

Therapeutic landscapes: Paradigms and applications

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Abstract

The word “therapeutic science” arises from the Greek: *Therapeytikè* (the art of assistance) and its use as an ecological hypothesis seems at first a little forced. But the ecosystem services that natural processes provide and “offer” to humans are not only restricted to air, water and food, they are spread on a large family of apparently small and cryptic services which assure, like emerging phenomenon, a well-being status in humans. Why cannot the landscape be considered eligible for a therapy? Dealing with therapeutic landscape means to accept that landscape is not simply a meta-ecosystem organization but a complex entity composed of material and un-material elements. This point requires new paradigms in order to incorporate into the ecological realm concepts that apparently are related to spirituality, philosophy and metaphysics. For this reason the landscape must be considered the result of cognitive processes and not simply a large area or a scenic view of the surroundings. If we embrace the hypothesis of landscape as the result of perception we have to discover the natural elements that elicit well-being status or malaise. Probably the well-being is the accomplishment of a specific function and such function requires a specific eco-field. The eco-field is defined as a carrier of meaning spatial configuration that is requested when a specific function is activated. Genetic or cultural template have to be considered as well, in order to select the appropriated eco-field. Such a process is dynamic and adaptive and changes according to sex, age and culture of the subject. The sense of place, heritage and spiritual values are some of the components that participate to the human well-being. Such elements are embedded into the cognitive landscape that in turn is the result of human choices in environmental use of resources and in the governance. Finally, landscape therapy can be used to increase the recovery after a trauma or a specific disease and can be considered either a frontier of modern medicine and a new frontier in ecological research.

Introduction

The ecosystem services provided by natural processes and “offered” to humans are not only restricted to air, water and food; they are composed of a large family of apparently small and/or cryptic services that provide, as emergent phenomena, well-being in humans.

For instance, scenery and aesthetics (Bourassa 1991)

and wild sounds (Schafer 1977, Truax 2001) are considered important components of the environment that people interacting with the landscape perceive (Gould & White 1986).

The landscape becomes the structure through which animals, plants and humans perceive their surroundings and in which they perform most of their vital functions. Relevant concepts that will be used in this paper deal with perception, cognition and biosemiotic mechanisms

that transform perception into cognitive elaboration (Allen & Bekoff 1997).

The landscape is an expression of the ecological complexity, which may be observed in the landscape's spatial patterns and functional mechanisms (see *e.g.* Green *et al.* 2006). In addition to being a material support for life, the landscape, like the ecosystem, is a dispenser of services. Moreover, the landscape can be viewed as a producer of bio- and eco-semiotic families of cognitive "objects", a property not considered by the ecosystem paradigm.

Dealing with the concept of the landscape in a therapeutic context implies considering landscape as more than an organization of meta-ecosystems (or a collection of items); the landscape is a complex cognitive entity composed of material and non-corporeal elements interacting within a network of energy, matter and information (Farina 2006).

This point requires new paradigms to incorporate into the ecological realm concepts that are currently considered in isolation as aspects of spirituality, philosophy, metaphysics and psychology.

The ecosystem services provided by natural processes contribute to the maintenance of the human well-being both directly, through the provision of material resources as food and water, and indirectly, *exempli gratia*, the sense of place, heritage and spiritual values all contribute to human well-being (Hudson-Rodd, 1998; Ingold, 2000; Wilson, 2003). Lynch (1981) maintains that our life requires a positive sensory world capable of supporting our bodies' functions.

The rise of tourism as one of the most important post-industrial habits across the world does not reflect a random societal whim; it is a necessary means by which individuals cope with the new information-based societal model (*sensu* Di Castri & Balaji 2002). Tourism offers the therapeutic benefits of a pleasant surrounding composed of both natural beauties and a well-organized, peaceful local society.

Most recreational activities that modern societies demand may be considered forms of "therapy" used to cope with the hyper-active habits needed to meet the gregarious demands for time that the contemporary lifestyle places on individuals. The word "therapeutic" (from the Greek: *therapeytikè*, the art of assistance) and its coupling with the word "landscape" in an ecological context may initially appear inappropriate. However, if we consider the reasons why metropolitan parks or wilderness areas are created, we must eventually acknowledge that, beyond the simply abstract need for beauty or to rediscover primeval feelings, the features of these natural areas provide psychological treatment for human stress.

