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SYSTEMATIC SPATIAL PLANNING

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Abstract
Spatial planning is defined as the change of the distribution of activities in space and the change of the links between them by converting forms of land use and property. Systematic spatial planning is the most advanced level in a hierarchy from data and going to information and knowledge, collected on each level of territorial holarchy. Systematization is achieved by data converting into higher forms through statistics, analysis, modeling, simulation, systems analysis and decision support systems. Application of Spatial optimization through systematic planning, focuses on the selection of reserves for optimal space planning. It will expand the use of these techniques through systematic spatial planning for more integrated land management objectives. Systematic planning activities (long-term strategy), to solve problems (short-term projects), development and management requires more research and management. Thus, we can conclude that spatial planning is the science that integrates four concepts: territorial planning (economic component), urban (social component), environmental protection and cultural models. Based on these findings, the main method of spatial planning to review all these concepts integrative method is SketchMatch. This method implies that in a span of one day (minimum) to a maximum of three days, a group of stakeholders, eg citizens, policy makers makers, farmers) meet to analyze, define and find solutions to a problem of spatial planning. Methods of systematic spatial planning have been applied successfully in the frame of project " Cat's bend- Space for the river", developed in partnership with the Dutch Government - Department of Water Management and Planning 2008-2009.
Keywords: spatial planning, systematic spatial planning, SketchMatch, applied methods in spatial planning.

1. INTRODUCTION

Spatial planning presumes to anticipate and prepare, to make preparations and supplies for the future. This involves preparing for future land use by residents and strengthen this preparations trough regulation and promotion of changes in land use and buildings. Spatial planning goal is to investigate and recommend such preparations that will lead to reconciliation of the conflicts and at the best benefits for the "customer" in terms of land use. To achieve the purpose of planning should be operated with an acceptable and workable system that defines the type of change for which preparations are made, the obligation to *prepare* plans and policies, the need for a consensus on implementing the *change, the obligation* to support preparations for a *consensus* and the right to be consulted and to object to a plan or a decision (IHS Romania, 2001).

Spatial planning could also be defined as regional planning activities, including strategies, policies and sectoral programs and specific integrated documentation for balanced **spatial development** and sustainable set of methods used by the public sector to ensure a rational organization of planning, environmental protection and economic and social goals (according to the principles of sustainable development).

In the Torremolinos Charter [European Charter on spatial planning] spatial planning is defined as the spatial expression of four types of policies: economic, social, environmental and cultural.

Another definition is changing the distribution of planning activities in space and the links between them by converting forms of land use and property (Pascariu, 2001).

2. SPATIAL PLANNING AT EUROPEAN LEVEL

Planning of the settlements / regions / territories are now being made in the European area through effective spatial planning processes in conjugation with the instruments of regional development, both supported by the specific concept of strategic planning approaches. Development is defined by the European Commission as "a form of land and conversion of property or its use by planning tools and generally involves the construction of new buildings or modifying existing and extensive engineering operations. In this mean, plans are a way of expression as instruments of policy development planning and include in addition to graphics and text documents, tax incentives and / or other "(Commission of the European Communities – CEC, 1997).

Space planning in terms of cohesion and regional development is a "global project of a whole territory within the local administration that seeks to satisfy needs, putting in place an economic and social development plan, developed autonomously controlled actors local, but integrated into the national plan and articulated with other regional plans "(Bailly et al., 1988).

In the late 60's territorial planning and spatial planning starts to be a major preoccupation of governments in European countries. Were put into discussion events that were to influence the development of cities and regions in Western Europe about space:

- shift from hegemony to decentralization industrial center (in production);
- the role of key sectors of development: investment flows, industrial-port platforms, structures exchange (Intermodal), tourist flows;
- the need to reduce social disparities in infrastructure and strong extension axes by countries and adjacent regions (cross-border cooperation);

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- community-policy implications (Structural Founds): Agricultural and rural policy, environmental policy and economics conflict environment, trade policies, industrial competition, training and tracking of activities, regional policy as a basic component of development policy planning, transport policy and urban networks.

