Planning Urbanization Inside Natural Urban Landscapes

Habitat Mapping as a Part of a Complex Landscape Planning Process

Davorin GAZVODA

SUMMARY

The paper deals with the currently popular "habitat mapping" of urban open spaces. Among many other methods, which try to define or measure the level of natural preservation, habitat mapping is a sort of pre-analytical method or, rather, a simple inventarisation (identification) of habitats. Biologists, who most often conduct such mapping, define habitats according to the predominant plant species. The method is quite similar to the known methods used by plant sociologists when they produce their vegetation maps. If these maps are used instead of habitat maps, and combined with other spatial data, relevant spatial models can be produced to simulate habitats, which is a common procedure in the landscape planning process. In this case the long-term and expensive procedure of habitat mapping is not needed. Therefore, the maps of habitats, once they are produced, must also be evaluated by biologists, and hierarchically categorized from "the most preserved or natural habitat" to the "less preserved or natural habitat" for continuous use. Once habitats are categorized, they can be used, and, the simulation of further urbanization can be made in a landscape ecological manner by preserving important habitats. Final step is to provide necessary corridors and stepping stones for certain species and to propose new types of urban parks and recreational zones.

KEY WORDS

natural urban landscapes, habitats, habitat mapping, landscape planning, spatial models

E-mail: davor.gazvoda@bf.uni-lj.si

Department of Landscape Architecture
Biotechnical Faculty, University of Ljubljana
Jamnikarjeva 101, 1000 Ljubljana. Slovenia

Received: November 16, 1998

Planiranje urbanizacije unutar prirodnih urbanih krajolika

Mapiranje staništa kao dio složenog procesa planiranja krajolika

Davorin GAZVODA

SAŽETAK

Ovaj rad obrađuje trenutno aktualno "mapiranje staništa" otvorenih urbanih prostora. Mapiranje krajolika je jedna od metoda koje pokušavaju odrediti ili izmjeriti razinu očuvanja prirode. To je vrsta predanalitičke metode ili radije, jednostavna inventarizacija (identifikacija) staništa. Biolozi, koji najčešće provode ovakva mapiranja, određuju staništa prema prevladavajućim biljnim vrstama. Ova metoda je vrlo slična poznatim metodama koje upotrebljavaju biljni sociolozi kada rade svoje mape vegetacije. Ako se ovakve mape upotrebljavaju umjesto mapa staništa i kombiniraju s drugim prostornim podacima, mogu se proizvesti relevantni prostorni modeli. Oni simuliraju staništa, što je uobičajena procedura u procesu planiranja krajobraza. U tom slučaju dugotrajna i skupa procedura mapiranja staništa nije potrebna. Zbog toga, kada se mape staništa jednom naprave, one moraju biti procijenjene od biologa, te hijerarhijski kategorizirane od "najočuvanijeg ili prirodnog staništa" do "manje očuvanog ili prirodnog staništa" za trajnu uporabu. Kada se staništa jedanput kategoriziraju, ona mogu biti korištena, te se može učiniti simulacija buduće urbanizacije u krajoliku na ekološki način, očuvanjem važnih staništa. Posljednji korak je osiguravanje potrebnih koridora i staza kojima bi prolazile određene vrste, te predlaganje novih tipova gradskih parkova i područja za rekreaciju.

KLJUČNE RIJEČI

prirodni urbani krajolici, staništa, mapiranje staništa, planiranje krajolika, prostorni modeli

E-mail: davor.gazvoda@bf.uni-lj.si

Oddelek za krajinsko arhitekturo
Biotehniška fakulteta, Univerza v Ljubljani
Jamnikarjeva 101, 1000 Ljubljana, Slovenija

Primljeno: 16. studenog 1998.

NATURAL AREAS INSIDE THE CITY

In every city, some parts of urban open space can be recognized as natural urban landscapes. Often their naturalness is measured by the stage of vegetation in the natural process of the successive growth towards the climax – a forest. Forested urban areas and areas in various stages of pioneer vegetation are, therefore, considered as natural urban landscapes. They are rare in town centers, but numerous in suburban areas, where they are mixed with other types of cultural landscape. The continuous growth of cities endangers these green spaces except for the few protected areas where further urbanization is disabled. This conflict between conservation and development must be solved at the proper institutional level, at which nature conservation services must define and protect all valuable natural landscapes, yet also provide some spaces for further development. On the other hand, urban designers need to be aware of these landscapes and include them in the new urban structure. In other words: the balance between urbanization and natural landscapes must be achieved through congruent urban planning in which the ecological aspect and the preservation of natural urban landscapes must become its common component.