The eco-field hypothesis and the biosemiotics

According to von Uexkull (1982, 1992), every species perceives a private universe (the *Umwelt*) in which it lives and behaves. Recently, Farina & Belgrano (2004, 2006) have applied the concept of the *Umwelt* to the spatial character of the landscape to formulate the eco-field hypothesis, which links vital functions of the organisms to their resources. An eco-field is defined as a spatial configuration that, as a carrier of meaning, an organism perceives when performing a given function. For each function, an organism requires a specific spatial configuration, which serves as an interface, to locate the necessary resources through a biosemiotic processes. When the organism attempts to perform a different function, it perceives a new eco-field. The organism's "landscape" is the entire collection of eco-fields that it perceives in order to fulfill all its functions and locate all its resources.

The eco-field hypothesis is based on the principle that vital functions are the drivers of the perceptual and cognitive processes involved in resource tracking, and that spatial configurations are the carriers of meaning in the environmental matrix. This hypothesis implies the use of biosemiotic mechanisms by organisms to reduce the energy expenditures in resource acquisition. Biosemiotics, *i.e.* the theory of sign applied to animals and humans (*e.g.* Favareau 2007), becomes a central component of this cognitive landscape approach, because cognition is a tool fundamental to the performance of functions. Ergo, the eco-field becomes the intermediary (or interface) necessary for the organism to intercept resources unevenly distributed in time and space.

This theory of semiotics is consistent with Peirce's triadic vision of the sign (*e.g.* Peirce 1931-1958, 1955, Jamsa 2007), in which an object is connected to an interpretant by a representamen. In biosemiotics, the

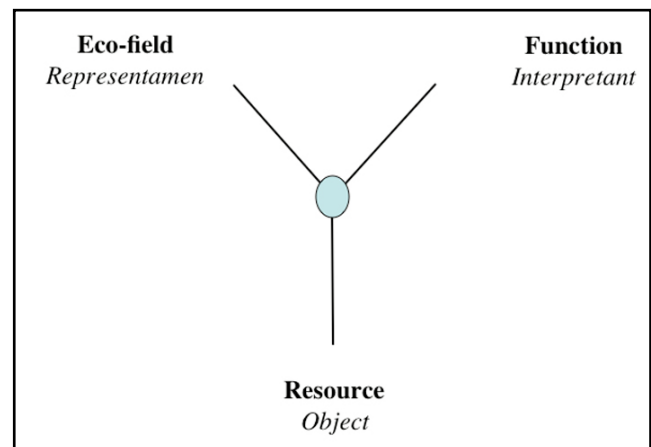


Figure 1 - The triadic vision of the sign according Peirce (1931-58): Eco-field as the Representamen or Sign, Function as the Interpretant, and Resource as the Object. Using these associations, the eco-field hypothesis can be coupled with this model.

object corresponds to the resources, the representamen to the eco-field and the interpretant to the specific function (see Fig. 1).

If the landscape, as the summation of interspecific eco-fields, is treated as a source of signals that are converted into signs by organisms (*e.g.* animal cognition and plant growth forms) then size, shape and contagion are not simply landscape attributes (or patterns) of composing patches, but are categories of identifiable signs recognized by organisms.

A new vision of the landscape

The cognitive approach to the interpretation of the landscape necessitates a more holistic conceptualization that considers the landscape to be an entity that consists of a structural matrix, a collection of organisms and a set of rules. Tenable conclusions about the landscape's components must incorporate, at a minimum, these three components.

The structural matrix is the mosaic of natural, semi-natural or anthropogenic land covers. Most ecological studies of the landscape are based on the description and the functional interpretation of such a matrix (*e.g.* Naveh & Lieberman 1984, Risser *et al.* 1984, Forman & Godron 1986, Turner 1989, Turner *et al.* 2001).

While the structural matrix appears fixed, each species or individual organism will perceive only the properties of this matrix that are pertinent to that individual's functions (or the common functions of individuals of a given species). Therefore, the structural matrix alone provides insufficient information about the ways in which organisms extract services from the landscape.

Finally, rules are the necessary complement to this vision of the landscape. Rules include the ecological requirements of each species that determine the eco-fields, and the climatic constraints or anthropogenic governing rules. Rules influence both the structure of the land matrix, and the way that it is perceived by the organisms present. This in turn affects the organisms' behavior (*e.g.* land abandonment, migration), and so the entire system (matrix, organism and rules) behaves holistically as a complex reactive and adaptive system.

For instance, when a central or local government designates a protected area, it issues new rules that cover or interact with the natural rules and social habits of the current occupants. Often, conflicts arise from the differences in priorities reflected in the rules mandated by different stakeholders. Most of the principles of sustainable development are based on rules that public and private agencies both adopt, *e.g.* to alleviate poverty or to conserve the environment (Sayer & Campbell 2004).

