

THE CITY SEEN AS AN ECOSYSTEM. THEORETICAL APPROACH

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Abstract

This paper makes a incursion in the field of ecology to search for answers to the current problems facing urban management. Searching urban equilibrium can not be achieved without considering the examples that nature shows us. The city understood as a complex system is nothing else than a replica at a much smaller scale of natural ecosystems.

Key words: ecosystem, urban management, panarchy, theory

INTRODUCTION

From semantic point of view "city" seems to be impossible to define, the first attempt to clarify belongs to French Institute of Statistics which outlines a concept that statistically is identified with "urban population". During the first census towns are considered only those which has administrative functions (the county seat), the concept of "urban population" is associated with a population of 1831 inhabitants.

Thus, the definition of urban areas has never been internationally harmonized (Cailly et al., 2010). The project proposed by Alfred Sauvy at the International Congress Statistics held in St. Petersburg in 1872 were was supposed a global standardization of the significance of the city, could not be made because the UN Statistical Institute can only "recommend" not "impose" a definition for Member States (Ebrard, 2010).

Defining criteria underlying the city are varied thus difficulties arise when aiming to compare specific indicators of the urban environment. Some countries maintain multiple definitions to define the same urban space: urban system, urban agglomeration, metropolitan area, urban cluster, etc.. (Portnov, 2006).

Like many other concepts, the word "city" is used in several different ways, but similar to each other.

„The city is a complex form of human settlement, with varying sizes and urban facilities, meeting usually several functions: administrative, industrial, commercial, political and cultural "

Legally, the city is a political subdivision created by the state, which is different from other subdivisions, such as regions, districts, communes and villages. But the way in which cities are set varies from country to country and within the same country, from state to state.

URBAN SPACE-THE COMPLEXITY OF THE SYSTEM

Starting from the fact that "the city is an landscaped urban area with multiple functions in social life and numerous relationships with its outside", resulting "the need of its approach as a socio-spatial system" (Nicolae et al., 1998).

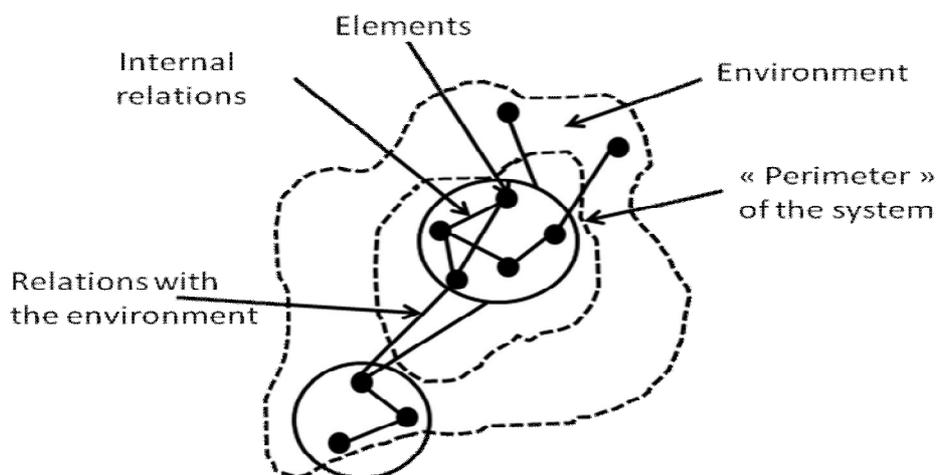


Figure 1 Urban space (system)
(Source: processing after Candea, 2001)

The city is composed by several elements which are in a inter-conditionality and interdependence relation on which is built a matrix of urban structure.(Ianoş, 1987)

Among these the most common include:

- the natural frame - soil and subsoil characteristics, climatic and hydrographic conditions and specific natural vegetation etc.;
- economic entities - unit production, storage and sales etc.;
- urban facilities - represented by stations, passenger stations, depots, water treatment stations etc.;
- green spaces - leisure and recreation areas, sports areas, parks, plantations etc.;
- technical endowment - utility networks and industrial water supply, sewerage, gas, heating system, telephone, electricity;
- the built and compositional frame - represented by residential areas, different social endowments, cultural and religious monuments etc.;
- the circulation of persons and goods via road, rail and air in the area;
- housing - existing habitable fund highlighted by zones and degrees of comfort, positioning, available sites for housing etc.;
- population - through all its characteristics: number, age structure, gender structure, socio-professional structures etc.;

- labor force - in terms of human resources, degree of capitalization, travel, distribution in the area, etc.

Between these components is established, while a range of quantitative or qualitative spatial relations (Enache, 1977).

CITIES AS ECOSYSTEMS

Cities depend on natural ecosystem processes for basic life support services, being themselves an ecosystem, with abiotic and biotic components that interact to create flows of energy and cycling of matter. Urban biotope is the result of human modeling of the natural biotope held over a long historical process, to its benefit. As in the case of natural ecosystems, urban biotope is composed by stationary elements, but also by elements induced by human society (anthropogenic factors) (Petrișor, 1997).