A conflict between natural urban landscapes and future urbanization

Main Slovenian cities are nowadays aware of the importance of green urban spaces. Town planning offices work on the so called "green system plans" which incorporate many ecological aspects of urban green areas, trying to link all spaces in a complex green system. Parts of this research are very specific analyses dealing with narrow ecological problems on the one hand while on the other hand structural plans are required in order to prescribe the forms of future urban patterns. A dichotomy between the protection of natural areas and future urbanization raises the question if natural urban landscapes can remain protected and at the same time serve as a generic factor for new urbanization. An active role of natural landscapes is investigated so that the most harmless land use is located next to natural areas, appropriate types of houses and infrastructural objects are chosen, and the directions and patterns of further urbanization are designed (Gazvoda et all. 1998). This is quite a common way to deal with an old problem, introduced by McHarg who used a layer-cake method some thirty years ago when he was working on the expansive growth of American cities (McHarg, 1972).

Nowadays, a serious planner's work still starts with the retrospection of all available spatial data. Common maps (topography, water features, vegetation, roads, settlements, etc.) are usually available. City planners, however also order specific data to be collected, i.e. an additional or more detailed land surveying, or more specific types of thematic maps. Habitat mapping is one of the most popular processes not only in Slovenia but also in other European countries. Habitat maps can be very helpful and useful for city planners, but can also be very dangerous. Especially when they become a substitute for more complex planning methods as it will be explained later on.

HABITAT MAPPING AS A PART OF LANDSCAPE PLANNING PROCESS

Landscape planning in Slovenia is still too often replaced by partial methods, addressing a single task, and oriented toward the inventarization of specific spatial features. One of the reasons for that are insufficient spatial databases. Without high quality data a planner is not able to build an appropriate spatial model. Instead of using basic spatial layers, it has became quite usual to use narrow, specific thematic maps. Not all of these maps exist, and a time consuming process of gathering certain information starts. One type of these thematic maps are also habitat maps. When they are compared to some subtracted or simplified layers of spatial data, it becomes obvious that the problem with habitat mapping is its complexity (in terms of contents). Other types of spatial data (land surveys) address more technical problems, while habitat mapping requires wide botanical and zoological knowledge. To a landscape planner, habitat maps, regardless their complexity, are just one type of thematic maps and cannot be used instead of planning zone maps. Habitat maps are one of many valuable data layers to be entered into further planning process. Habitat mapping is not a problem-oriented method, and therefore it cannot be used directly in a decision making process. For example: a mapper, usually a biologist, gathers data of various plant and/or animal species in order to define their living environment – the habitat. The definitons are based on different methods used to define predominant parameters for detecting homogenious areas – habitats. In Slovenia, the most popular method is the definition of habitat according to the predominant plant species. When the method used is not a detailed one (in 1: 5.000 to 1: 25.000 scale), these habitat maps are not much different from land cover or vegetation maps made by plant sociologists.

However, habitat maps can be valuable when they are made in a very detailed scale, when they refer to endangered plant species or, when they focus on one specific animal (usualy endangered). Even then, the maps serve as the basic information on the areas in space without indicating which habitat is more valuable, more important. It makes a perfect sense that - to a biologist - all plant or animal species are of same importance, and that all should be protected. On the other hand, a planner must decide how to direct new development in a given time and space. Although the planner tries to protect as much space as possible, some habitats are sometimes necessarly lost. In order to control the planning process, particularly final proposals at the end presented in many variations, a transparent planning process is required so that all parameters can be controlled, adjustable, and the process itself repeatable (Marušič 1998). This is the only

way for the planner to justifiy final proposals. The second prerequisite is quality spatial data needed for the construction of spatial models, such as process models, evaluation models, decision models, or vulnerabiltiy, atractiveness and feasibility models (Steinitz 1990 and 1993). Often, all of the mentioned models simulate a stage of environment based on the calculated models. Not all of the data needed can be provided. For this reason the data must be predicted, calculated and used for the creation of simulation models presenting possible or potential situations. One of these models can also be the model of "potential habitats". Why potential? Because instead of the time consuming and expensive habitat mapping, potential habitats are calculated and presented through simulation models. Later, the situation can be checked in the field and corrected on the basis of real, existing habitat situation.