In the late '90s, the threshold of XXI century, spatial planning ministers from member states of the Council of Europe (numbering over 40) adopted an important and broad impact statement for the sustainable development of European territory trough Hanover 2000 Declaration.

Spatial planning in EU countries is now a generally accepted meaning: group of methods used by the public sector to ensure a rational organization of territory, environment and economic and social objectives (in equilibrium, according to the principles of sustainable development).

However there are differences of emphasis, priorities and instruments. Thus, some countries focus on economic planning (France), others on the efficient use of land (the Netherlands) or regulatory systems (United Kingdom). In some cases it is particularly important for issues of urban design / control intervention, urban silhouette (Italy). Spatial planning system depends very much on the systems of governance. In the EU are three main forms of such systems: the unitary (central power level delegation of responsibilities: France, Netherlands), regional (power shared between the center and regions under the constitution: Italy, Spain) and federal (power shared between center and the regions with autonomy in some areas and enabling legislation: Austria, Belgium, Germany, Great Britain - in part). As a result, even the legislation may be different, so there are European countries with a single law on spatial planning or regional laws and federal laws (Austria, Germany, Spain). In Belgium, there is a total autonomy in the regulation of spatial development (there is a federal law). Categories of spatial planning tools can also vary from country to country but can be classified into the following four categories:

- National policies, perspectives - identify national policies, strategies, guidelines, benchmarks, etc.., comprise the whole or significant parts of its;
- Strategies - identify patterns of development at sub-national levels (maybe one or two levels), but above the local level (municipality, commune), may be indicative or programmatic, and implemented by other 'local' instrument;
- Framework Plans - identify the spatial development framework and criteria for regulating land use (can not be applied to the judiciary); refers to the smallest administrative units and can be implemented with more detailed instruments;
- Regulatory - identify and regulate development at the parcel of land (regulation, control, mechanisms of implementation).

It should be noted that at present all EU Member States and most other European countries have institutionalized systems of spatial planning and territorial addresses all levels, taking advantage of a regulatory framework and procedures. There are differences, but also many similarities between these systems (Pascariu, 2001).

In conclusion, the general characteristics of European spatial planning can be summarized as follows:

- existence of specific legislation
- administrative responsibilities at all levels of government
- differentiated skills
- hierarchical relationship between territorial levels
- existence of structural plans / guidelines and plans for mandatory / regulatory plans, there is a correlation
- cyclical procedure for updating plans
- public participation
- plans as a tool and support for specific policies
- integrating economic, social, environmental and spatial

Recent European approaches simultaneously reveals the triad of social, economic and environmental and the need to promote those measures which ensure the implementation of as many objectives (maximize the synergy effect). Development strategies in recent decades bring to the fore a number of unusual items for specific documentation developed in Romania (territorial planning), or the role of technology transfer, transport and services, institutional cooperation, stressing in particular the role of the SME (Small, Medium Enterprises) sector, the labor work and physical infrastructure.

3. SYSTEMATIC SPATIAL PLANNING

To reduce the gap, and in some cases the expansion of wealth and development between the two halves of the continent, the countries of the eastern half of Europe need a more dynamic development (INTERREG IIC – CADSES, 1999). Some regions of EU Member States (such as Eastern Germany, Southern Italy and Burgenland) face the same problem. Systematic and balanced Spatial Planning and Development can significantly improve the potential to enhance efficiency and support growth.

Operating processes of environmental degradation across the landscape heterogeneity and actions at different locations vary in the level of environmental benefits and costs (Gondo and Zibabgwe, 2010). The benefit of planning, for example, on biodiversity and on actions for the recovery area depends on their location in relation to the spatial arrangement of remaining habitat in the landscape context.

