995. Urban Policy and Practice. London, Routledge.
6. Blackman, T., 1998. Towards evidence-based local government: theory and practice. Local Government Studies, No 24/2, p. 56-70.
7. Bory, B., Puchinger, K., 2005. Polycentric development in the CONSPACE region. Recommendation report, 1st draft. CONSPACE, WP 3: Polycentric spatial development. Klagenfurt.
8. Bosel, H., 1999. Indicators of Sustainable Development. Theory, Method, Applications. A Report to the Balaton Group. Winnipeg, International Institute for Sustainable Development (IISD).
9. Chambers, M., 1994. Quality Indicators for Progress. A Guide to Community Quality-of-life Assessments. Jacksonville, Jacksonville Community Council Inc.
10. Community Initiative INTERREG III B (2000-2006) CADSES Application Form. Revised Version 2, February 2003.
11. CONSPACE. URL: http://www.conspace.info/html/project_goals.html (17.9.2005).
12. CONSPACE Research Report and Documentation. 2006. Klagenfurt, Office of the State Government of Carinthia, Department 20, Regional Planning.
13. Compendium of Sustainable Development Indicator Initiatives. 2002. Winnipeg, International Institute for Sustainable Development (IISD), International Sustainability Indicators Network (ISIN). URL: http://www.iisd.org/measure/compendium/ (30.8.2008).
14. Coombes, M., Wong, C., 1994. Methodological steps in the development of multi-variate indexes for urban and regional policy analysis. Environment and Planning A, 26, p. 1297-1316.
15. Černe, A., 2004. Dispersed and decentralised settlement system. Dela 21 (Cities in transition). Ljubljana, University of Ljubljana, Faculty of Arts, Department of Geography, p. 83-95.
16. Černe, A., Gulič, P., Kušar, S., 2004a. Comparative analysis of goals, indicators and data of spatial development in the states and regions included in the CONSPACE project.

Ljubljana, University of Ljubljana, Faculty of Arts, Department of Geography. CD-ROM.

17. Černe, A., Gulič, P., Kušar, S., 2004b. Proposal for the enlistment of ideal/optimal indicators for monitoring spatial development in states and regions included in the CONSPACE project. Ljubljana, University of Ljubljana, Faculty of Arts, Department of Geography. CD-ROM.
18. Černe, A., Gulič, P., Kušar, S., 2004c. Proposed group of forecast indicators for measuring development potential of the CONSPACE project region. Ljubljana, University of Ljubljana, Faculty of Arts, Department of Geography. CD-ROM.
19. Černe, A., Gulič, P., Kušar, S., 2005. Methodology sheets of indicators for monitoring spatial development and measuring development potential of the CONSPACE project region. Ljubljana, University of Ljubljana, Faculty of Arts, Department of Geography. CD-ROM.
20. Černe, A., Gulič, P., Kušar, S., et al., 2006. CONSPACE-PP5-WP2: Harmonisation of Tools, Data and Procedures and Monitoring of Spatial Development: final report. Ljubljana, University of Ljubljana, Faculty of Arts, Department of Geography. CD-ROM.
21. Černe, A., Kušar, S., Guzelj, T., Kokole, V., Lenarčič, L., 2007. Kategorizacija obstoječega stanja poselitvenega in prometnega omrežja RS za izdelavo državnega strateškega prostorskega načrta. Ljubljana, University of Ljubljana, Faculty of Arts, Department of Geography, Ministry of the Environment and Spatial Planning.
22. Development in the Baltic Sea Region towards the Baltic 21 Goals - an indicator based assessment. Baltic 21 Series No 2/2000. Stockholm, Ministry of Environment, UNEP/GRIDA.
23. ESPON in progress: preliminary results by autumn 2003. 2004. Luxembourg.
24. ESDP-European Spatial Development Perspective: Towards Balanced and Sustainable Development of the Territory of the European Union. 1999. Luxembourg, European Commission.
25. Gatrell, A.C., 1983. Distance and Space. A Geographical Perspective. Oxford, Clarendon Press.
26. Hemphill, L., Berry, J., McGreal, S., 2004. An indicator-based approach to measuring sustainable urban regeneration performance. Urban Studies 41, 4, p. 725-772.
27. Horn, R. V., 1993. Statistical Indicators for the Economic and Social Sciences. Cambridge, Cambridge University Press.
28. Indicators for monitoring and evaluation: an indicative methodology. 2000. The New Programming Period 2000-2006 Methodological Working Papers 3. Brussels, European Commission.
29. Kušar, S., 2006. CONSPACE Region – A Counter Balance to Spatial Polarisation in the European Union. Europe XXI, 14, p. 219-231.
30. Lenarčič, L., 2005. Pilot action Indicators of spatial development: final report. Ljubljana. CD-ROM.

31. Marinović-Uzelac, A. 2001. Prostorno planiranje. Zagreb, Dom & svijet, 548 str.

32. MARS-Indicators on the social pillar. 2004. INTERREG IIIB Alpine Space Programme, Project MARS: Monitoring the Alpine Regions' Sustainability.

33. Nordio, M., 2005. Pilot action: Monitoring of regional spatial development for the definition of new indicator: final report. Venice, R.S.D.E. Consulting.

34. Pomorski zakonik. 2006. Uradni list RS, 120/06. Ljubljana.

35. Pravilnik o razvrščanju letališč. Uradni list RS, 18.

36. Sustainable development in Switzerland. Indicators and comments. 2004. Neuchatel, The Swiss Agency for the Environment, Forests and Landscape, The Swiss Federal Statistical Office (SFSO), Swiss Federal Office for Spatial Development.

37. Urban Indicators Guidelines. Monitoring the Habitat Agenda and the Millennium Development Goals. 2004. Nairobi, United Nations Human Settlements Programme.

38. Urban Indicators Tool Kit. URL: http://www.UrbanObservatory.org/indicators, http://www.Istanbul5.org (30.8.2008).

39. Zakon o javnih cestah. 1997. Uradni list RS, 29.

40. Zakon o varnosti železniškega prometa. 2000. Uradni list RS, 85.

41. Wong, C., 2006. Indicators for Urban and Regional Planning. The interplay of policy and methods. London, Routledge.

# List of tables

# List of figures

# Index

**D**



**E**



**F**

**T**



**U**



**V**



W

## Doslej izdane publikacije iz zbirke GeograFF

### GeograFF 1 - 2008

Matej Ogrin: Prometno onesnaževanje ozračja z dušikovim dioksidom v Ljubljani

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Katja Vintar Mally: Države v razvoju - med okoljevarstvom in razvojnimi težnjami

### GeograFF 5 - 2009

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