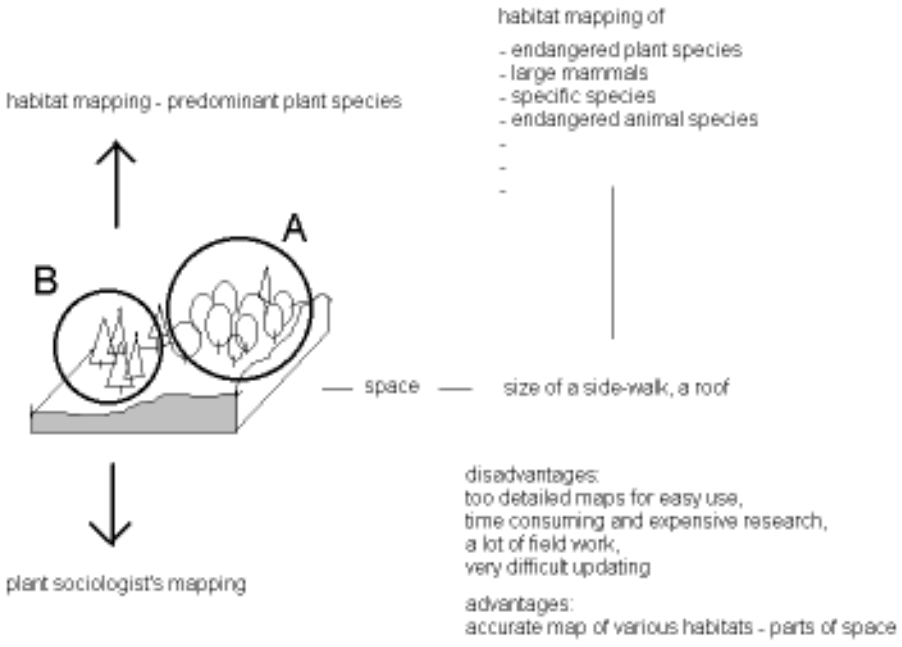

Illustration 1.
Advantages and disadvantages of habitat maps compared to vegetation maps