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The benefits of spatial planning depends on natural or built environment, also the spatial location of the intervention area and are dependent on characteristics of the area of interest (physical, development opportunities, population, etc.) (Hernández-Moreno, 2010). Planning costs (such as relocation costs, operational changes, etc.) varies also spatially with changes in regional characteristics. To maximize the return on shares, they must be prioritized in places where the benefits are maximized in relation to costs.

Decisions must be made about the location and types of investment management activities and thus, in most cases at a cost effective resource management objectives. Complexity that undermines these decisions requires a systematic approach based on the data to an explicit planning framework based on frame-decision theory.

Systematic method of spatial planning is a multi-criteria analysis to identify geographic priorities for management actions on the ground. Multicriteria decision analysis is a powerful tool to support complex decision constrained by many competitors: the objectives and criteria. Spatial multicriteria decision analysis is a subset of multiple criteria analysis techniques, which plays a variable location and is ideal for complex problems like joint management and spatial planning (Bryan et al., 2008).

Specifically, the method uses a spatial approach to multi-objective decision making to identify sites where action is needed to natural resource management. Rules commonly used in the analysis of multi-objective decision making based on optimization and are derived from operational research. Systematic planning algorithm uses a variant of "minimum set", which is a linear programming model derived from the location set covering the problem. In this formulation, the set of spatial units (eg land parcels) is identified as meeting certain objectives at a minimal cost. Application of spatial optimization in systematic planning, focuses on the selection of reserves for optimal space planning (Bryan et al., 2007). It will expand the use of these techniques through systematic spatial planning for more integrated land management objectives.

Systematic planning is the most advanced level in a hierarchy from data to information and knowledge, and climbing. Systematization is achieved by converting data into higher forms trough statistics, analysis, modeling, simulation, systems analysis and decision support systems. Planners have always sought tools to enhance their analytical power, solving, and decision-making capacity.

4. APPLICATION OF SYSTEMATIC SPATIAL PLANNING IN ROMANIA. CASE STUDY

An example of a sustainable approach to flood prevention through systematic spatial planning and management of water resources is the "Cat's Bend - Space for the river", developed in partnership by

the Dutch Government - Department of Water Management and Planning with the Ministry of Environment of Romania, HKV Consultants, the Netherlands, Danube Delta National Institute, WWF Romania, Eco-Counselling - ALMA-RO Galati and Bucharest, 2008-2009.

Although numerous studies in Romania and in Europe show that prevention and management of flood risk depends not only on the height of levees, but also on a systematic spatial planning, public authorities in Romania continue to rely on them as the only solution for disaster prevention.

The concept of "Space for the river", as applied in the Netherlands in the last 10 years, aims to identify effective methods to increase spatial planning so that a stream can be managed, for example, by the existence of side channels or relocating flood dykes in the floodplain of the river course.

Besides the different concept of spatial planning, the Dutch approach provides a crucial role for public consultation in decision-making (using the method SketchMatch). Being large infrastructure works (channals, sometimes renaturation of wetlands, relocate or change the shape/ orientation of dikes), local citizens must not only be consulted but directly involved in the design drawings for space planning. This allows the plan to include the population on economic development priorities, social and environmental areas and ensures acceptance of the plan by citizens. It was demonstrated that the potential measures can solve a number of important issues for communities: failures, drought, lack of infrastructure for tourism, agriculture etc. increase performance.

Such a process of consultation and planning took place in Romania, in Cat's Bend area. The project includes Cat Bend region, along the Danube, Galati and Tulcea counties, in eastern Romania.

Since the Danube was closed by channels and dykes, there is no enough space to reduce the maximum flow of the river during rainy or nature development along the River. Due to climate change and widespread deforestation, these peak flows are present more frequently, but in a larger volume of water in a shorter time. The Danube Floodplain in Cat's Bend area has insufficient capacity to reduce peak flows, as observed during the summer of 2004 and 2005 and spring 2006, when a large part of the region was flooded and evacuations were necessary. Measures such as removing dams at certain points along the river opened the place for high levels of water and nature. This often means a fundamental change in the spatial and functional planning of the region, for example, agricultural land in areas surrounding the river is transformed into natural areas. Since this involves a fundamental change, stakeholder participation is essential to the success of such projects and spatial planning.