Examining the city as an ecosystem enables flows of energy, materials and information to be studied together along with the interactions between human and nonhuman parts of the system (Grimm et. al., 2000).

The analysis of cities through ecosystem model allows reconsidering of their development based on existing principles in natural systems, providing guidance in transforming human processes in cities, as well as in changing urban form and in restoring the capacity of urban bioregions to function sustainably.

Therefore, for a better understanding of the city as an ecosystem in the following model of Bossel is described:

a) *Bossel's System Model of Sustainability*

According to the work of Bossel sustainable ecosystems can be characterized as ecosystems that are:

- Healthy (effective) – ecosystems sustain themselves effectively and remain healthy by capturing and storing sufficient energy and matter to fulfill the needs of all the biotic participants.

- Zero waste – it is crucial not only producing energy, matter and information but also processing wastes.

- Self-regulating – feedback loops allow ecosystems to regulate themselves and maintain normal functioning, to reorganize themselves following a disturbance, and to facilitate evolutionary processes.

- Resilient and self-renewing – sustainable ecosystems maintain their structure and function under conditions of normal variability. In the face of external disturbance, the structure of the ecosystem may change and functioning may be disrupted, but the ecosystem will be able to restore functionality (Walker et al., 2002)

- Flexible – the network structure of ecosystems is decentralized, facilitating the flow of information necessary for the operation of positive

feedback and flexible responses. According to Holling's adaptive cycle theory – panarchy (Holling, 1978, 1986, 1992, 1996, 2001), connectedness can enhance stability, but overconnectedness can make system rigid and prone to disturbance. Thus, periodic disturbance may also restore flexibility.

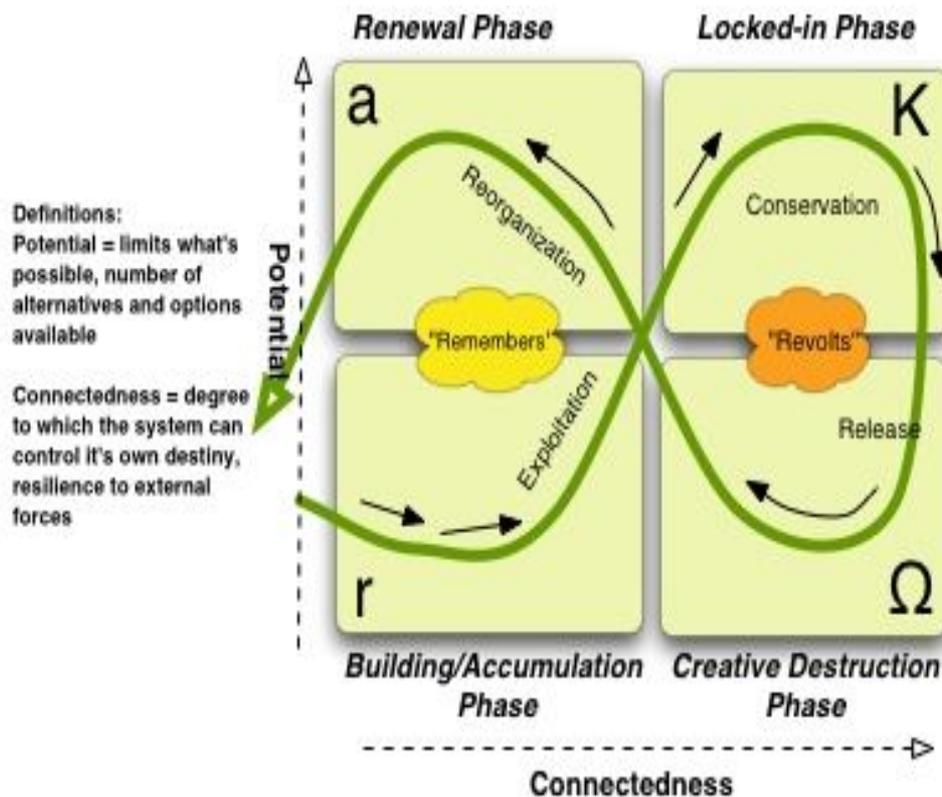


Figure 2 Resilience and Adaptive Cycles in Human and Natural Systems
 The simplified Panarchy Model
 (Source: Gorenflo, 2010 adapted from Gunderson, L. And Holling, C.S., Panarchy: Understanding Transformations in Human and Natural Systems 2002)

These five elements are found in natural ecosystems but according Newman and Jennings (2008), sustainable societies still have three main characteristics:

- **Ethics based on strong emotional connections**
- **Psychological fulfillment**
- **Cooperative coexistence**

CONCLUSIONS

Cities are constantly looking for solutions to harmonize the three elements that compose sustainable development: environment, economy and society. Many development models are tested for achieving balanced and sustainable growth. Perhaps the most successful models are those that have performed and which can be observed in natural ecosystems. Ecosystems are nearest model from which can inspire the cities development, more than that cities are part of this ecosystem, which unfortunately can be influenced by anthropogenic factors. Use of ecosystem functional model in urban management can offer solutions to the problems facing the cities.

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