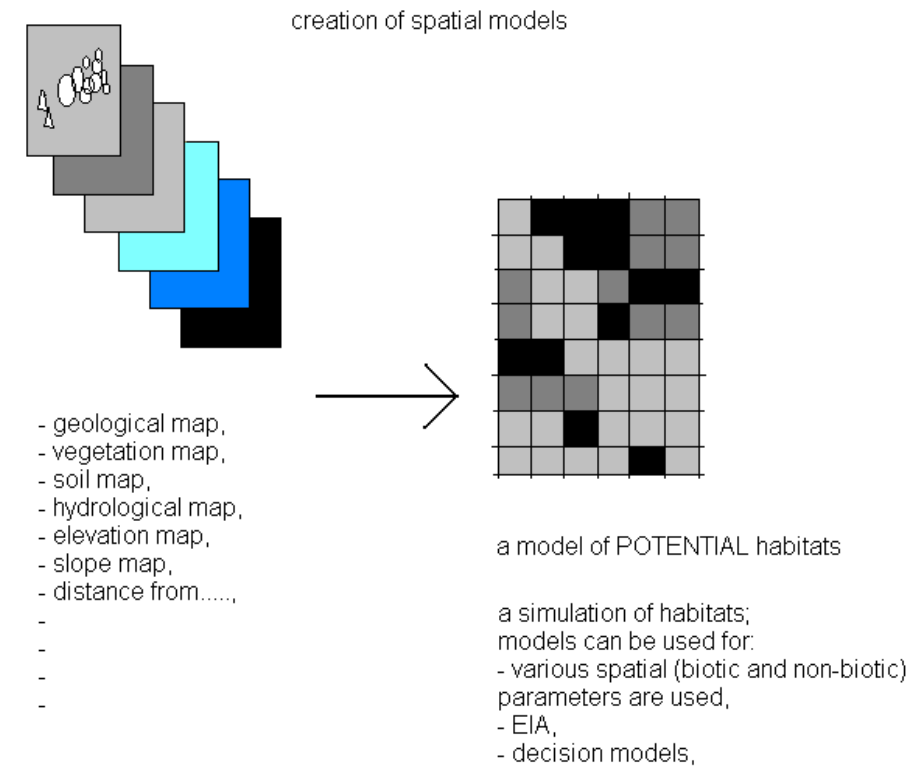

Illustration 2.
A composition of potential habitats models

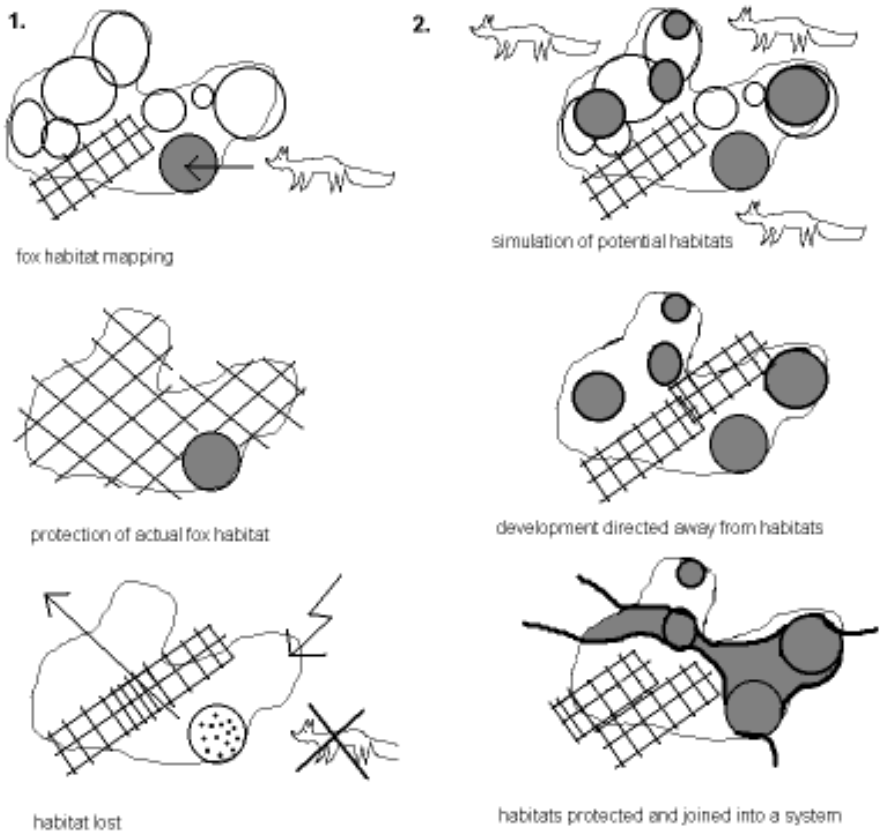

Illustration 3.
Decision making by using mapped and modeled fox habitats

This is not the occasion to go into details about the nature of landscape planning. While an educated landscape architect/planner should be able to understand the framework of this paper, other readers can find more about the topic in the mentioned readings by C. Steinitz and I. Marušič. However, the main difference between an inventory and complex modeling (of habitats) can be clearly explained by the example of fox habitat mapping, as follows.

The left part of the illustration shows habitat mapping. Spatial parameters, which define a fox habitat, are used for exact mapping. All fox habitats are found in the space, marked on the map, and protected. When new development comes to that areas, it is directed away from those habitats. When some habitats are lost (due to natural impacts, such as forest fire, flood, etc.), foxes cannot move to another location and are locally extinct.

The right part of the illustration presents potential habitats as used in the landscape planning process. It uses simulation models and data parameters which define fox habitats (such as topography, land cover, distance from infrastructural corridors and settlements). "Potential fox habitat" models are built. This means that all the areas, where foxes could live, are found (calculated). When the question of new land uses is raised, the urbanization is directed away from all potential habitats. Even more. The existing corridors and stepping stones (see Forman 1986 and Dramstadt 1996) are left in place. In the case that a certain habitat is lost, animals can move to other areas which become new habitats. When potential habitats cannot be protected a planner can focus on possible (potential) connections and various protection and development scenarios (see "security pattern analysis" by Yu, 1996) which can be further calculated from the basic spatial models (repeatable and controlled process!).

CONCLUSION

When habitat maps are made, they cannot act as a substitute for a landscape or regional plan. Habitat maps are very useful, and for this reason a large and good quality database should be built when enough money and time are available.

However, when this is not the case, partial spatial maps can be used to build simulation models and to calculate "potential habitat models" which are sufficient for large scale planning of development in a given region. A biologist or ecologist must be consulted when habitat maps are prepared and, especially, when habitats are evaluated. Only with the cooperation of all participating professions and with proper use of habitat maps this method will become a valuable part of complex regional planning.

REFERENCES

DRAMSTADT W., OLSON J., FORMAN R. (1996) Landscape Ecology Principles in Landscape Architecture and Land-Use Planning. Harvard University / Island Press / ASLA, Cambridge

FORMAN R., GODRON M. (1986) Landscape Ecology. John Wiley & Sons, New York

GAZVODA D., KRUŠNIK C., KUČAN A., MARUŠIČ I. (1998) Naravno okolje kot razvojni dejavnik Ljubljane. BTF, Ljubljana (research report)

MARUŠIČ IVAN (c1998) Krajinsko planiranje. BTF, Ljubljana (scripta)

STEINITZ CARL (1990) Framework for Theory Applicable to the Education of Landscape Architects (and Other Environmental Proffesionals). Landscape journal vol.9, no. 2: 136-143

STEINITZ CARL (1993) A Framework for Theory and Practice in Landscape Planning. GIS Europe, July: 42-45

YU KONGJIAN (1995) Security Patterns in Landscape Planning: With a Case in South China. Harvard University, Cambridge (doctoral thesis)