Resources and landscape

The activities of most organisms are related to the identification and acquisition of a spectrum of resources ranging from food and shelter, to safety, roosting or social aggregation. The landscape is the sum of function-specific eco-fields and represents the necessary interface between such resources and the organisms (Fig. 2).

This paradigm highlights the importance of perceptual characteristics of the landscape to the well-being of every organism. If the sense of place, heritage and spiritual values are considered resources that contribute to the human well-being, then the eco-semiotic view of the landscape assumes a central role in this process.

In eco-semiotic terms, we may define human well-being as the accomplishment of a variety of functions that in turn require specific eco-fields. Humans possess a genetic need to access to a wide variety of natural resources that the modern lifestyle often inhibits or limits. This produces stress reactions that contribute to a person's "ill-being". This problem, which is very common in Western human societies, is a "social illness" that demands "therapeutic" actions.

A therapeutic landscape may be found in a secluded natural environment, but often such areas are remote, are not accessible or do not fulfill enough requirements to facilitate the emergence of human well-being. Consequently, most "therapeutic landscapes" are anthropogenic and result from a combination of creativity, engineering and scientific knowledge.

Although there is a consensus about the therapeutic

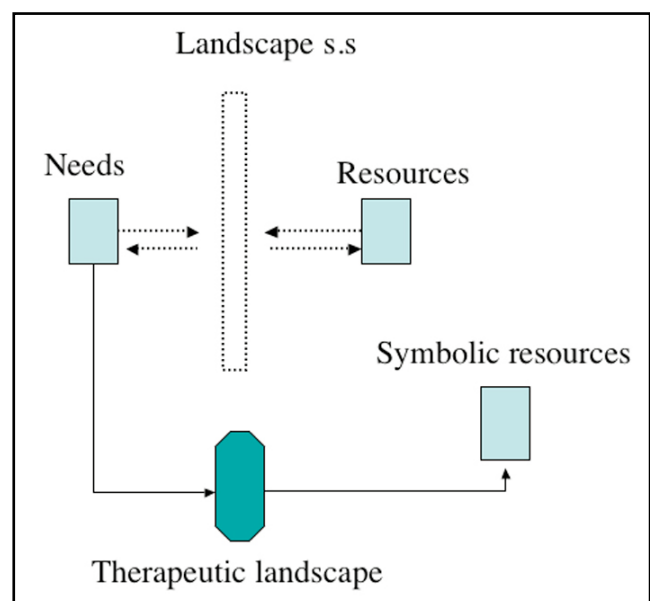


Figure 2: The landscape (sum of the all eco-fields of a given species) acts as an interface between needs and resources. In a human society that is no longer connected to a natural context, the resources to address the needs are either inaccessible or entirely absent. Therefore, the therapeutic landscape functions like a semiotic interface and connects the needs to the symbolic resources.

role of such landscapes, little attention is devoted to the basic mechanisms that drive the process (however, see e.g. Gibson 1979). The therapeutic benefit is typically considered a psychological effect and is therefore not considered in an ecological sense. The psychological perspective connected with the experience of natural environments, however is well recognized (e.g. Kaplan & Kaplan 1989, Appleton 1996, Kaltenborn 1998, Jorgensen & Stedman 2001).

Using an ecological framework, we may view this process as one of niche construction. Organisms form niches by producing environmental modification, specific to their needs, that provide evolutionary advantages (Odling-Smee et al. 2003). A therapeutic landscape can be considered as a particular case of the niche-construction process in humans, whereby a cultural inheritance overrides the genetic inheritance and therefore modifies the human evolutionary process (Odling-Smee et al. 2003, pp. 264). This hypothesis is consistent with the eco-field theory and confirms the capacity of humans to intercept material and non-corporeal resources.

When we are visiting a recreational area, like a city park or a tourist path in a protected area, we perceive several signs that represent biosemiotic symbols of fun-

damental resources no longer available to us elsewhere. We instinctively perceive the environment as being "rich in vital resources". Such perception stimulates cognitive (eco-semiotic) systems that recall ancestral feelings connected to vital survival functions, and this experience translates into a psychological benefit.

The appearance of the availability of a large spectrum of resources provides humans, in addition to other animals, with emergent benefits that contribute to individual well-being.

In conclusion, a therapeutic landscape utilizes symbols as substitutes of genuine physical and material resources that are necessary to perform vital functions, but which are no longer available in an individual's native surroundings.

Activities that damage or alter natural environments have deleterious effects on the landscape's ability to provide the necessary resources and the associated "environmental richness" signs. Therefore, humanity must invest substantially more effort into the conservation and "production" of therapeutic landscapes, both to assure social sustainability and individual and social well-being. Doing so will help to improve people's quality of the life.