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Space planning drawings for the study area developed under the project are limited primarily to the region. Attention will be paid also to the potential effects of upstream and downstream only at a qualitative level.

The consultation process was conducted in the summer of 2009 and a series of plans and potential solutions by experts in planning and hydrologists in the Netherlands and Romania, with the direct participation of citizens and local decision makers have been delivered to the Ministry of Environment. Implementation of these plans took into account the rules of a systematic spatial planning, and flood protection strategy as it was defined in the feasibility study REELD Romania ("Ecological And Economic Resize of the Danube Floodplain - Romanian sector" - a study to determine the appropriate strategy to protect the Danube Delta region against flooding and to provide a better understanding of the Danube floodplain, which have developed a series of digital terrain models and a hydraulic model, which is the basis for future water management measures, along the Danube), complementary to the Dutch method "Space for the river."

Based on studies and data collected from the floods of 2004-2006 Cat's Bend area Galati / Tulcea was given priority status by the Ministry of Environment. Measures are also needed in other parts of Romania, but this region needs more support because was hit pretty hard during the recent floods. In the short term, anti-flooding measures are to be taken considering various land use functions: for example, flood protection near residential areas, nature, agriculture, transport and other economic activities such as tourism.

Traditional measures such as enhancing and strengthening the dykes are relatively expensive and offer little chance of being effective. Romania also realizes that water should be managed differently in a way that could provide more space for the river and nature.

Thus, solutions do exist and have been identified through stakeholder consultation. Their effectiveness depends on the replication of this project in other areas of the Danube.

However, so far none of the suggestions and solutions identified by the experts and the local community were taken into account and there is no initiative to plan this. Central and local authorities continue to build dams (for example, Galati), which on medium term is a method highly inefficient and even dangerous, especially if it is the only method used. Practically, the government could respond in a sustainable manner related to the flooding problems that would use the tools at its disposal, thus avoiding the loss of hundreds of lives, material and financial damage that would increase pressure on the public budget, in an unstable period of economically.

5.SYSTEMATIC SPATIAL PLANNING METHODS USED IN THE PROJECT

This project uses the approach *More Space for the River* in the regional plans (spatial concepts) for Cat's Bend region by combining several methods: interviews with stakeholders, workshop SketchMatch, hydraulic modeling and GIS 3-D views. GIS 3D views are a very important tool for this project, because the 3D GIS has the advantage of being attractive in terms of graphics and above all provide a clear and accessible understanding of the effects of proposed measures. Space Planning Concepts are viewed by them and the effects of the measures proposed in the water are also more clearly exposed. In this way, the plans and their potential effects are more easily understood by a large group of people involved, and it helps to create local support for future measures (sometimes essential) in the region to cope with recurring flood. All methods used in the project complement each other and therefore should be presented as a coherent package. The methods are described and explained briefly below:

a. Socio-anthropological research (interviews with stakeholders)

In order to ensure a fair and adequate representation of local concerns and options in SketchMatch spatial planning process, a study on small-scale socio-anthropological workshop was conducted before SketchMatch. A series of interviews, with a duration of about 2 hours, took place with key informants in the area.

b. GIS Viewing 3-D GIS

After calculating the three to four scenarios for spatial planning, the scenarios are viewed in 3-D. Three-dimensional visualization allows the presentation and communication of different scenarios. There are many opportunities and techniques available to view scenarios. For example, you may choose to use a simple image (Arc Map, Arc Scene); however, experience shows that a combination of GIS (geographic information systems), techniques of graphic design and navigation techniques of video game industry (Virtools) may lead to a 3-D interactive model, which acts as a powerful interactive tool in the planning process.