References

- Allen, C. & Bekoff, M. 1997. *Species of mind. The philosophy and biology of cognitive ethology.* The MIT Press, Cambridge, Massachusetts.
- Appleton, J. 1996. *The experience of landscape.* Wiley & Sons, New York.
- Bourassa, S.C. 1991. *The aesthetics of landscape.* Belhaven Press, London & New York.
- Di Castri, F. 2002. Preface. In: Di Castri, F. & Balaji, V. eds., *Tourism, Biodiversity and Information.* Backhuys Publishers, Leiden. Pp. xiii-xxi.
- Farina, A. 2006. *Il paesaggio cognitivo. Una nuova entità ecologica.* Franco Angeli, Milano.
- Farina, A., Belgrano, A., 2004. *The eco-field: A new paradigm for landscape ecology.* *Ecological Research* 19: 107-110.
- Farina, A., Belgrano, A., 2006. *The Eco-field Hypothesis: Toward a Cognitive Landscape.* *Landscape Ecology* 21: 5-17.
- Farina, A., Bogaert, J., Schipani, I., 2005. *Cognitive landscape and information: new perspectives to investigate the ecological complexity.* *BioSystems* 79: 235-240.
- Favareu, D. 2007. *The evolutionary history of biosemiotics.* In: Barbieri, M. (ed.), *Introduction to biosemiotics.* Springer. Pp.1-67.
- Forman, R.T.T., Godron, M., 1986. *Landscape ecology.* Wiley & Sons, New York.
- Gibson, J.J., 1979. *The ecological approach to visual perception.* Houghton Mifflin, Boston.
- Gould, P. & White, R. 1986. *Mental maps.* Allen & Unwin, London.
- Green, D.G., Klomp, N., Rimmington, G., Sadedin, S. 2006. *Complexity in landscape ecology.* Springer, Dordrecht, The Netherlands.
- Hudson-Rodd, N. 1998. *Nineteenth century Canada: indigenous place of dis-ease.* *Health and Place*, 4, 55-66.
- Ingold, T. 2000. *The perception of the environment.* Routledge, London & New York.
- Jamsa, T. 2007. *Semiosis in evolution.* In: Barbieri, M. (ed.), *Introduction to biosemiotics.* Springer. Pp.69-100.
- Jorgensen, B.S., Stedman, R.C. 2001. *Sense of place as an attitude: lakeshore owners attitudes toward their properties.* *Journal of Environmental Psychology*, 21, 233- 248.
- Kaltenborn, B.P. 1998. *Effects of sense of place on responses to environmental impacts.* *Applied Geography*, 18, 169-189.
- Kaplan, R. & Kaplan, S. 1989. *The experience of nature. A Psychological perspective.* Cambridge University Press, Cambridge, UK.
- Lynch, K. 1981. *Managing the sense of a region.* The MIT Press, Cambridge, MA.
- Naveh, Z., Lieberman, A., 1984. *Landscape ecology. Theory and applications.* Springer, New York.
- Odling-Smee, F.J., Laland, K.N., Feldman, M.W. 2003.

- Niche construction. The neglected process in evolution. Princeton University Press, New Jersey.
- Peirce, C.S., 1931-1958. Collected papers of Charles Sanders Peirce. Harvard University Press, Cambridge, Mass.
- Peirce, C.S., 1955. Philosophical writings of Peirce. Edited by j. Buchler. Dover Publications, New York.
- Risser, P.G., Karr, J.R., Forman, R.T.T., 1984. Landscape ecology: Directions and approaches. Illinois Natural History Survey. Special Publication Number 2, Champaign. 18 pp.
- Sayer, J. & Campbell, B. 2004. The science of sustainable development. Cambridge University Press, Cambridge, UK.
- Schafer, R.M. 1977. The tuning of the world. McClelland and Stewart Limited, Toronto.
- Truax, B. 2001. Acoustic communication. Ablex Publishing, Westport, Connecticut.
- Turner, M.G., 1989. Landscape ecology: the effect of pattern on process. *Annu. Rev. Ecol. Syst.* 20:171,197.
- Turner M.G., Gardner, R.H., O'Neill, R.V., 2001. Landscape ecology in theory and practice. Pattern and process. Springer-Verlag, New York.
- von Uexkull, J. 1982 (1940). The theory of meaning. *Semiotica* 42(1): 25-82.
- von Uexkull, J. 1992 (1934). A stroll through the worlds of animals and men. *Semiotica* 89 (4): 319-391.
- Wilson, K. 2003. Therapeutic landscapes and First Nations peoples: an exploration of culture, health and place. *Health and Place*, 9, 83-93.