To create this product view, activities are divided into five parts: data collection, processing and data conversion , development, data integration, visualization.

c. Hydraulic Modeling

A hydraulic model is essential for realistic drawing to view in 3D GIS spatial planning. It was used a hydraulic model developed within the project REELD, as it covers the entire Delta region. HKV (Dutch consulting company) and a Romanian partner (Danube Delta National Institute), together, refined this model and adapt it, so it can be used for Cat's Bend region as a basis for regional plans.

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Hydraulic modeling components include (i) regional data collection, (ii) data analysis, (iii) adapting the current model, (iv) adjustment of numerical model to one or more measured in field situations, and (v) calculation of scenarios for future situations. Finally, (vi), the results are analyzed.

Reliability of calculated results with the numerical model depends largely on the availability of reliable regional data. In addition to geographic data, water level and water flow are obviously very important in hydraulic modeling. Ranging from adjustable parameters (eg soil roughness), the water levels calculated by a hydraulic model can be adapted to the actual measured water levels. Clearly, the model can not run without parameters. The condition for the edge value must remain within certain limits. If it does not work, it usually means there is a mistake in the conceptualization, which requires a setback in the search for possible repair errors.

The development of regional planning boards (spatial concepts), which can then be incorporated into the hydraulic model, are also influenced by the desire to provide interested parties given the circumstances. Concepts of spatial and hydraulic scenarios are developed during the workshops SketchMatch and the results are analyzed for consistency and logic. GIS applications play an important role by viewing results, such as flow, water level and flood extent.

d. SketchMatch method

SketchMatch method is a method developed by DLG (Dutch Government - Department of Water Management and Planning) so that it works on the principle of "creativity under pressure". In a span of one day (minimum) to a maximum of three days, a group of stakeholders, (eg citizens, policy makers makers, farmers) meet to analyze, define and find solutions to a problem of spatial planning .

The strength of this method is group work.

Coordination is facilitated by a person who supervises the process or one or more specialists in providing visualization of spatial planning problems and their solutions by plotting on the map.

SketchMatch method combines different disciplines: spatial planning, regional development, layout, GIS, ecology, hydrology, hydraulics, cost estimation, etc.. A thorough training, including a picture of the mission design and the actors involved, it is very important. This consists in, that if the right people with the right expectation sit at the drawing board, the chances of success grow.

A good SketchMatch brings together the parties so that people begin to understand each other's desires and interests. This increases support as participants accept a joint plan, which they themselves have outlined. In the plan they see their own wishes and interests represented, and also the wishes and interests of others.

With this method, local residents, experts and policymakers together, outline the SOLUTION, develop plans for a particular field, well-defined. Specialists in space planning, with participants develop creative ideas for the area and seek an agreement on a land use plan. The challenge usually involves finding solutions to problems of spatial planning which has a number of different objectives on agriculture, water, nature, recreation, cultural history and rural housing. These different aspects are discussed and weighed well before the actual process of design to provide possible scenarios for land use study area.

6. RESULTS AND CONCLUSIONS

In the early '60s were promoted a series of spatial concepts and spatial planning, which have resulted in the reference documents over time. The most recent and important statement is from Hanover in 2000, which has an equivalent in the so-called EU ESDP (European Spatial Development Perspective).

We can say that territorial planning ('amenajarea teritoriului' in Romanian) is a part of spatial planning ('planificare spațială' in Romanian), but a part with specific characteristics (thus avoiding confusion between the two terms, which is common in Romanian language). Important is the complex interrelationship between the two sciences.

Considering the definition established in 1983 in the European Charter for Spatial Planning, it can be said that spatial planning is the science that integrates four concepts: spatial (economic component), urban (social component), environmental protection and cultural models.

Based on these findings, the main method of spatial planning to analyze all these integrative concepts is SketchMatch method.

The method can integrate many disciplines: spatial planning, regional development, layout, GIS, ecology, hydrology, hydraulics, cost estimation, etc.., Several aspects (technical, social, economic), stakeholder involvement is the core process. These observations lead to a systematic spatial planning, combining all the aspects to be taken into account.

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